ISSN 1309-470X
e-ISSN 1309-5994

ACIBADEM ÜNİVERSİTESİ

SAĞLIK BİLİMLERİ DERGİSİ

Volume **14** / Issue **2** / April **2023**

ACIBADEM ÜNİVERSİTESİ

SAĞLIK BİLİMLERİ DERGİSİ

Volume: **14**, Issue: **2**, April **2023**

ISSN: 1309-470X
e-ISSN: 1309-5994

YAYIN TÜRÜ
Hakemli Süreli Yayın
(Dergi, yılda 4 sayı olarak Ocak, Nisan, Temmuz, Ekim aylarında yayımlanır)

YAYIN SAHİBİ
Acıbadem Mehmet Ali Aydınlar Üniversitesi Adına
Rektör, Prof. Dr. Ahmet Şahin

EDİTÖR
Prof. Dr. Enis Özyar

EDİTÖR YARDIMCISI
Dr. Öğr. Üyesi Akif Enes Arıkan

DERGİ SORUMLUSU
Ezgi Karaduman

ADRES / YÖNETİM YERİ
Acıbadem Üniversitesi Sağlık Bilimleri Dergisi Acıbadem Üniversitesi Tıp Fakültesi Kayışdağı Cad. No:32
34752 Ataşehir / İstanbul
Tel : +90 (216) 500 42 96
Faks : +90 (216) 576 50 76
e-posta : editor@acibadem.edu.tr

Acıbadem Üniversitesi Sağlık Bilimleri Dergisi
ULAKBİM TR Dizin, EBSCO ve Türkiye Atıf Dizini'nde indekslenmektedir.

Kapak resmi: Prof. Dr. Erkmen Böke (1939-2014):

İzmir'de 1939 yılında doğdu. 1962 yılında Ankara Üniversitesi Tıp Fakültesi'ni bitirdi. 1970 yılında Almanya Heidelberg Üniversitesi'nden Genel Cerrahi uzmanlığını aldı. Türkiye'ye döndükten sonra Hacettepe Üniversitesi'nde 1970 yılında Genel Cerrahi Uzmanı, 1973 yılında da Göğüs ve Kalp-Damar Cerrahisi Uzmanlığını aldı. Aynı üniversitede 1976 yılında Doçentliğe, 1982 yılında da Profesörlüğe atandı. 1982-1988 yılları arasında Hacettepe Üniversitesi Hastaneleri Başhekimliği görevinde bulundu. Almanca ve İngilizce bilen Prof. Dr. Böke, evli ve iki çocuk babasıdır.

Resim çalışmalarına 2003 yılından beri yoğun olarak devam etmiş olan Prof. Dr. Böke, ilk iki yağlıboya kişisel resim sergisini Hacettepe Üniversitesi Ahmet Göğüş Sanat Galerisi'nde 2005 ve 2007 yıllarında, üçüncü kişisel sergisini Arsuz İskender Sayek Evi'nde "Füsun'un Çiçekleri" adıyla ve dördüncü sergisini de 2011 yılında Ankara Elele Sanat Galerisi'nde açmıştır. Prof. Dr. Erkmen Böke, yedi karma sergiye katılmıştır.

ACIBADEM ÜNİVERSİTESİ

SAĞLIK BİLİMLERİ DERGİSİ

Volume: **14**, Issue: **2**, April **2023**

ISSN: *1309-470X*
e-ISSN: *1309-5994*

JOURNAL TYPE
Refereed Periodicals
(The journal is published four times a year in January, April, July and October)

JOURNAL OWNER
On behalf of Acıbadem Mehmet Ali Aydınlar University
Rector, Prof. Dr. Ahmet Şahin

EDITOR
Prof. Dr. Enis Özyar

DEPUTY EDITOR
Assist. Prof. Dr. Akif Enes Arıkan

SECRETARY
Ezgi Karaduman

ADDRESS / EDITORIAL OFFICE
Acıbadem University Health Sciences Journal Acıbadem University, School of Medicine Kayışdağı Cad. No: 32
34752 Ataşehir / İstanbul
Phone : +90 (216) 500 42 96
Fax : +90 (216) 576 50 76
e-mail : editor@acibadem.edu.tr

Acıbadem University Health Sciences Journal is indexed in ULAKBİM TR Dizin, EBSCO and Türkiye Atıf Dizini.

Cover image: Prof. Dr. Erkmen Böke (1939-2014):

He was born in Izmir in 1939. He graduated from Ankara University Faculty of Medicine in 1962. In 1970, he received his General Surgery specialty from Heidelberg University, Germany. After returning to Turkey, General Surgeon at Hacettepe University in 1970, also in 1973, took/finished the Thoracic and Cardiovascular Surgery Specialty. He was appointed Associate Professor in 1976 and Professor in 1982 at the same university. Between 1982-1988, he worked as the Chief Physician of Hacettepe University Hospitals. Speaking German and English, Prof. Dr. Böke is married and has two children.

Prof. Dr. Böke opened his first two personal oil painting exhibitions at Hacettepe University Ahmet GÖĞÜŞ Art Gallery in 2005 and 2007, the third one at the Arsuz İskender Sayek House under the name "Flowers of FÜSUN" and the fourth one at the Ankara Elele Art Gallery in 2011. Prof. Dr. Erkmen Böke participated in seven group exhibitions.

ACIBADEM ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ DERGİSİ

Volume: 14, Issue: 2, April 2023

Contents / İçindekiler

Research Articles / Araştırma Makaleleri

ACIBADEM ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ DERGİSİ

Volume: 14, Issue: 2, April 2023

Contents / İçindekiler

ACIBADEM ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ DERGİSİ

Volume: 14, Issue: 2, April 2023

Contents / İçindekiler

ACIBADEM ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ DERGİSİ

Volume: 14, Issue: 2, April 2023

Contents / *İçindekiler*

ACIBADEM ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ DERGİSİ

Volume: 14, Issue: 2, April 2023

Contents / *İçindekiler*

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 97-102
https://doi.org/10.31067/acusaglik.1221155

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI Biochemistry and Molecular Biology / Biyokimya ve Moleküler Biyoloji

β-hydroxybutyrate Does Not Influence Viability and Clonogenicity of A549 Lung Cancer Cells

Ali Burak Özkaya[1], Senanur Malcanlı[2,3], Öykü Gönül Geyik[2,3]

[1]İzmir University of Economics, Faculty of Medicine, Department of Medical Biochemistry, İzmir, Türkiye
[2]İstinye University, Faculty of Medicine, Department of Medical Biology, İstanbul, Türkiye
[3]İstinye University, Institute of Graduate Education, İstanbul, Türkiye

Ali Burak ÖZKAYA
Senanur MALCANLI
Öykü GÖNÜL GEYİK

Correspondence: Ali Burak Özkaya
İzmir University of Economics, Faculty of Medicine, Department of Medical Biochemistry, İzmir, Türkiye
Phone: -
E-mail: ali.ozkaya@ieu.edu.tr

Received: 19 December 2022
Accepted: 19 February 2023

ABSTRACT

Background/Purpose: The metabolic shift from catabolism of carbohydrates to lipids results in production of ketone bodies leading to a state called ketosis. Ketosis via ketone supplement or ketogenic diet has been proposed as a non-toxic therapeutic option for a broad range of malignancies. Although the clinical impact of ketogenic diet is well-documented, the effect of ketone bodies on cancer cell biology is not clear for some cancers including non-small-cell lung cancer (NSCLC). In this study, we aimed to demonstrate the effects of the most prominent ketone body, β-hydroxybutyrate, on a NSCLC cell line, A549.

Methods: A549 cell line was utilized as the in vitro model in this study. The effects of different β-hydroxybutyrate concentrations on cell viability were measured via sulphorodamine-B (SRB) viability assay. Long term effects of ketosis were evaluated via colony formation assay. Finally, the effect of β-hydroxybutyrate on cell migration was determined via scratch assay.

Results: Our results suggest that introduction of β-hydroxybutyrate in physiologically relevant concentrations into the cell culture media does not influence cell viability, clonogenicity or migration.

Conclusion: β-hydroxybutyrate has been previously demonstrated to induce, inhibit or does not influence the viability of different cell lines but there is no report regarding its effects on NSCLC cells. Here we report that physiologically relevant concentrations of β-hydroxybutyrate have no effect on viability, clonogenicity and migration of A549 cells.

Keywords: ketosis, beta-hydroxybutyrate, cancer, non-small-cell lung cancer

Ketoz A549 Akciğer Kanseri Hücrelerinin Canlılığını ve Klonojenitesini Etkilememektedir

ÖZET

Giriş/Amaç: Metabolizmanın karbohidrat katabolizmasından lipid katabolizmasına geçişi ketoz adı verilen bir duruma yol açan keton cisimlerinin üretimine neden olur. Keton cismi takviyesi veya ketojenik diyet yoluyla tetiklenen ketoz, çok çeşitli maligniteler için toksik olmayan bir tedavi seçeneği olarak önerilmektedir. Ketojenik diyetin klinik etkisi iyi belgelenmiş olsa da, küçük hücreli dışı akciğer kanseri de dahil olmak üzere bazı kanserler için keton cisimlerinin kanser hücresi biyolojisi üzerindeki etkisi net değildir. Bu çalışmada en önemli keton cismi olan β-hidroksibütiratın küçük hücreli dışı akciğer kanseri hücre hattı A549 üzerindeki etkilerinin gösterilmesi amaçlanmıştır.

Yöntemler: Bu çalışmada in vitro model olarak A549 hücre hattı kullanılmıştır. Farklı β-hidroksibutirat konsantrasyonlarının hücre canlılığı üzerindeki etkileri, sülforhodamin-B (SRB) canlılık testi ile ölçülmüştür. Ketozun uzun vadeli etkileri, koloni oluşum testi ile değerlendirilmiştir. Son olarak, β-hidroksibutiratın hücre göçü üzerindeki etkisi, çizik testi ile belirlenmiştir.

Bulgular: Çalışmada elde edilen veriler, fizyolojik konsantrasyonlarda β-hidroksibutiratın hücre kültürü ortamına dahil edilmesinin hücre canlılığını, klonojenisitesini veya göçünü etkilemediğini göstermektedir.

Sonuç: β-hidroksibutiratın farklı hücre hatlarında canlılığı artırdığı, azalttığı veya etkilemediği daha önceki çalışmalarla gösterilmiştir ancak küçük hücreli olmayan akciğer kanseri hücreleri üzerindeki etkilerine dair bir veri bulunmamaktadır. Bu çalışmada fizyolojik β-hidroksibutirat konsantrasyonlarının A549 hücrelerinin canlılığı, klonojenitesi ve göçü üzerinde hiçbir etkisinin olmadığı belirlenmiştir.

Anahtar kelimeler: ketoz, beta-hidroksibütirat, kanser, küçük hücreli dışı akciğer kanseri

During fasting, starvation or strenuous exercise, as a response to decreasing blood glucose levels, energy metabolism shifts from carbohydrate catabolism to lipid oxidation. Increased β-oxidation rate in liver enabled by this shift results in production of excessive amounts of acetyl-CoA which is then utilized to synthesize a group of small water-soluble metabolites called ketone bodies. Ketone bodies including acetoacetate, β-hydroxybutyrate (BHB), and acetone can be oxidized via Krebs cycle to produce energy when they are transported to extrahepatic tissues. Amongst ketone bodies BHB is the most prominent one in the blood during ketosis (1) and BHB is the most common ketone body supplement (2).

The state of ketosis which is characterized by elevated serum levels of ketone bodies occurs if the rate of ketone body production exceeds their utilization. Ketosis may be a physiological condition if the levels of ketone bodies in circulation are between 0.5 and 3.0 millimolar (mM) (2). Higher levels (≥10 mM) indicate ketoacidosis, a potentially dangerous form of metabolic acidosis, and require medical intervention (2).

Mild (physiological) ketosis, generally achieved via nutritional alterations such as ketogenic diet and ketone supplementation, has been demonstrated to offer therapeutic potential in various medical conditions including epilepsy, Alzheimer's disease, Parkinson's disease and metabolic syndrome (3). Recent preclinical and clinical studies suggest that ketogenic diet may also be a strong candidate as an adjuvant cancer therapy for a spectrum of malignancies of brain, breast, colon, lung and others (2,4). Ketogenic diet has been shown to slow tumor growth, prolong survival rate, and enhance drug response in mice with cancer (4) especially for brain malignancies including glioma (5), glioblastoma multiforme (6) and astrocytoma (7). Meta-analysis of clinical data for different cancers suggest that the ketogenic diet is safe and beneficial for cancer patients (8). On the other hand, there are many pre-clinical and clinical studies demonstrating that neither ketogenic diet nor ketone supplementation alone has any effect on viability of cancer cells and/or tumor progression for brain, pancreas, breast, liver (9–14) and other cancers (4).

Even though the data is more limited for lung cancer, the leading cause of cancer-related deaths (15), current evidence suggest that similar to many others, ketosis suppresses tumor growth (13,16) and according to the results of one clinical study from Turkey, ketogenic diet improves survival and treatment response in metastatic non-small-cell lung cancer patients (NSCLC) (17). There is currently no data regarding the effects of ketone bodies on lung cancer cells. In this study we aimed to reveal the effects of β-hydroxybutyrate, the most prominent ketone body, on A549 non-small-cell lung cancer cells.

Material and Methods

Cell Culture

Non-small-cell lung cancer cell line A549 (CCL-185, ATCC) cells were cultured in RPMI-1640 medium containing 10% fetal bovine serum (FBS), 1% (2 mM) L-glutamine (L-Gln) and 1% penicillin/streptomycin (complete medium) at 37°C in a humid incubator with 5% CO_2 pressure.

Cell Viability

β-Hydroxybutyrate (BHB) (Sigma, #166898) was dissolved in absolute Ethanol (EtOH) to obtain 50 mg/mL solution. Subsequently, different concentrations were prepared in complete medium. EtOH equivalent of the highest concentration was prepared in complete medium and was used as vehicle control.

The sulphorodamine B (SRB) test was performed to determine the effect of BHB on cell viability of A549 lung carcinoma cells (18). $5x10^3$ cells/well were seeded in 100 µL medium to the wells of 96-well plates. After overnight incubation, increasing concentrations of BHB in 100 µL medium were applied to the cells as 6 replicates (N=6) in the test wells. Final BHB concentrations were 1 µM, 1 mM and 3 mM representing physiological ketosis (2). After 48 hours of incubation following administration of the solutions, 50 µL of 50% trichloroacetic acid (TCA) solution was added to the wells and fixed at 4°C for 1 hour. TCA was then removed by sequential washes and 50 µL of the SRB solution was added to each well and incubated for 30 min at room temperature in the dark. The wells were washed to remove unbound dye and the plate was dried. The protein-bound dye was dissolved with 150 µL/well of 10 mM tris base (pH 10) on a shaker at approximately 150 rpm for 10 min. Then, spectrophotometric reading was performed at 564 nm/690 nm. After subtraction of absorbance values at 690 nm from at 564 nm, the resulting signals were compared between wells equivalent to cell viability using the GraphPad Prism V9 program and visualized as dose-response curves.

Migratory Abilities

Migratory abilities of A549 cells were determined by scratch assay. Cells were trypsinized and resuspended in complete medium. Cells were then counted and seeded in 3 replicates, 300,000 cells in 0.5 mL per well of 24 well plates. Cells were incubated in 37°C humidified CO_2 incubator overnight. The next day, scratches in the form of crosses were made using sterile 200 µL pipet tips. Wells were rinsed with PBS to remove detached cells. Subsequently sample wells were treated with 3 mM BHB. Experimental steps were performed according to previous literature (19). Images were acquired under inverted light microscope (Nikon, Eclipse TS2) and analyzed using FIJI (ImageJ) with the "Wound healing assay" macro by Kees Straatman. Images are also uploaded as a supplementary document. Calculations were performed to obtain percentage of migration against untreated cells and graphs were plotted using GraphPad Prism v9.

Clonogenicity

Assessment of clonogenicity of A549 cells was carried out by colony formation assay (CFA). Cells were trypsinized, resuspended in complete medium and counted on hemocytometer. 50 cells per well were seeded in 24 well plates in triplicate on the 1st day. Plates were incubated in 37°C humidified CO_2 incubator. 3 mM BHB was applied on the 2nd day. Media were replaced on 4th day. Cells were fixed and stained by 0.2% crystal violet (Sigma-Aldrich) solution in 2% EtOH for 10 min in dark at room temperature. Then the plates were washed with water, dried overnight and visualized by inverted light microscope (Nikon, Eclipse TS2) on the 8th day. Colonies were then counted; colony formation percentages were calculated against untreated wells and graphs were plotted using GraphPad Prism v9.

Data Analysis

All graphs were plotted using GraphPad Prism v9. All columns represent mean values of all samples and error bars represent standard deviation. In SRB data analysis, untreated cell viability was considered as 100% and all the others were calculated accordingly.

Results

Short-term BHB treatment does not influence A549 cell viability.

Cells were either left untreated, treated with vehicle control of with increasing concentrations of BHB (1 µM, 1 mM and 3 mM) for 48 hours. We tested these concentrations to mimic physiological blood concentrations (2) of BHB during pre-ketosis (1 µM) and mild ketosis (1-3 mM) states. We measured cell viability via SRB assay. According to our findings, BHB treatment failed to alter cell viability compared to untreated and vehicle controls (Figure 1A).

Long-term BHB treatment caused a slight decrease in A549 clonogenicity compared to untreated cells.

Since there was no viability inhibition after 48-hours of treatment, we decided to observe effects of BHB on longer periods of time. We carried out a colony formation assay by which we counted the number of formed colonies after the treatment for 8 days. Cells were either left untreated, treated with vehicle control or 3 mM BHB, and formed colonies were counted after the treatment period. Our findings suggest that the BHB treatment decreased the number of colonies formed only slightly compared to untreated and there was no difference compared to the vehicle control (Figure 1B).

BHB does not affect migratory abilities of A549 cells.

After short- and long-term effects were determined we moved on to investigate the effects of BHB on A549 cell migration. Cells were treated with 3 mM BHB for 3 days. Cell migration was evaluated each day via scratch assay. BHB treatment decreased cell migration compared to vehicle control on the first day, but the difference was not apparent on following days (Figure 1C).

Discussion

Ketosis achieved via ketone supplementation or ketogenic diet has been proposed as a safe adjuvant therapeutic option for cancer (20). However, its efficiency in reducing tumors and inhibiting cancer cell viability is up to debate as there are many contrasting reports including anti-tumor activity (60% of studies), ineffectiveness (17%) and pro-proliferative effects (10%) (4). The effect of ketosis on cancer progression may depend on the cancer type and it can indirectly influence tumor growth via enhancing chemo/radiotherapy response without directly influencing cancer cell viability (12,21).

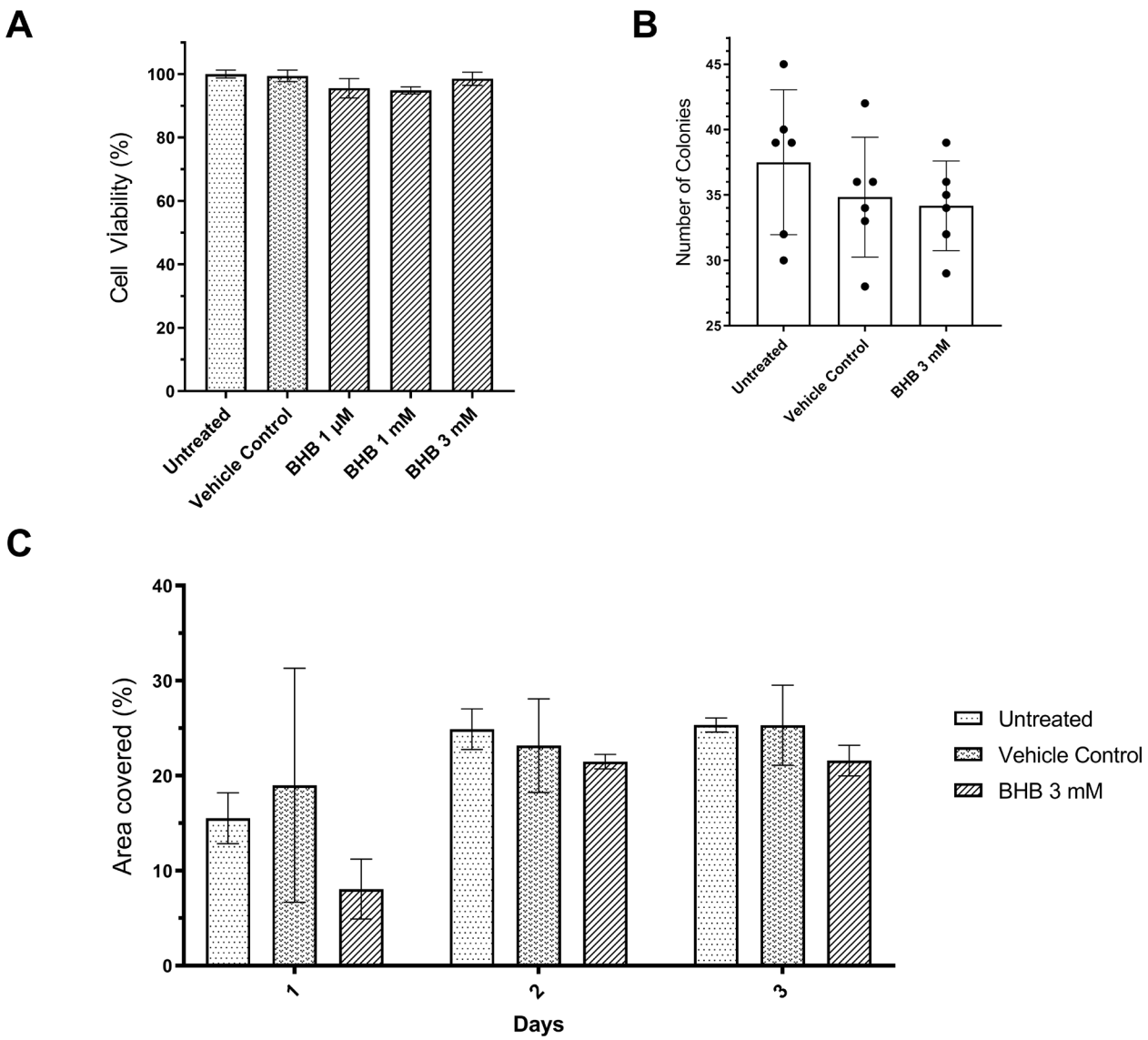

Figure 1. Effects of BHB treatment on A549 cells. A. Mean cell viability percentage of different samples according to the SRB assay. Untreated cell viability was considered as 100% and all the others were calculated accordingly. Vehicle control is ethanol (0.6%), N=6 and error bars represent standard deviation. B. Number of colonies formed according to the CFA analysis. Dots represent separate measurements (N=6) and the columns represent mean values, vehicle control is ethanol (0.6%) and error bars represent standard deviation. C. Mean area percentage covered by migrating cells according to the scratch assay. Columns represent mean of 3 separate samples (N=3), error bars represent standard deviation.

In case of NSCLC, limited data suggest that ketosis, achieved via ketogenic diet, suppresses tumor growth, enhances chemo/radiotherapy response and reduces angiogenesis in mice models (13,16). One clinical study support this by providing evidence of improved survival and enhanced treatment response in patients with metastatic NSCLC (17). However, currently there is no data regarding the direct effects of ketone bodies on cancer cells and whether the anti-cancer effects of ketosis are due altered cancer cell viability. Here we report that the physiologically relevant concentrations of BHB does not have any short- or long-term effects on viability of A549 cancer cells. Therefore, previously reported anti-tumor activity of ketogenic diet in NSCLC may be due a mechanism other than inhibition of cancer cell viability.

Another proposed anti-cancer effect of BHB was the inhibition of cancer cell migration (22,23). However, we demonstrated that BHB does not influence cancer migratory ability of A549 cells in vitro.

Since we focused on a single cell line, our results should not be generalized to NSCLC. Cell-line dependent effects of BHB may be investigated in future studies. Moreover, further studies are needed to identify the anticancer mechanism of ketogenic diet on NSCLC, focusing on previously proposed alternative mechanisms such as enhancing treatment response, altering cellular metabolism or remodelling tumor microenvironment (13,16,24–26).

Conclusion

Here we report ineffectiveness of BHB treatment on viability, clonogenicity and motility of A549 NSCLC cells. Since both clinical and in vivo data suggest an anti-cancer effect for ketogenic diet, further studies are needed to investigate the mechanism of such effect.

Declarations

Funding

Internal funds of the institutions.

Conflicts of Interest/Competing Interests

Authors declare no conflict of interest.

Ethics Approval

Not applicable (Cell culture study).

Availability of Data and Material (Data Transparency)

All data has been presented.

Authors' Contributions

All authors contributed to this work in accordance with the ICMJE authorship criteria.

References

1. Newman JC, Verdin E. β-Hydroxybutyrate. Annu Rev Nutr. 2017 Aug 21;37:51–76.
2. Veech RL. The therapeutic implications of ketone bodies: the effects of ketone bodies in pathological conditions: ketosis, ketogenic diet, redox states, insulin resistance, and mitochondrial metabolism. Prostaglandins, Leukotrienes and Essential Fatty Acids. 2004 Mar 1;70(3):309–19.
3. Stafstrom CE, Rho JM. The ketogenic diet as a treatment paradigm for diverse neurological disorders. Front Pharmacol. 2012 Apr 1;3:59.
4. Weber DD, Aminzadeh-Gohari S, Tulipan J, Catalano L, Feichtinger RG, Kofler B. Ketogenic diet in the treatment of cancer – Where do we stand? Molecular Metabolism. 2020 Mar 1;33:102–21.
5. Strowd RE, Cervenka MC, Henry BJ, Kossoff EH, Hartman AL, Blakeley JO. Glycemic modulation in neuro-oncology: experience and future directions using a modified Atkins diet for high-grade brain tumors. Neurooncol Pract. 2015 Sep;2(3):127–36.
6. Champ CE, Palmer JD, Volek JS, Werner-Wasik M, Andrews DW, Evans JJ, et al. Targeting metabolism with a ketogenic diet during the treatment of glioblastoma multiforme. J Neurooncol. 2014 Mar;117(1):125–31.
7. Seyfried TN, Marsh J, Shelton LM, Huysentruyt LC, Mukherjee P. Is the restricted ketogenic diet a viable alternative to the standard of care for managing malignant brain cancer? Epilepsy Research. 2012 Jul 1;100(3):310–26.
8. Zhao H, Jin H, Xian J, Zhang Z, Shi J, Bai X. Effect of Ketogenic Diets on Body Composition and Metabolic Parameters of Cancer Patients: A Systematic Review and Meta-Analysis. Nutrients. 2022 Oct 8;14(19):4192.
9. Maurer GD, Brucker DP, Bähr O, Harter PN, Hattingen E, Walenta S, et al. Differential utilization of ketone bodies by neurons and glioma cell lines: a rationale for ketogenic diet as experimental glioma therapy. BMC Cancer. 2011 Jul 26;11:315.
10. Rieger J, Bähr O, Maurer GD, Hattingen E, Franz K, Brucker D, et al. ERGO: a pilot study of ketogenic diet in recurrent glioblastoma. Int J Oncol. 2014 Jun;44(6):1843–52.
11. Seyfried TN, Sanderson TM, El-Abbadi MM, McGowan R, Mukherjee P. Role of glucose and ketone bodies in the metabolic control of experimental brain cancer. Br J Cancer. 2003 Oct 6;89(7):1375–82.
12. Zahra A, Fath MA, Opat E, Mapuskar KA, Bhatia SK, Ma DC, et al. Consuming a Ketogenic Diet while Receiving Radiation and Chemotherapy for Locally Advanced Lung Cancer and Pancreatic Cancer: The University of Iowa Experience of Two Phase 1 Clinical Trials. Radiation Research. 2017 Apr 24;187(6):743–54.
13. Allen BG, Bhatia SK, Buatti JM, Brandt KE, Lindholm KE, Button AM, et al. Ketogenic diets enhance oxidative stress and radio-chemotherapy responses in lung cancer xenografts. Clin Cancer Res. 2013 Jul 15;19(14):3905–13.
14. Byrne FL, Hargett SR, Lahiri S, Roy RJ, Berr SS, Caldwell SH, et al. Serial MRI Imaging Reveals Minimal Impact of Ketogenic Diet on Established Liver Tumor Growth. Cancers (Basel). 2018 Sep 5;10(9):312.
15. Siegel RL, Miller KD, Fuchs HE, Jemal A. Cancer statistics, 2022. CA A Cancer J Clinicians. 2022 Jan;72(1):7–33.
16. Lin BQ, Zeng ZY, Yang SS, Zhuang CW. Dietary restriction suppresses tumor growth, reduces angiogenesis, and improves tumor microenvironment in human non-small-cell lung cancer xenografts. Lung Cancer. 2013 Feb;79(2):111–7.
17. Iyikesici MS. Feasibility study of metabolically supported chemotherapy with weekly carboplatin/paclitaxel combined with ketogenic diet, hyperthermia and hyperbaric oxygen therapy in metastatic non-small cell lung cancer. Int J Hyperthermia. 2019 Apr 1;36(1):446–55.
18. Vichai V, Kirtikara K. Sulforhodamine B colorimetric assay for cytotoxicity screening. Nat Protoc. 2006 Aug;1(3):1112–6.
19. Liang CC, Park AY, Guan JL. In vitro scratch assay: a convenient and inexpensive method for analysis of cell migration in vitro. Nat Protoc. 2007 Feb 1;2(2):329–33.
20. Woolf EC, Syed N, Scheck AC. Tumor Metabolism, the Ketogenic Diet and β-Hydroxybutyrate: Novel Approaches to Adjuvant Brain Tumor Therapy. Front Mol Neurosci. 2016 Nov 16;9:122.
21. Mikami D, Kobayashi M, Uwada J, Yazawa T, Kamiyama K, Nishimori K, et al. β-Hydroxybutyrate enhances the cytotoxic effect of cisplatin via the inhibition of HDAC/survivin axis in human hepatocellular carcinoma cells. Journal of Pharmacological Sciences. 2020 Jan 1;142(1):1–8.
22. Shukla SK, Chaika NV, Singh PK. Abstract 3557: Beta-hydroxybutyrate inhibits oncogenic signaling and cellular motility in pancreatic cancer cells. Cancer Research. 2018 Jul 1;78(13_Supplement):3557.
23. Shang S, Wang L, Zhang Y, Lu H, Lu X. The Beta-Hydroxybutyrate Suppresses the Migration of Glioma Cells by Inhibition of NLRP3 Inflammasome. Cell Mol Neurobiol. 2018 Nov 1;38(8):1479–89.
24. Yao A, Li Z, Lyu J, Yu L, Wei S, Xue L, et al. On the nutritional and therapeutic effects of ketone body d-β-hydroxybutyrate. Appl Microbiol Biotechnol. 2021;105(16–17):6229–43.

25. Bartmann C, Janaki Raman SR, Flöter J, Schulze A, Bahlke K, Willingstorfer J, et al. Beta-hydroxybutyrate (3-OHB) can influence the energetic phenotype of breast cancer cells, but does not impact their proliferation and the response to chemotherapy or radiation. Cancer & Metabolism. 2018 Jun 11;6(1):8.

26. De Feyter HM, Behar KL, Rao JU, Madden-Hennessey K, Ip KL, Hyder F, et al. A ketogenic diet increases transport and oxidation of ketone bodies in RG2 and 9L gliomas without affecting tumor growth. Neuro-Oncology. 2016 Aug 1;18(8):1079–87. ,

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 103-107
https://doi.org/10.31067/acusaglik.1197182

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI Biochemistry and Molecular Biology / Biyokimya ve Moleküler Biyoloji

Antiproliferative Effect of Thymoquinone on Human Colon Cancer Cells: Is It Dependent on Glycolytic Pathway?

Mete Özkoç[1], Ergül Mutlu Altundağ[2]

[1]Department of Medical Biochemistry, Faculty of Medicine, Girne American University, North Cyprus via Mersin, Turkey

[2]Department of Medical Biochemistry, Faculty of Medicine, Eastern Mediterranean University, North Cyprus via Mersin, Turkey

ABSTRACT

Purpose: In the present study, we aimed to investigate the anti-proliferative effect and metabolic activity of thymoquinone (TQ) on colon cancer cells (HCT-116).

Material and Methods: Cell viability was determined by MTT analysis. Cells were treated with different concentrations of TQ (40, 60, 80, 100, 150, and 200 µM) on HCT-116 cells and half-maximal inhibitory concentration (IC50) values were calculated by using the CompuSyn software program. In addition, glucose and lactate concentrations were measured from cell culture supernatants for RPMI medium, control and TQ (IC50 dose) groups. Statistical analyses were performed using GraphPad Prism 7.

Results: Thymoquinone was found to be antiproliferative particularly in 40-200 µM concentrations. The IC50 concentration of TQ was calculated as 68 µM. Glucose levels of supernatants were 478, 384±8.5 and 412±19.7 mg/dL in RPMI medium, control and TQ group, respectively. Lactate levels were found as 20±3.5 µM in the control group and 8±1.1 µM in TQ group.

Conclusion: The present study showed that TQ has an antiproliferative effect on HCT-116 in addition to its inhibitory effect on a glycolytic pathway.

Keywords: Colon cancer, Antiproliferative effect, Thymoquinone, Glycolytic Pathway

Mete ÖZKOÇ
Ergül MUTLU ALTUNDAĞ

Timokinonun insan kolon kanseri hücreleri üzerindeki antiproliferatif etkisi: Glikolitik yola mı bağlı?

ÖZET

Amaç: Bu çalışmada, timokinonun (TQ) kolon kanseri hücreleri (HCT-116) üzerindeki antiproliferatif ve glikolitik yolak üzerindeki etkilerini araştırmayı amaçladık.

Gereç ve Yöntemler: Hücre canlılığı MTT analizi ile belirlendi. HCT-116 hücrelerine farklı konsantrasyonlarda (40, 60, 80, 100, 150 ve 200 uM) TQ uygulandı ve CompuSyn yazılım programı kullanılarak yarı maksimum inhibitör konsantrasyon (IC50) değeri hesaplandı. Ek olarak, RPMI medyum, kontrol ve TQ (IC50 dozu) grupları için hücre kültürü süpernatanlarından glukoz ve laktat konsantrasyonları ölçüldü. İstatistiksel analizler için GraphPad Prism 7 kullanıldı.

Bulgular: Timokinonun özellikle 40-200 µM konsantrasyonlarda antiproliferatif olduğu bulundu. TQ'nun IC50 konsantrasyonu 68 µM olarak hesaplandı. Süpernatantların glikoz seviyeleri RPMI medyumu, kontrol ve TQ grubunda sırasıyla 478, 384±8.5 ve 412±19.7 mg/dL olarak bulundu. Laktat düzeyleri ise kontrol grubunda 20±3.5 µM ve TQ grubuna 8±1.1 µM olarak bulundu..

Sonuç: Bu çalışma, TQ'nun glikolitik yol üzerindeki inhibitör etkisine ek olarak HCT-116 hücreleri üzerinde antiproliferatif etkiye sahip olduğunu göstermiştir.

Anahtar kelimeler: Kolon kanseri, Antiproliferatif etki, Timokinon, Glikolitik Yolak

Correspondence: Ergül Mutlu Altındağ
Department of Medical Biochemistry, Faculty of Medicine, Eastern Mediterranean University, North Cyprus via Mersin, Turkey
Phone: +905488714458
E-mail: ergul.altundag@emu.edu.tr

Received: 02 November 2022
Accepted: 19 February 2023

One of the most commonly diagnosed cancer types is colorectal cancer (CRC) and the deaths depending on CRC is increasing day by day (1). There has been a significant increase in the diagnosis of CRC in the West and other high-income countries over the past decade (1, 2). Increasing morbidity and mortality related to CRC led to developing new targeted treatment strategies. At this point cell culture systems, especially the cancer cell lines, have provided important research opportunities to illuminate the molecular basis of cancers. HCT-116 is one of the cell lines among the identified 70 colorectal cell lines (3).

The development of CRC may be due to bacterial causes (2) as well as genetic reasons such as chromosomal instability, DNA-repair defects, abnormal DNA methylation, mutational inactivation of tumour suppressor genes, activation of oncogene pathways, etc. (4). Surgical operations, radiotherapies and systemic therapies are used in colorectal treatments. Systemic therapies include the administration of fluoropyrimidines, alone or in combination with oxaliplatin (5). However, the effects of cytotoxicity, drug resistance or adverse reactions are the main encountered problems in systemic therapies. Less toxic and well-tolerated "natural products" are used in order to have better treatment outcomes and improve the life quality of the CRC patients. Alkaloids, polysaccharides, polyphenols, terpenoids and unsaturated fatty acids are among those natural compounds (6). Thymoquinone (TQ), as a phytochemical, is found dominantly in Nigella sativa (black seed), possesses anti-oxidant, anti-inflammatory, anti-hepatotoxic and nephrotoxic, antidiabetic, antimicrobial and antiproliferative activities (7). Studies have shown that TQ inhibits the division of the cancer cells at different stages of cell cycle and leads to apoptosis in cancer cell lines by activating the proapoptotic factors and suppressing the anti-apoptotic factors (8).

In normal cells, one molecule of glucose is converted to two molecules of pyruvic acid by glycolysis and in the presence of oxygen, lactate molecules are diverted to the citric acid cycle for further catabolic reactions. Electrons flow through the electron transport chain and in final step ATP is produced by ATP synthase. The process is called cellular respiration. However, cancer cells switch from cellular respiration to inadequate glycolytic pathways, although the ATP demand is extremely high in cancer cells (9). So, carbohydrate consumption and metabolism are changed in cancer cells.

In this in vitro study we will focus on the changes in glucose and lactate concentrations and the antiproliferative effect of TQ on HCT-116 cell line.

MATERIAL AND METHOD

Materials

The colorectal cancer cell line (HCT-116) was purchased from the American Type Culture Collection (ATCC, Manassas, VA). RPMI medium, dimethyl sulfoxide (DMSO) and Thymoquinone were obtained from Merck. Glucose measurement kit (ref: 61 269) was obtained from bioMérieux (France), lactate kit (ref:1001330) was obtained from SPINREACT (Spain).

Cell Culture

HCT-116 cells were grown in RPMI medium containing 10% fetal bovine serum (FBS), 1% Penicillin/Streptomycin and 1% L-glutamine in an incubator adjusted at 37°C and 5% CO2. HCT-116 cells were seeded into each well so as to be $1x10^4$ and incubated for 24h. Following day, TQ was added from stock solution (DMSO concentration is less than 0.1% in stock solution) into the wells in different volumes in order to adjust the concentrations to 40, 60, 80, 100, 150 and 200 µM and left to incubation for 24h.

Cell Viability

MTT (3-[4,5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide) test was applied for cell viability. Briefly, after 24h incubation period with TQ, 10 µL MTT were added into the wells and incubated for 3 hours. Mixtures were removed from the wells and 100 µL DMSO added in order to dissolve formazan crystals occurred in the well. Purple coloured formazan crystals dissolved in DMSO were measured with a Varioskan Flash microplate reader (Skanit Software 2.4.5, Thermo Scientific) at a wavelength of 540 nm. The absorbance values were used to calculate the % cell viability. IC_{50} value of TQ were calculated by CompuSyn software by using the fractional (Fa) values.

Analysis of Glucose and Lactate Concentrations

Glucose and lactate concentrations were analysed in order to reveal the changes on glycolytic pathway in control group and TQ-treated (only for IC_{50} value of TQ) group. Briefly, HCT-116 were seeded into the cells and incubated for a night. Briefly, HCT-116 were seeded into the 6-wells microplate and incubated for a night. Following day, only RPMI medium were added into empty (without cells) wells and into control group and TQ were added into TQ-treated group wells and left for incubation throughout 24 hours. Samples were pipetted from wells into tubes after incubation and reagents were added as indicated in the manufacturer's assay kit procedure and measured by spectrophotometer. Glucose concentrations were expressed as mg/dL and lactate concentrations as µM.

Statistical Analysis

The statistical analyses were carried out by GraphPad Prism 7. Since our data was normally distributed, to compare more than two independent samples with one another, one-way ANOVA test was applied. The results were given as mean (± standard deviation).

RESULTS

The Antiproliferative Effect of Thymoquinone on HCT-116 Cells and IC50 Value

There is gradually reduction in the % cell viability in TQ-treated groups compared to control group. According to the statistical analysis, the reduction of cell viability was non-significant when 40 µM concentration of TQ was compared with the control group. However, the range of concentrations of TQ from 60 to 200 µM showed significant decrease when compared to the control group *(p<0.001)* (Fig 1a). The IC50 value of TQ on HCT-116 cells was calculated as 68 µM over the Fa values by using the CompuSyn Software program (Fig 1b).

Glucose Concentrations

Glucose concentrations decreased in both control *(p<0.001)* and TQ *(p<0.05)* groups compared to RPMI medium group but according to the statistical analysis the drop was found extremely significant particularly in control group. Although, the lower levels were observed in TQ group compared the control group, the difference between them was found as non-significant (Table 1).

Lactate Concentrations

Lactate was not detected in RPMI Medium group. Lactate levels were significantly higher in TQ and control groups compared to RPMI Medium group, *p<0.01*. On the other hand, lactate levels were found to be significantly lower in TQ group when compared with control group *(p<0.05)* (Table 1).

Tablo 1. Glucose and lactate concentrations in RPMI medium, control and TQ groups

	RPMI Medium	Control	TQ (68 µM)
Glucose Concentration (mg/dL) (mean±sd)	478	384±8.5 ^{a***}	412±19.7 ^{a*}
Lactate Concentration (µM) (mean±sd)	0	20±3.5 ^{a**}	8±1.1^{a**,b*}

*^{a} Significant differences compared to RPMI Medium group; ^{b} Significant differences compared to Control group. * p<0.05; ** p<0.01; *** p<0.001.*

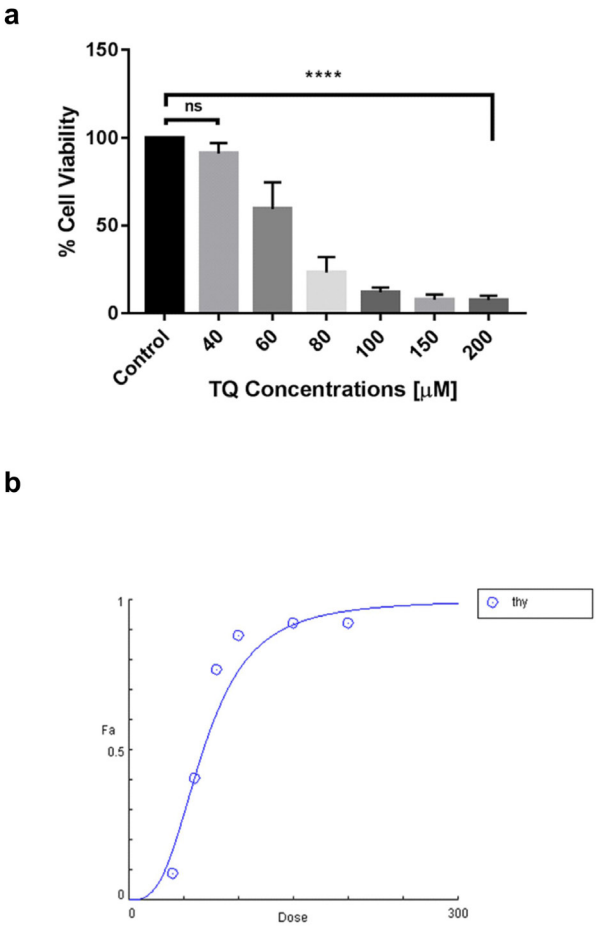

*Figure 1. Antiproliferative effect of thymoquinone on HCT-116 cells. a, shows cell viability against different doses of TQ on HCT-116 cells. b, shows IC_{50} value of TQ on HCT-116 cells. ns, non-significant; ****, significant differences, p<0.001*

DISCUSSION

The third most common cancer-related deaths are colorectal cancer in US. Approximately only 1 in 5 patients who are diagnosed with CRC can live more than 5 years (10). High mortality of CRC (3) has forced researchers to find effective and exact treatments.

Nowadays, natural products derived from plants, animals or microorganisms play an important role in cancer treatment (11) in addition to conventional treatment. TQ, a well-known antioxidant molecule, is one of the natural products found in black seed and it inhibits tumour growth and protects the cells against cancer development (12). Studies have shown that thymoquinone is effectively protective in different types of cancer and even in different stages of cancer (proliferation, metastasis and invasion) (13).

In a study, it has been reported that TQ reduces the cell viability through increase the apoptotic pathways in a time- and dose-dependent manner in HCT-116 cells. It was demonstrated that 25 µM TQ killed approximately half of the living cells following to 24h incubation period (14). Gali-Muhtasib *et al.* (2004) demonstrated that IC50 value of TQ in HCT-116 cells is 35 µM in 24h incubation. Researchers attribute the antiproliferative effect of TQ to p53-dependent apoptosis (15). In our study, we found that TQ has antiproliferative effect on HCT-116 cells in different doses. The calculated IC50 value of TQ (68 µM) is showed similarity with the study that carried out by El-Far et al (2021)(16).

Glycolysis is unique pathway for catabolism of glucose in many types of cells. The catabolic pathway (glycolysis) starts with one molecule glucose and ends with two molecules pyruvic acid. The energy released is conserved as ATP and reducing agent NADH. In presence of oxygen, in another words in aerobic respiration, two molecule pyruvic acid are diverted to citric acid cycle for the further catabolic reactions and the ATP is produced at the end of the electron transport chain by the ATP synthase. In absence of oxygen, pyruvic acid is converted to lactic acid by lactate dehydrogenase and the NAD^+ concentrations are kept stable in the cytosol (9). Of course, as expected, all these processes occur in normal cells. However, in cancer cells, the process switch from aerobic respiration to glycolysis although produced energy is lower at the end of the glycolysis. As the cancer cells grow rapidly, oxygen starts to be insufficient for the metabolism. Due to this, energy is predominantly provided by glycolysis in cancer cells. Adaptation to this hypoxic condition is achieved by hypoxia-inducible transcription factor (HIF). This factor increases the synthesis of glycolytic enzymes and glucose transporters (17). Lee *et al.* (2019) demonstrated that TQ has potential inhibitory effect on HIF-1α on renal cancer cell lines (Caki-1, Caki-2, A498). In addition, researchers showed that glucose levels increased while lactate levels decreased in TQ-treated group (18). In another study, similar results were expressed by Karim et al. (2022) in colorectal cancer cell lines (19). In the present study, lower glucose concentration is result of high consumption in control group. On the other hand, we can understand from the findings that lactate production is decreased in TQ group compared to control group. These changes in carbohydrate metabolism led us to reach in two results. First, as indicated in the studies, TQ increases cancer cell death by activating apoptosis. Thus, the reduction in lactate production and glucose consumption may be result of the antiproliferative effect of TQ. Briefly can be mentioned that the less amount of cancer cells the less production of lactate. Second, TQ may have inhibited the HIF and led to cancer cell death by decreasing the glucose catabolism because glycolysis is the main metabolic pathway to meet the energy demand of cancer cells.

CONCLUSION

In conclusion, we found that 68 µM TQ has antiproliferative effect and glucose metabolism is adversely affected in HCT-116 cells. In order to be more successful in cancer treatments, various of molecular mechanisms must be illuminated related to cancer forming and its treatment models by different studies. For further studies, we are thinking that it would be helpful to investigate some biomarkers in apoptotic pathways and focus on HIF.

DECLARATION

Funding
No funding.

Conflicts of Interest/Competing Interests
Authors has no conflict of interest to disclose.

Ethical Committee Approval
Ethical approval does not require for our study.

Availability of Data and Material
Available if it is requested.

Authors' Contributions
EMA designed the study, carried out the experiments and analysed the results. MÖ carried out the experiments, analyzed the results and wrote the paper.

ACKNOWLEDGEMENT
This study was conducted as a part of Eastern Mediterranean University of Dr. Fazıl Küçük Medical Faculty 3rd Class ICS projects. Thanks to Mokhinur TINCHLIKOVA, Metin SUNAL, Hatice SARI, Ulya Nur ÇİÇEK, Alp Arslan DOĞAN, Gülben DEMİR, 3rd-grade students of Medical Faculty for their contribution to the project.

REFERENCES

1. Sinicrope FA. Increasing Incidence of Early-Onset Colorectal Cancer. New England Journal of Medicine. 2022;386:1547–1558. DOI:10.1056/nejmra2200869
2. Mármol I, Sánchez-de-Diego C, Dieste AP, et al. Colorectal carcinoma: A general overview and future perspectives in colorectal cancer. Vol. 18, International Journal of Molecular Sciences. MDPI AG; 2017. DOI:10.3390/ijms18010197

3. Mouradov D, Sloggett C, Jorissen RN, et al. Colorectal cancer cell lines are representative models of the main molecular subtypes of primary cancer. Cancer Res. 2014;74:3238–3247. DOI:10.1158/0008-5472.CAN-14-0013
4. Markowitz SD and Bertagnolli MM. Molecular Basis of Colorectal Cancer. New England Journal of Medicine. 2009;361. DOI:10.1056/nejmra0804588
5. García-Alfonso P, Muñoz Martín AJ, Ortega Morán L, et al. Oral drugs in the treatment of metastatic colorectal cancer. Vol. 13, Therapeutic Advances in Medical Oncology. 2021. DOI:10.1177/17588359211009001
6. Huang X mei, Yang Z jie, Xie Q, et al. Natural products for treating colorectal cancer: A mechanistic review. Vol. 117, Biomedicine and Pharmacotherapy. 2019. DOI:10.1016/j.biopha.2019.109142
7. Ali BH and Blunden G. Pharmacological and toxicological properties of Nigella sativa. Vol. 17, Phytotherapy Research. 2003. DOI:10.1002/ptr.1309
8. Darakhshan S, Bidmeshki Pour A, Hosseinzadeh Colagar A, et al. Thymoquinone and its therapeutic potentials. Vols 95–96, Pharmacological Research. 2015. DOI:10.1016/j.phrs.2015.03.011
9. Fadaka A, Ajiboye B, Ojo O, et al. Biology of glucose metabolization in cancer cells. Journal of Oncological Sciences. 2017;3:45–51. DOI:10.1016/j.jons.2017.06.002
10. Biller LH and Schrag D. Diagnosis and treatment of metastatic colorectal cancer: A review. Vol. 325, JAMA - Journal of the American Medical Association. 2021. DOI:10.1001/jama.2021.0106
11. Nobili S, Lippi D, Witort E, et al. Natural compounds for cancer treatment and prevention. Pharmacol Res. 2009;59:365–378. DOI:10.1016/j.phrs.2009.01.017
12. Jafri SH, Glass J, Shi R, et al. Thymoquinone and cisplatin as a therapeutic combination in lung cancer: In vitro and in vivo. Journal of Experimental and Clinical Cancer Research. 2010;29:1–11. DOI:10.1186/1756-9966-29-87
13. Imran M, Rauf A, Khan IA, et al. Thymoquinone: A novel strategy to combat cancer: A review. Biomedicine and Pharmacotherapy. 2018;106:390–402. DOI:10.1016/j.biopha.2018.06.159
14. Kundu J, Choi BY, Jeong CH, et al. Thymoquinone induces apoptosis in human colon cancer HCT-116 cells through inactivation of STAT3 by blocking JAK2- and Src-mediated phosphorylation of EGF receptor tyrosine kinase. Oncol Rep. 2014;32. DOI:10.3892/or.2014.3223
15. Gali-Muhtasib H, Diab-Assaf M, Boltze C, et al. Thymoquinone extracted from black seed triggers apoptotic cell death in human colorectal cancer cells via a p53-dependent mechanism. Int J Oncol. 2004;25.
16. El-Far AH, Godugu K, Noreldin AE, et al. Thymoquinone and Costunolide Induce Apoptosis of Both Proliferative and Doxorubicin-Induced-Senescent Colon and Breast Cancer Cells. Integr Cancer Ther. 2021;20. DOI:10.1177/15347354211035450
17. Akram M. Mini-review on glycolysis and cancer. Vol. 28, Journal of Cancer Education. 2013. DOI:10.1007/s13187-013-0486-9
18. Lee YM, Kim GH, Park EJ, et al. Thymoquinone selectively kills hypoxic renal cancer cells by suppressing HIF-1α-mediated glycolysis. Int J Mol Sci. 2019;20. DOI:10.3390/ijms20051092
19. Karim S, Burzangi AS, Ahmad A, et al. PI3K-AKT Pathway Modulation by Thymoquinone Limits Tumor Growth and Glycolytic Metabolism in Colorectal Cancer. Int J Mol Sci. 2022;23. DOI:10.3390/ijms23042305

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 108-118
https://doi.org/10.31067/acusaglik.1225228

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Cell Biology / Hücre Biyolojisi

Mammosphere Formation Assay Optimization in the Characterization of Cancer Stem Cells of the Primary Breast Tumor

Gizem Uslu[1], Zehra Seda Halbutoğulları[2,3], Gülçin Gacar[2], Nihat Zafer Utkan[4], Yusufhan Yazır[2,5]

[1]Department of Biochemistry and Molecular Biology, Institute of Health Sciences, Acibadem Mehmet Ali Aydinlar University, İstanbul, Turkey

[2]Center for Stem Cell and Gene Therapies Research and Practice/ Department of Stem Cell, Institute of Health Sciences, Kocaeli University, Kocaeli, Turkey

[3]Department of Medical Biology, Faculty of Medicine, Kocaeli University, Kocaeli, Turkey

[4]Department of General Surgery, Faculty of Medicine, Kocaeli University, Kocaeli, Turkey

[5]Department of Histology and Embryology, Faculty of Medicine, Kocaeli University, Kocaeli, Turkey

Gizem USLU
Zehra Seda HALBUTOĞULLARI
Gülçin GACAR
Nihat Zafer UTKAN
Yusufhan YAZIR

Correspondence: Zehra Seda Halbutoğulları Kocaeli Üniversitesi, KOÜ Kök Hücre ve Gen Tedavileri Araştırma ve Uygulama Merkezi (KÖGEM)/ Kök Hücre Anabilim Dalı, Tıbbi Biyoloji Anabilim Dalı, Kocaeli, Türkiye
Phone: +902623034940
E-mail: zehraseda@gmail.com

Received: 31 December 2022
Accepted: 19 February 2023

ABSTRACT

Introduction&Objective: Breast cancer is the most frequently diagnosed cancer and the leading cause of death from cancer among females worldwide. Breast cancer tumors that feature breast cancer stem cells (BCSCs) are known to cause drug resistance and metastasis. Culturing BCSCs from primary tumors as mammospheres is both difficult and costly. This study aims to present an optimized mammosphere formation assay protocol and improve the breast cancer stem cell characterization process by determining the appropriate mammosphere forming method and proper cell density of cancer stem cells isolated from breast tumors.

Material&Method: Cancer stem cells were isolated from breast tumors of two patients with invasive ductal carcinoma (IDC) and culturated. Subsequently, performed specific BCSCs surface markers and ALDH analysis by flow cytometry. Two mammosphere forming methods, i.e., low attachment and agar-coated wells seeded in three different cell concentrations, were compared.

Results: $CD44^+$, $CD24^-$ and $CD133^+$ antibody expressions showed that these cells could be tumor-initiating CSCs. ALDH assay results also indicated that these cells possessed stem cell features. In addition, the results of the mammosphere assay revealed that agar-coated wells at a concentration of 7000 cells/cm^2 had more prominent floating features and viable spheres.

Conclusion: The findings of this study supported the hypothesis that agar-coated culture plates in mammosphere culture would increase the mammosphere formation efficiency (MFE) value and revealed the importance of the number of cells in elucidating the nature of BCSCs.

Keywords: Breast cancer, mammosphere formation assay, cancer stem cell

Primer Meme Tümörü Kanser Kök Hücre Karakterizasyonunda Mamosfer Oluşturma Optimizasyonu

ÖZET

Giriş&Amaç: Meme kanseri, dünya çapında en sık teşhis edilen kanserdir ve kadınlar arasında kansere bağlı ölümlerin önde gelen nedenidir. Meme kanseri kök hücrelerini (MKKH) içeren meme tümörlerinin, ilaç direncine ve metastaza neden olduğu bilinmektedir. Primer tümörlerden MKKH' lerin mamosfer olarak kültürlenmesi hem zor hem de maliyetlidir. Bu çalışma, meme tümörlerinden izole edilen kanser kök hücrelerinden, uygun mamosfer oluşturma tekniğini ve uygun hücre yoğunluğunu belirleyerek optimize edilmiş bir mamosfer oluşturma protokolü sunmayı ve meme kanseri kök hücre karakterizasyon sürecini iyileştirmeyi amaçlamaktadır.

Gereç&Yöntem: İnvaziv duktal karsinomalı iki hastanın meme tümörlerinden kanser kök hücrelerinin izolasyonu ve kültürü gerçekleştirildi. Daha sonra, akım sitometrisi ile spesifik MKKH'leri yüzey belirteçleri saptandı ve ALDH analizi gerçekleştirildi. Düşük tutunma özellikli ve agar kaplanmış kuyucuklara üç farklı konsantrasyonda hücre ekilerek iki mamosfer oluşturma yöntemi karşılaştırıldı.

Bulgular: $CD44^+$, $CD24^-$ ve $CD133^+$ antikor ifadeleri, bu hücrelerin tümör başlatıcı KKH'leri olabileceğini gösterdi. ALDH analizi sonuçları da bu hücrelerin kök hücre özelliklerine sahip olduğunu gösterdi. Ek olarak, mamosfer testinin sonuçları, 7000 hücre/cm^2'lik bir konsantrasyonda agar kaplı kuyucukların daha belirgin yüzen özelliklere ve canlı sferlere sahip olduğunu ortaya çıkardı.

Sonuç: Bu çalışmanın bulguları, mamosfer kültüründe agar kaplı kültür kaplarının mammosphere oluşum etkinliği (MFE) değerini artıracağı hipotezini desteklemiş ve MKKH' lerin doğasını aydınlatmada hücre sayısının önemini ortaya koymuştur.

Anahtar Kelimeler: Meme kanseri, mammosphere oluşum testi, kanser kök hücresi

Breast cancer (BC) is the most common cancer among women, affecting an average of 2.1 million women each year. According to epidemiological studies, it is the leading cause of cancer-related deaths in women, with a prevalence of 24.5% and a mortality rate of 15.5%. The Global Cancer Incidence, Mortality and Prevalence (GLOBOCAN) breast cancer statistical data revealed that 2.3 million and 24.000 females were diagnosed with BC and 685.000 and 7000 females had died from BC worldwide and in Turkey, respectively, in 2020 (1). The morbidity rates associated with BC increase in countries with high human development index, whereas the mortality rates related to BC are higher in developing countries.

BC is a complex and heterogeneous disease involving multiple tumor entities associated with different histological patterns, biological features, and clinical behaviors. At the beginning of the last century, all patients with breast malignancy were treated with one type of treatment. The differences between BC patients in terms of prognosis and the identification of different morphological variants by pathologists over the last 50 years have caused scientists to categorize BC into different variants. The recently published World Health Organization (WHO) tumor classifications cited 20 major and 18 minor variants of BC (2).

Histologically, BC is categorized into four basic subtypes: ductal carcinoma in situ, lobular carcinoma in situ, invasive ductal carcinoma, and invasive lobular carcinoma. This study focused on invasive ductal carcinoma (IDC), the most common breast malignancy without any further subtype, constituting 75-80% of breast carcinomas (3). IDC is a malignant epithelial tumor that can invade surrounding tissues and metastasize to distant organs such as the lung, liver, and brain (4). In terms of the molecular classification of the tumor, BC is categorized into four determined by the positivity of estrogen receptor (ER), progesterone receptor (PR), human epidermal growth factor 2 (Her2), Ki67 and cytokeratin (CK) 5/6 markers. These subclasses are luminal A [ER (+), PR (+), Her2 (-), Ki67 ≤ 14%], luminal B [ER (+), PR (+), Her2 (-), Ki67> 14%], Her2-2 positive [ER (-), PR (-), Her2 (+), Ki67 (high)], and basal-like/triple-negative [ER (-), PR (-) and Her2 (-)]. Luminal A is the most common molecular BC subtype with a relatively good prognosis. This study focused on the most common BC subtypes and tumors with IDC-Luminal A character in terms of histological-molecular subtypes as a cellular source.

Breast tumors, like other solid tumors, contain a subgroup called breast cancer stem cells (BCSC). BCSCs are aggressive tumor cells responsible for tumor formation, progression, and metastasis. BCSCs delay the response in cancer treatment and cause metastasis and relapse of the disease after treatment (5). Therefore, efforts to develop current cellular therapies target BCSCs.

Tumor recurrence occurs in approximately 30% of the invasive BC cases. The mortality rate in BC cases with tumor recurrence is as high as 90% (6). This high mortality rate is attributed to the fact that BCSCs are resistant to radiotherapy, chemotherapy, and endocrine therapy and can reactivate the tumorogenic potential depending on specific signals while in the dormant state (7). BCSCs were first identified in 2003 by Al Hajj et al. based on cell surface markers (CD44+/CD24-/low) (8). Recent studies have cited aldehyde dehydrogenase 1 (ALDH1), CD133, and CD49 as BCSC markers, given that they were found to be associated with resistance to chemotherapy and radiotherapy (9). CD44 is a cell-matrix adhesion molecule expressed at physiological levels in normal cells, such as embryonic stem cells and stromal cells, and at high levels in cancer cells. When it binds to its ligands, CD44 activates a variety of signaling pathways that lead to cell adhesion, proliferation, migration, and metastasis (10). In addition, CD44 has been shown to be associated with secondary events such as the epithelial-mesenchymal transition (EMT) process, apoptosis resistance, invasion, metastasis, and poor prognosis in many other cancer types such as prostate, stomach, pancreas, colon, and breast cancers (11-13).

ALDH1 catalyzes the oxidation of a large group of toxic aldehydes to carboxylic acids inside the cell. High levels of ALDH1 expression and ALDH1 activity increase the detoxification capacity of BCSCs, creating resistance to cancer treatments such as chemotherapy and radiotherapy. In addition, ALDH has been shown to mediate the angiogenic phenotype in tumor neovascularization by increasing Vascular endothelial growth factor (VEGF) expression in BCSCs (14). ALDH1 has been associated with strong tumorigenicity in both in vivo and in vitro experiments and was recognized as a reliable biomarker for BCSCs (14). Accordingly, BCSCs are characterized by high CD44/CD24 ratios and ALDH expression levels (15). BCSCs also have the ability to form a highly proliferative spheroid, i.e., mammosphere, in non-adherent suspension culture (16). The proliferation and invasiveness of BCSCs are directly proportional to the mammosphere formation ability.

Studies on metastatic cancers, in general, focus on CSCs, which are implicated in multiple drug resistance, radiotherapy resistance, and disease relapse after treatment. Thus, it is essential to develop studies on optimizing cancer stem cell characterization. Accordingly, this study was carried out to develop a method to culture and characterize BCSCs.

MATERIALS and METHOD

Isolation of and culturing of BCSCs from primary tumor tissue

Breast invasive ductal carcinoma tissue samples were obtained from the Kocaeli University Faculty of Medicine Hospital, Department of General Surgery. Tumor tissues of the two patients diagnosed with IDC were removed by mastectomy in ~7-8 mm^3 tissue fragments for cell isolation (Table 1). The tumor tissue was delivered to the laboratory in Dulbecco's modified eagle medium-low glucose (DMEM-LG) supplemented with 5% penicillin/streptomycin (pen/strep) antibiotic and 10% fetal bovine serum (FBS). Tumor tissue was stored in a laminar flow cabinet (Safe Fast Elite 2150, Italy), then taken to a sterile petri dish with a diameter of 90 mm. The blood tissue and blood vessels were harvested from the tissue by washing it twice with 10 ml of Hank's balanced salt solution (HBSS) supplemented with 5% pen/strep antibiotic (Capricorn). Subsequently, the tumor tissue was taken into a new petri dish and divided into small pieces with the help of a scalpel. Four ml of the tumor dissociation enzyme mix (Collagenase/Hyaluronidase, StemCell Tech #07912, Canada) was added to the dissected tumor tissue, and the entire tissue/enzyme mixture in the petri dish was transferred to a 50 ml falcon tube. The tumor tissue/enzyme mixture was incubated overnight in a 37°C shaking water bath (17). Following the incubation, 7 ml of inactivation medium (DMEM-LG with 10% FBS) was added, and the enzymatic reaction was halted. Waste tissue pieces were removed by subjecting the tissue to a cell/tissue suspension through a 70 µm strainer. The cell suspension was centrifuged at 1600 rpm for 5 minutes, and the enzyme was removed by discarding the supernatant solution. Cell pellet BCSC medium [(DMEM/F12 (Gibco), 10% FBS (Gibco), 1% Penicillin/Streptomycin (Capricorn), 1% Glutamax (Gibco), 4 µg/ml Insulin (Sigma), 1 µg/ml Hydrocortisone (Sigma)] was homogenized with 10 ng/mL epithelial growth factor (EGF; Winsent)], inoculated in a T-25 cell culture dish (SPL Biosciences, Korea) and cultured at 37 °C in5% CO_2medium. Cells were propagated by subjecting them to 0.25% Trypsin/0.02% EDTA solution with trypsinization every 4-6 days (~70-80% confluency).

Table 1: Histopathological features and Bloom-Richardson grading of breast tumors of IDC patient1 and 2.

IDC Case 1 (Age:57)	IDC Case 2 (Age:42)
ER: 100% positive	ER: %80 positive
PR: 95% positive	PR: %60 positive
Ki67: 11% positive	Ki67: %10 positive
Bloom–Richardson Grading System	
Tubule formation: 2	Tubule formation: 2
Nuclear pleomorphism:2	Nuclear pleomorphism:1
Mitotic index: 2 (12/10 BBA)	Mitotic index: 1 (2/10 BBA)
Total score: 6, Grade: II	Total score: 4, Grade: I

Flow cytometry

BCSCs were harvested from both patients after passaging the cells with trypsin enzyme and counted following enzyme inactivation. Consequently, 2×10^5 cells were analyzed for each marker. After the cells were washed with the washing solution, a specific fluorescent fluoresce in isothiocyanate (FITC) and phycoerythrin (PE) – conjugate to the determined surface markers, i.e., CD44, CD73, CD90, CD105, CD13, CD29, CD140b, CD24, anti-HLA DR, anti-cytokeratin, CD45, CD34, CD15, and CD14 human monoclonal antibodies were incubated at room temperature at dark for 45 minutes. Subsequently, the washing solution was added again, and the resulting solution was centrifuged at 300×g for 5 minutes. The washing process was completed by discarding the supernatant. The cells were homogenized again using 350 µl washing solution for analysis in the FACS Calibur (BD Biosciences) flow cytometry device. The relevant analyses were performed using the Cell Quest software package (BD Biosciences).

ALDH assay

The ALDH enzyme activity levels of the isolated BCSCs obtained from the two patients were analyzed using the ALDH assay kit (StemCell Technologies-Aldefluor TM Assay Kit, U.S.) per the manufacturer's instructions. Accordingly, BCSCs were harvested using the trypsin enzyme and resuspended in single cells. Simultaneously, human leukocytes, i.e., white blood cells (WBCs), were obtained from peripheral blood and included in the ALDH test as the reference material. 3×10^6 cells reserved for ALDH analysis were centrifuged at 250×g for 5 minutes. The supernatant solution was discarded, and the cells were homogenized using 6 mL of test buffer. Flow cytometry tubes were prepared for propidium iodide (PI), 7-actinaminomycin-D (7-AAD), diethylaminobenzaldehyde (DEAB), verapamil, CD133 with ALDH parameters. The prepared cell suspension was distributed to each tube in portions of 500µl (5×10^5 cells).

5µl of DEAB reagent was added to the tube and mixed thoroughly. 2.5 µl of Aldefluor substrate was added to the tubes except for PI and 7-AAD tubes and mixed thoroughly. All tubes were incubated at 37 °C in the dark for 45 minutes. Subsequently, the cells were centrifuged at 250×g for 5 minutes. The supernatant solution was discarded and homogenized again with 300 µl of test buffer. 5 µl of CD133, PI, and 7-AAD probes were added to CD133, PI, and 7-AAD tubes, thoroughly mixed, incubated at 4°C in the dark for 20 minutes, then centrifuged at 250×g for 5 minutes. The supernatant solution was discarded, and the cells were homogenized once more using 500 µl of Aldefluor test buffer for analysis in the FACS Calibur (BD Biosciences) flow cytometry device. The relevant analyses were performed using the Cell Quest software package (BD Biosciences). The ALDH activity of BCSCs was evaluated in comparison with negative control DEAB and verapamil samples.

Mammosphere formation assay/mammosphere culturing and passaging

The mammosphere formation analysis featured the suspension cultures of isolated BCSCs obtained from both cases. The ability of these BCSCs to form a mammosphere on the agar-coated and low-attachment surfaces was comparatively examined. Prior to the experiment, 6-well plates (Falcon, U.S.) on which cells were seeded were covered with 3% agar (Fluka) containing 1:1 mammosphere medium.

The mammosphere medium used in the study was enriched and customized with additional add-ons, unlike the mammosphere medium contents described in the literature. Mammosphere medium consisted of DMEM/F12 supplemented with 1% pen/strep (Capricorn), 1% Glutamax (Gibco), 20 ng/ml EGF, basic fibroblast growth factor (bFGF), 1x B27, 4 µg/ml heparin (Sigma), 1 µg/ml hydrocortisone (Sigma), and 4 µg/ml insulin (Sigma).

In order to optimize the cell concentration or to determine the appropriate cell concentration in the mammosphere formation analysis, three groups with the following cell concentrations were created: 3×10^3 cells/cm^2, 5×10^3 cells/cm^2, and 7×10^3 cells/cm^2. Cells were cultured with a mammosphere medium for seven days by seeding in agar-coated and low-attachment 6-well flasks in accordance with the determined concentrations. Generation I mammospheres were examined on the 7th day of culture by imaging with a phase-contrast microscope, the mammosphere counts were counted, and the mammosphere formation efficiency (MFE) was calculated using the following formula: *"MFE (%) = (# of mammospheres per well) / (# of cells seeded per well) x 100".*

Passaging mammospheres

On the 7th day of culture, generation I mammospheres were counted, and each well was transferred to a 15 ml conical tube. Mammospheres that remained on the surface were washed with the phosphate-buffered saline (PBS) solution, transferred to the tubes, and centrifuged at 115×g for 10 minutes. The supernatant solution was discarded. The pellet was re-suspended with 500 µl of TrypLE enzyme and incubated at 37°C for 3 minutes. The enzyme was neutralized with 500 µl of FBS. After centrifugation at 500×g for 5 minutes, the supernatant solution was discarded, and the pellet was re-suspended with 100 µl of mammosphere medium. It was pipetted up and down several times and passed three times through a 25 G syringe to form a single-cell suspension. After the cell count was done, inoculation was performed on agar and low-attachment six well plates at concentrations of 3×10^3 cells/cm^2, 5×10^3 cells/cm^2, and 7×10^3 cells/cm^2. It was cultured with a mammosphere medium for seven days, and a mammosphere count was done on the 7th day. MFE formulation was calculated as in generation I (18).

Statistical analysis

SPSS 10.0 (Statistical Package for the Social Sciences, version 10.0, Chicago, IL, U.S., 1999) software package was used to perform all statistical analyses. Research data were tested with the paired t-test. Newman–Keuls method was used for multiple analyses. Each experimental group consisted of at least three replicates. The difference between the experimental and control groups was deemed significant and highly significant in cases where the probability (p) statistics were ≤ 0.05 and <0.01, respectively. The MFE value of Generation I and II was calculated using the following formula: *"MFE (%) = (# of mammospheres per well) / (# of cells seeded per well) x 100".*

RESULTS

Isolation and culturing of BCSCs from primary tumor tissue

BCSCs isolated from the breast tumor tissue were cultured adherently, and their morphology was regularly examined under a phase-contrast microscope (Figure 1). BCSCs did not show morphological signs of aging or differentiation during culturing. In fact, it was observed that they proliferated quite rapidly, even during additional passages.

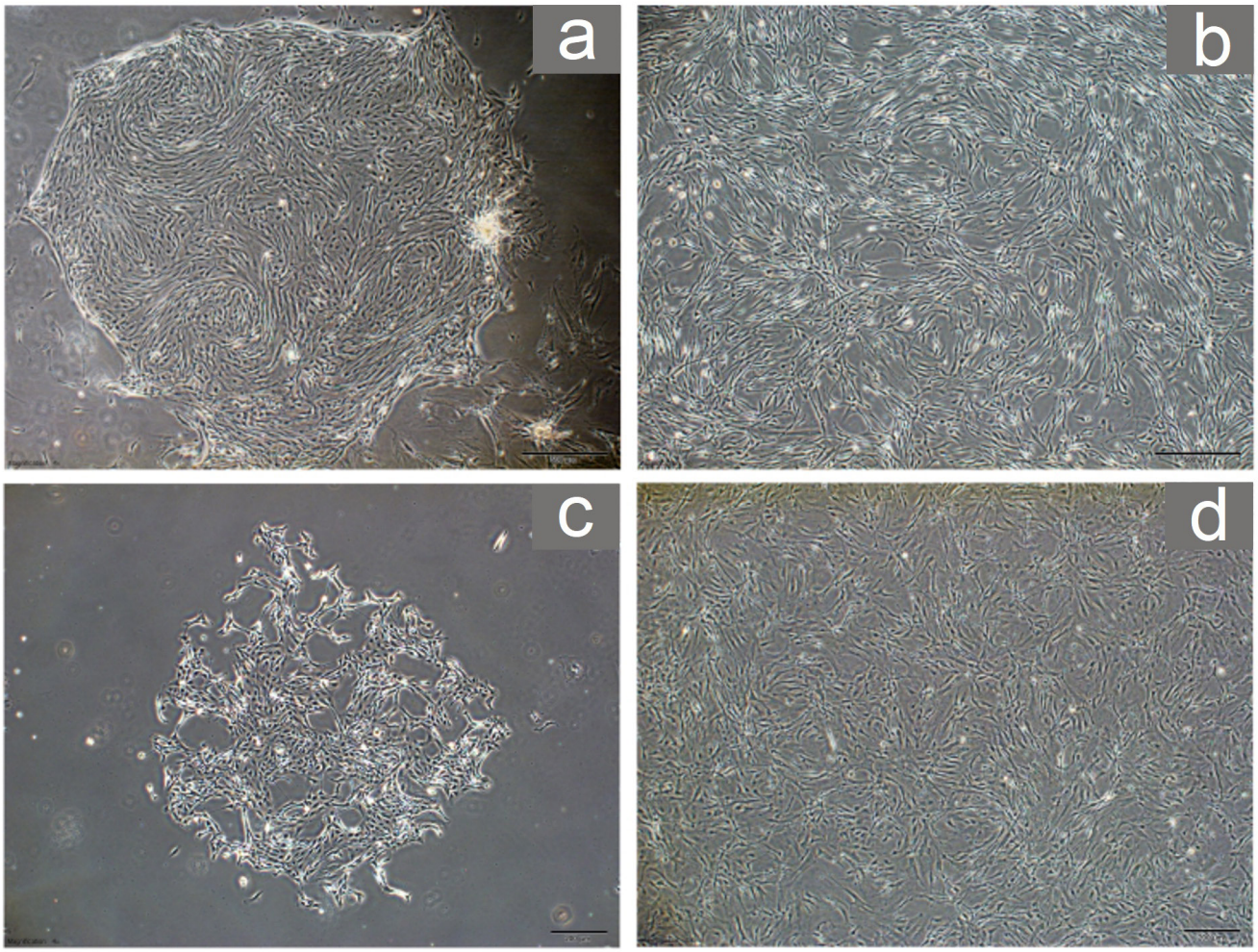

Figure 1. *P0 (a) and P3 (b) light microscope images of the BSC obtained from case 1. P0 (c) and P3 (d) light microscope images of the BSC obtained from case 2. Barr; 500µm.*

Flow cytometry

As the isolated BCSCs of cases 1 and 2 reached passage 3 (Figure 4.3), stem cell markers, i.e., CD73, CD90, CD105, CD13, CD29, and CD140b, showed high positivity, in addition to exhibiting CD44+/CD24- breast cancer stem cell phenotype. Hematopoietic and epithelial cell markers such as human leukocyte antigen-D related (HLA-DR), cytokeratin, CD45, CD 34, CD15, and CD14 were also negative (Figure 2).

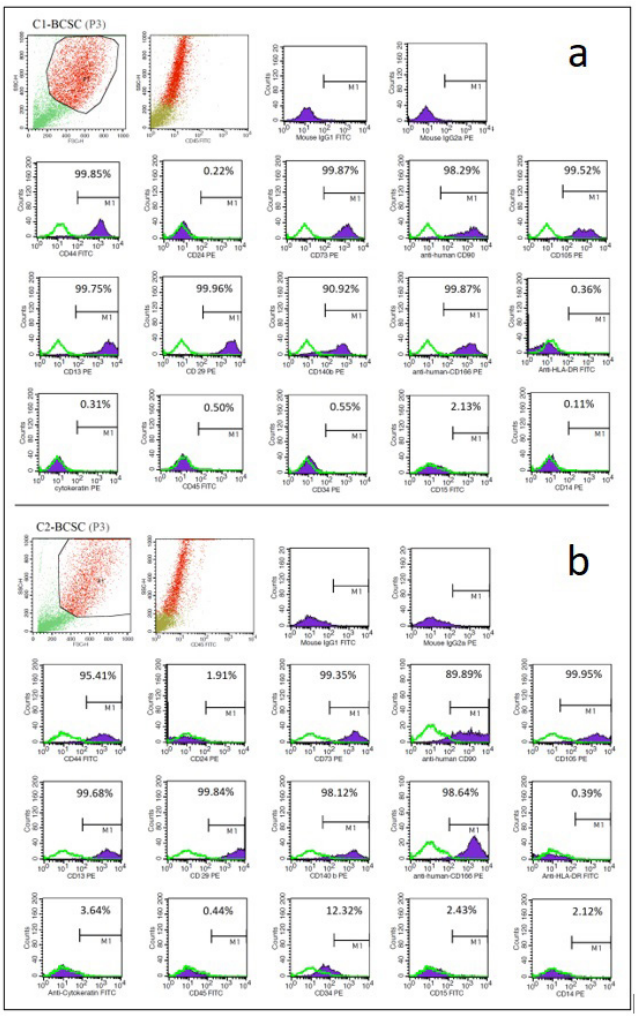

Figure 2. *Flow cytometry analyses of the BCSCs of case 1 (a) and case 2 (b)*

ALDH assay

ALDH enzyme activity was positive, over 99% in all double staining performed within the scope of the ALDH test. CD133 expression was 61.74% in the BCSC of case 1 and 89.13% in the BCSC of case 2. The 7-AAD and PI values were less in the BCSC of case 1 than in the BCSC of case 2, and below ~15% in the BCSCs of both cases. The ALDH test revealed CD133 positivity suggesting that the isolated tumor cells have a cancer stem cell phenotype.

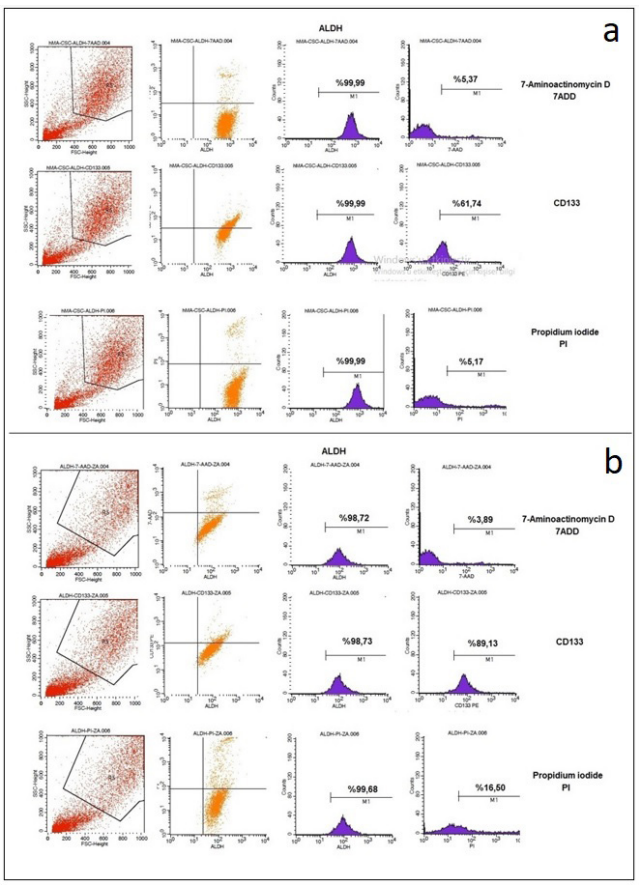

Figure 3. *ALDH analyses by flow cytometry of the BCSCs of case 1 (a) and case 2 (b). ALDH double stained with 7ADD, PI, and CD133.*

Optimization of the mammosphere culture system

Primary tumor cells obtained from both cases featured mammosphere formation in the serum-free spheroid culture system.

MFE values of the BCSCs were calculated according to the mammosphere count, and mammosphere size measurement was performed in generation I and generation II (Figures 4 and 5).

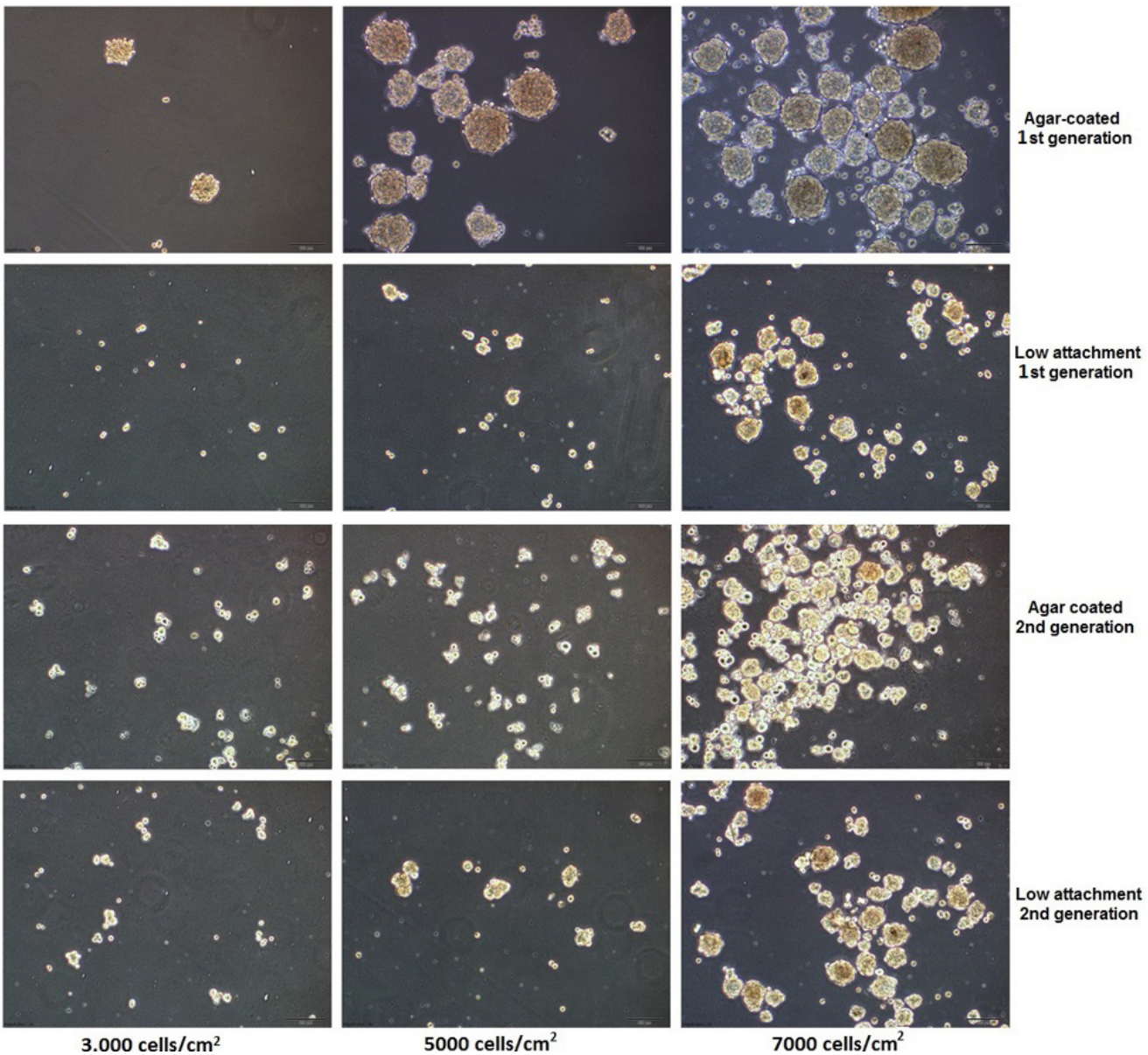

Figure 4. *Morphology of mammospheres from the BCSCs of case 1 seeded on different cell concentrations, agar-coated, and low attachment wells. Barr; 100µm*

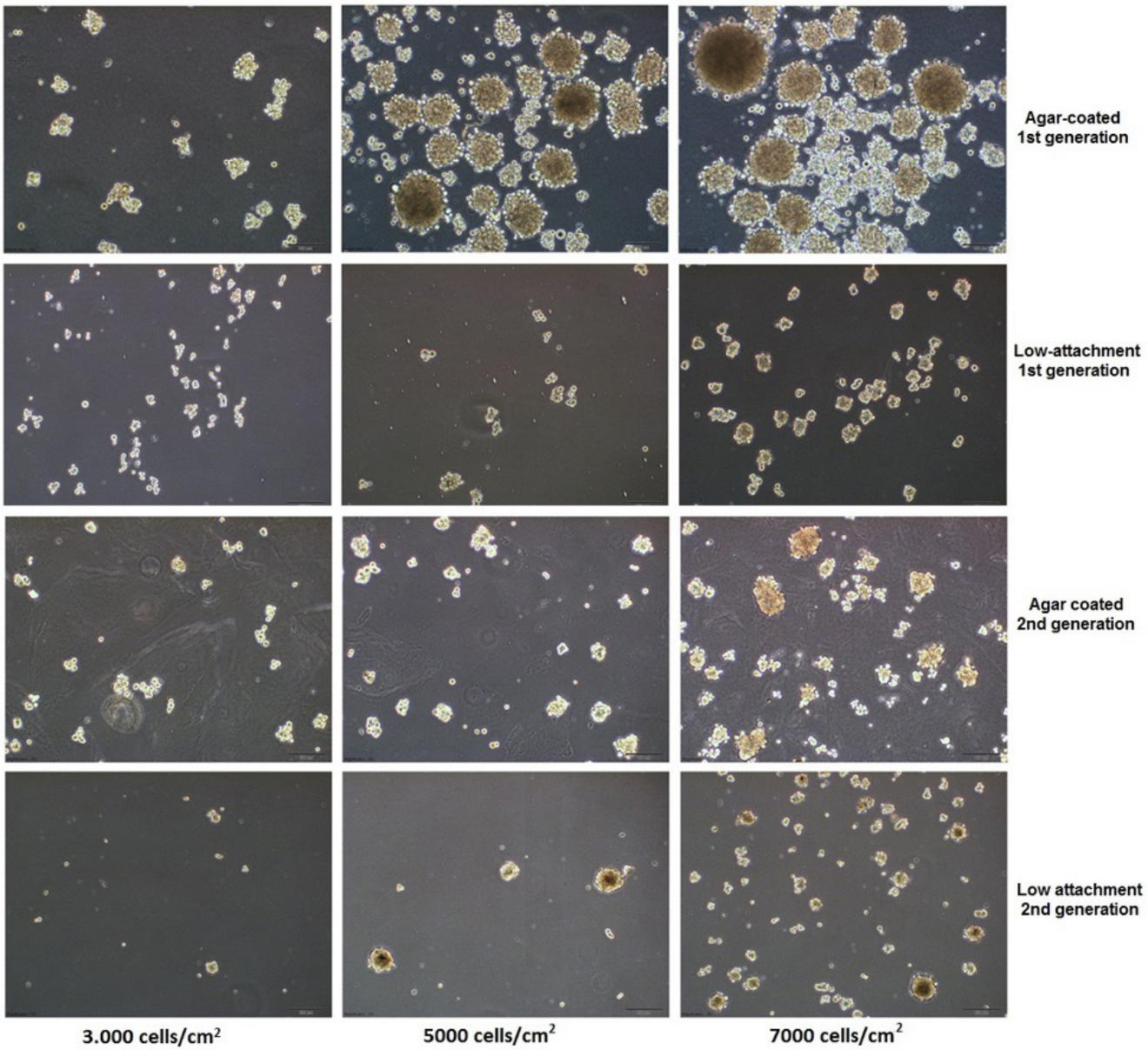

Figure 5. *Morphology of mammospheres from the BCSCs of case 2 seeded on different cell concentrations, agar coated, and low attachment wells. Barr; 100µm*

The cell concentration of 7,000 cells/cm^2 was found to be more effective in evaluating the MFE of primary breast tumor cells compared to the other cell concentrations of 3,000/cm^2 and 5,000/cm^2. The number of cells planted is a crucial factor in forming the mammosphere. The MFE value of the cells planted at a cell concentration of 7000 cells/cm^2 was found to be significantly higher than at other cell concentrations ($p< 0.05$ and $p<0.01$) (Figure 6, Figure 7).

In terms of the mammosphere number, size, and quality, it was observed that the agar-coated spheroid culture system was relatively advantageous over the low attachment spheroid culture system. The results of the mammosphere experiment indicated that the BCSCs of case 1 had a significantly higher ability to form spheroids in the two isolated cell lines compared to the BCSCs of case 2. In the agar coating mamosphere formation; Case I MFE value is 2.1 times higher in Case II MFE value in Generation 1, while it is 3 times higher in Generation II (7,000 cells/cm2) ($p<0.001$).

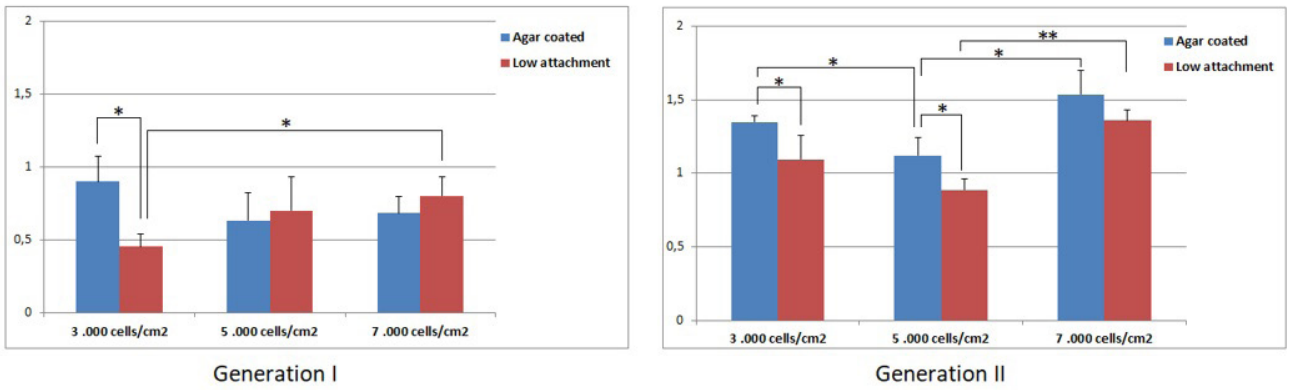

Figure 6. *MFE of mammospheres obtained from the BSCS of case 1. Data were mean±SD, *p<0.05, **p<0.01*

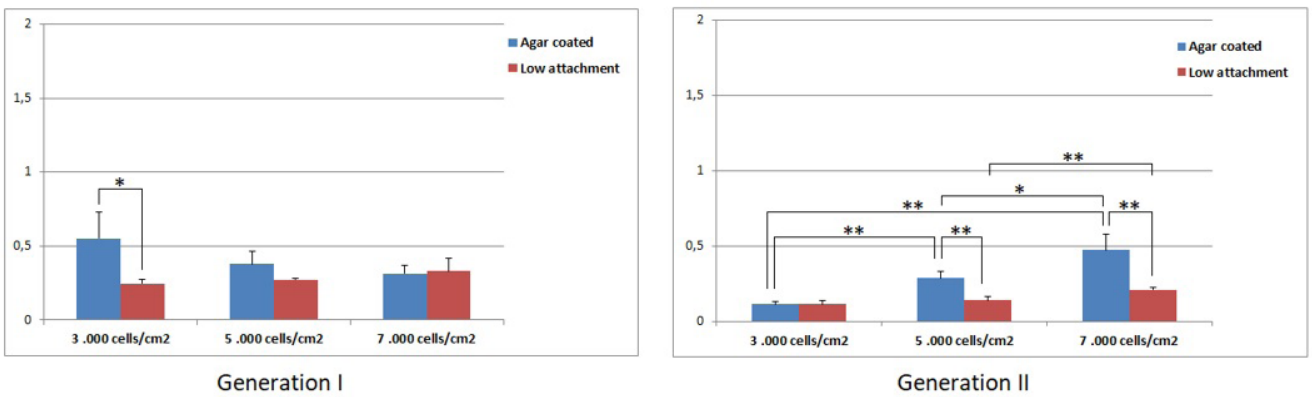

Figure 7. *MFE of mammospheres obtained from the BSCS of case 2. Data were mean±SD, *p<0.05, **p<0.01.*

DISCUSSION

As in many solid tumors, high ALDH activity in breast tumors is considered an indicator of aggressive and metastatic tumors. Increased ALDH activity in vitro in colony formation, migration, and invasion is associated with in vivo metastasis (19). A study on breast cancer cell lines demonstrated that ALDH-positive cell lines had high invasion capacities (20).

The characterization analysis revealed that the cells isolated from the primary tumor tissue within the scope of this study had cancer stem cell phenotype. BCSCs, the tumorigenic subpopulation of breast tumors, were mainly identified by CD44 positivity and CD24 negativity ($CD44^+/CD24^-$) (8). The results of the flow cytometry analyses indicated that the cells isolated from tumor tissues had $CD44^+/CD24^-$ phenotype, CD61 positivity, another basic marker, and high ALDH enzyme activity (21). In addition, the high positivity of other stem cell markers, i.e., CD133, CD166, and CD29, suggested that the isolated primary tumor cells had the characteristics of cancer stem cells. CD133 is a transmembrane glycoprotein expressed in healthy somatic progenitor/stem cells and cancer stem cells, the metastatic precursor cells of solid tumors (22). Due to its more restricted expression compared to other CSC markers, such as CD44 and ALDH, CD133 has long been considered one of the most rigorous indicators of malignant precursors in different solid tumors, including breast cancer (22). In a study featuring MDA-MB-231, MDA-MB-468, and triple-negative high ALDH, $CD44^+$ phenotype cell lines, CD133 was found to be associated with enhanced malignant/metastatic behavior in both in vitro and in vivo experiments (23). In addition to being a sharp CSC marker, CD133 is a valuable prognostic marker as it is positively correlated with high tumor grade, distant metastasis, and poor overall survival (24).

The high rate of cancer stem cell markers, mammosphere forming capacity, and ALDH positivity indicated that cancer stem cells, a subpopulation in the tumor, were successfully isolated in this study. As Zhang et al. stated, there are four basic methods used in cancer stem cell identification and isolation (28), the most common being the methods that feature the separation of surface markers or combination of biomarkers, followed by the one that features side population cell isolation with Hoescst 33342 dye, the aldeflour method, and mammosphere formation. Other methods other than cell separation are isolation methods based on cancer stem cell properties. The efficiency of creating two generations of mammosphere after isolation was demonstrated in this study, in addition to $CD44^+$ and $CD24^{-/low}$, surface markers, and ALDH positivity. Furthermore, the fact that the cells featured self-renewal and proliferation activity in the advancing passages indicated that these cells were, in fact, cancer stem cells. It is known that cell lines such as MCF-7 and MDA, which are frequently used in studies, are heterogeneous. Therefore, $CD44^+$ and $CD24^-$ cells have been selected over these cell lines in many recent studies (29). Given the surface marker results and cancer stem cell properties obtained after isolation, it was the primary cell line that featured cancer cell characteristics comparable to the in vivo environment in this study.

Mammosphere-forming efficiency varies depending on the cancer cell lines and cells isolated in primary culture (30). As a matter of fact, the results obtained using human-derived breast tumors from two cases in this study revealed high cell proliferation in both cases with varying mammosphere-forming abilities.

CONCLUSION

In conclusion, the cell lines obtained from the tumor tissues of two cases had high CD44 positivity, CD24 negativity, and ALDH rates. Mammosphere formation was significantly higher in the BCSC of case 1 than in the BCSC of case 2, this difference can be associated with histopathological features of cancer tissue and Bloom-Richardson grading of breast tumors.

CD44 positivity, CD133 positivity, CD24 negativity, ALDH positivity, and high mammosphere forming abilities indicated that the cancer stem cells were isolated. In addition, the MFE value of the cells was significantly higher in the agar-coated culture plates than in the low-attachment culture plates. The mammosphere experiment demonstrated that 7000 cell/cm^2 concentration was more suitable for mammosphere assay.

DECLARATIONS

Funding

This study is supported by Kocaeli University, Scientific Research Unit under the grant number 2018/112.

Conflict of interest

The authors declare that they have no competing interests.

Ethical approval

This study was approved by the Ethics Committee of Kocaeli University (approval number: KU GOKAEK 2018/4.24). Informed consents, approved by the institutional ethics committee, were obtained from each patient.

Author contributions

G.U. and Z.S.H. conceived the project. Z.S.H. and Y.Y. supervised the project. analysis. G.U. and Z.S.H. performed BCSCs isolation and cell culture. G.G. performed flow cytometer. G.U. and Z.S.H. performed MFE analysis. N.Z.U. performed the surgeries and contributed to tumor tissue sample collection. G.U. and Z.S.H. contributed to writing and revising the draft. All authors read and approved the final manuscript.

REFERENCES

1 Sung H, Ferlay J, Siegel RL, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. Ca-a Cancer Journal for Clinicians. 2021;71:209-49. DOI:10.3322/caac.21660

2 Ellis I, Cornelisse C, Schnitt S, et al. Invasive breast carcinomas. In: Tavassoli FA., Devilee P., eds. WHO Classification of Tumours. Pathology and Genetics of Tumours of the Breast and Female Genital Organs. 3 ed: IARC Press; 2003.

3 Li CI, Uribe DJ and Daling JR. Clinical characteristics of different histologic types of breast cancer. Brit J Cancer. 2005;93:1046-52. DOI:10.1038/sj.bjc.6602787

4 Chen XF, Zhang CY, Guo DJ, et al. Distant metastasis and prognostic factors in patients with invasive ductal carcinoma of the breast. Eur J Clin Invest. 2022;52. DOI:10.1111/eci.13704

5 Lawson JC, Blatch GL and Edkins AL. Cancer stem cells in breast cancer and metastasis. Breast Cancer Res Tr. 2009;118:241-54. DOI:10.1007/s10549-009-0524-9

6 Gwynne WD, Shakeel MS, Girgis-Gabardo A, et al. The Role of Serotonin in Breast Cancer Stem Cells. Molecules. 2021;26. DOI:10.3390/molecules26113171

7 Saha T and Lukong KE. Breast Cancer Stem-Like Cells in Drug Resistance: A Review of Mechanisms and Novel Therapeutic Strategies to Overcome Drug Resistance. Front Oncol. 2022;12. DOI:10.3389/fonc.2022.856974

8 Al-Hajj M, Wicha MS, Benito-Hernandez A, et al. Prospective identification of tumorigenic breast cancer cells. P Natl Acad Sci USA. 2003;100:3983-8. DOI:10.1073/pnas.0530291100

9 Crabtree JS and Miele L. Breast Cancer Stem Cells. Biomedicines. 2018;6:77. DOI:10.3390/biomedicines6030077

10 Ponta H, Sherman L and Herrlich PA. CD44: From adhesion molecules to signalling regulators. Nat Rev Mol Cell Bio. 2003;4:33-45. DOI:10.1038/nrm1004

11 Blick T, Hugo H, Widodo E, et al. Epithelial Mesenchymal Transition Traits in Human Breast Cancer Cell Lines Parallel the CD44(hi/) CD24(lo/-) Stem Cell Phenotype in Human Breast Cancer. J Mammary Gland Biol. 2010;15:235-52. DOI:10.1007/s10911-010-9175-z

12 Patrawala L, Calhoun T, Schneider-Broussard R, et al. Highly purified CD44(+) prostate cancer cells from xenograft human tumors are enriched in tumorigenic and metastatic progenitor cells. Oncogene. 2006;25:1696-708. DOI:10.1038/sj.onc.1209327

13 Hou WY, Kong LW, Hou ZP, et al. CD44 is a prognostic biomarker and correlated with immune infiltrates in gastric cancer. Bmc Med Genomics. 2022;15. DOI:10.1186/s12920-022-01383-w

14 Ciccone V, Terzuoli E, Donnini S, et al. Stemness marker ALDH1A1 promotes tumor angiogenesis via retinoic acid/HIF-1/VEGF signalling in MCF-7 breast cancer cells. J Exp Clin Canc Res. 2018;37. DOI:10.1186/s13046-018-0975-0

15 De Beca FF, Caetano P, Gerhard R, et al. Cancer stem cells markers CD44, CD24 and ALDH1 in breast cancer special histological types. J Clin Pathol. 2013;66:187-91. DOI:10.1136/jclinpath-2012-201169

16 Grimshaw MJ, Cooper L, Papazisis K, et al. Mammosphere culture of metastatic breast cancer cells enriches for tumorigenic breast cancer cells. Breast Cancer Res. 2008;10. DOI:10.1186/bcr2106

17 Shi AP, Fan ZM, Ma KW, et al. Isolation and. characterization of adult mammary stem cells from breast cancer-adjacent tissues. Oncol Lett. 2017;14:2894-902. DOI:10.3892/ol.2017.6485

18 Lombardo Y, De Giorgio A, Coombes CR, et al. Mammosphere Formation Assay from Human Breast Cancer Tissues and Cell Lines. Jove-J Vis Exp. 2015. DOI:10.3791/52671

19 Rodriguez-Torres M and Allan AL. Aldehyde dehydrogenase as a marker and functional mediator of metastasis in solid tumors. Clin Exp Metastas. 2016;33:97-113. DOI:10.1007/s10585-015-9755-9

20 Charafe-Jauffret E, Ginestier C, Iovino F, et al. Breast cancer cell lines contain functional cancer stem cells with metastatic capacity and a distinct molecular signature. Cancer Res. 2009;69:1302-13. DOI:10.1158/0008-5472.CAN-08-2741

21 Shao J, Fan W, Ma BA, et al. Breast cancer stem cells expressing different stem cell markers exhibit distinct biological characteristics. Mol Med Rep. 2016;14:4991-8. DOI:10.3892/mmr.2016.5899

22 Lorico A and Rappa G. Phenotypic Heterogeneity of Breast Cancer Stem Cells. J Oncol. 2011;2011. DOI:10.1155/2011/135039

23 Croker AK, Goodale D, Chu J, et al. High aldehyde dehydrogenase and expression of cancer stem cell markers selects for breast cancer cells with enhanced malignant and metastatic ability. J Cell Mol Med. 2009;13:2236-52. DOI:10.1111/j.1582-4934.2008.00455.x

24 Brugnoli F, Grassilli S, Al-Qassab Y, et al. CD133 in Breast Cancer Cells: More than a Stem Cell Marker. J Oncol. 2019;2019. DOI:10.1155/2019/7512632

25 Darvishi B, Boroumandieh S, Majidzadeh-A K, et al. The role of activated leukocyte cell adhesion molecule (ALCAM) in cancer progression, invasion, metastasis and recurrence: A novel cancer stem cell marker and tumor-specific prognostic marker. Exp Mol Pathol. 2020;115. DOI:10.1016/j.yexmp.2020.104443

26 Xiao M, Wang X, Yan M, et al. A systematic evaluation for the potential translation of CD166-related expression as a cancer biomarker. Expert Rev Mol Diagn. 2016;16:925-32. DOI:10.1080/14737159.2016.1211932

27 Lu H, Clauser KR, Tam WL, et al. A breast cancer stem cell niche supported by juxtacrine signalling from monocytes and macrophages. Nat Cell Biol. 2014;16:1105-17. DOI:10.1038/ncb3041

28 Zhang X, Powell K and Li L. Breast Cancer Stem Cells: Biomarkers, Identification and Isolation Methods, Regulating Mechanisms, Cellular Origin, and Beyond. Cancers (Basel). 2020;12. DOI:10.3390/cancers12123765

29 Sun H, Jia J, Wang X, et al. CD44+/CD24- breast cancer cells isolated from MCF-7 cultures exhibit enhanced angiogenic properties. Clin Transl Oncol. 2013;15:46-54. DOI:10.1007/s12094-012-0891-2

30 Wang R, Lv Q, Meng W, et al. Comparison of mammosphere formation from breast cancer cell lines and primary breast tumors. J Thorac Dis. 2014;6:829-37. DOI:10.3978/j.issn.2072-1439.2014.03.38

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 119-124
https://doi.org/10.31067/acusaglik.1162796

Surgical Approach in Liver Hemangiomas with Special Emphasis on Lesion Diameter and Type of Surgery: A Retrospective Cohort of 69 Patients

Elvan Onur Kırımker[1], Süleyman Utku Çelik[1,2], Deniz Kütük[1], Şiyar Ersöz[1], Can Konca[1], Mehmet Ali Koç[1], Acar Tüzüner[1], Mehmet Kaan Karayalçın[1], Deniz Balcı[1,3]

[1]Department of General Surgery, Ankara University School of Medicine, Ankara, Turkey
[2]Department of General Surgery, Gulhane Training and Research Hospital, Ankara, Turkey
[3]Department of General Surgery, Bahcesehir University, Istanbul, Turkey

Elvan Onur KIRIMKER
Süleyman Utku ÇELİK
Deniz KÜTÜK
Şiyar ERSÖZ
Can KONCA
Mehmet Ali KOÇ
Acar TÜZÜNER
Mehmet Kaan KARAYALÇIN
Deniz BALCI

Correspondence: Süleyman Utku Çelik
Gülhane Training and Research Hospital, Department of General Surgery, Ankara, Turkey
Phone: +905353391650
E-mail: s.utkucelik@hotmail.com

Received: 17 August 2022
Accepted: 10 January 2023

ABSTRACT

Purpose: Liver hemangioma (LH) being the most common benign tumor of the liver is a rare indication for liver surgery. Indications include symptomatic disease, suspicion of malignancy, increase in lesion size, and Kasabach-Merritt syndrome. Surgical treatment mainly consists of enucleation or liver resection (LR). The study aimed to evaluate surgical outcomes in patients with LHs.

Methods: In this study, surgical treatment for liver hemangioma in a single center were retrospectively reviewed. Demographics, preoperative and postoperative laboratory values, imaging studies, and follow-up data of patients were collected.

Results: The mean age was 51.9±11.0 years and 69.6% were female. Abdominal pain was present preoperatively in 32 (46.4%) cases. Mean lesion diameter was 7.5 (1.2-20) cm. Giant hemangioma was reported in 54 (78.3%) patients. LR and enucleation were preferred for 37 (53.6%) and 32 (46.4%) patients, respectively. Intraoperative transfusion requirement was more common in enucleation than LRs (78.1% vs. 48.6%, p=0.012). Intraoperative erythrocyte transfusion was more frequently in operations of giant hemangiomas (68.5% vs. 40.0%, p=0.044). Complications were observed more frequently in giant hemangioma group regardless of grades (40.7% vs. 13.3%, p=0.049). Preoperative thrombocytopenia was found more frequent in cases with serious complications (66.7% vs 22.2%, p=0.019).

Conclusion: Emerging percutaneous intervention and imaging modalities are expected to decrease number of surgeries for liver hemangiomas. Although enucleation, LR and even liver transplantation are still required for a set of patients. Enucleation and LR have similar outcomes, but transfusions are more common according to the present study. Size of LHs is related with complications and transfusion requirements.

Keywords: hemangioma, liver resection, enucleation

Karaciğer Hemanjiyomlarında Lezyon Çapına Ve Cerrahi Tipine Göre Cerrahi Yaklaşım: 69 Hastadan Oluşan Retrospektif Bir Kohort

ÖZET

Amaç: Karaciğerin en sık görülen benign tümörü olan karaciğer hemanjiyomlarının (KH) tedavisinde karaciğer cerrahi nadir bir endikasyondur. Endikasyonlar arasında semptomatik hastalık, malignite şüphesi, lezyon boyutunda artış ve Kasabach-Merritt sendromu sayılabilir. Cerrahi tedavi esas olarak enükleasyon veya karaciğer rezeksiyonundan (KR) oluşur. Bu çalışma, KH'li hastalarda cerrahi sonuçlarını değerlendirmeyi amaçladı.

Yöntem: Bu çalışmada karaciğer hemanjiyomunun cerrahi tedavisi tek merkezde retrospektif olarak gözden geçirildi. Hastaların demografik bilgileri, ameliyat öncesi ve sonrası laboratuvar değerleri, görüntüleme çalışmaları ve takip verileri toplandı.

Bulgular: Ortalama yaş 51,9 ± 11,0 iken; hastaların %69,6'sı kadındı. 32 (%46,4) olguda ameliyat öncesi karın ağrısı mevcuttu. Ortalama lezyon çapı 7,5 (1,2-20) cm idi. 54 (%78,3) hastada dev hemanjiom olduğu görüldü. Sırasıyla cerrahi tedavi olarak 37 (%53,6) ve 32 (%46,4) hastada KR ve enükleasyon tercih edildi. İntraoperatif transfüzyon gereksinimi enükleasyon yapılanlarda KR'lere göre daha fazlaydı (%78,1'e karşı %48,6; p=0.012). Dev hemanjiomların ameliyatlarında intraoperatif eritrosit transfüzyonu daha sıktı (%68,5'e karşı %40,0; p=0,044). Dev hemanjiom grubunda evreden bağımsız olarak komplikasyonlar daha sık gözlendi (%40,7'ye karşı %13,3; p=0.049). Ciddi komplikasyon gelişen olgularda preoperatif trombositopeni daha sık bulundu (%66,7'ye karşı %22,2; p=0.019).

Sonuç: Gelişen perkütan girişim ve görüntüleme yöntemlerinin karaciğer hemanjiyomlarına yönelik ameliyat sayısını azaltması beklenmektedir. Enükleasyon, KR ve hatta karaciğer transplantasyonu bir dizi hasta için hala gereklidir. Enükleasyon ve KR benzer sonuçlara sahip olsa da bu çalışmaya göre enükleasyon grubunda transfüzyon daha yaygındır. KH'lerin boyutu komplikasyonlar ve transfüzyon gereksinimleri ile ilişkilidir.

Anahtar Kelimeler: hemanjiyom, karaciğer rezeksiyonu, enükleasyon

Liver hemangiomas (LH) are vascular malformations being the most common benign tumors of the liver. Its incidence in autopsy series is ranging between 0.4% and 7.3%. It is more common in women with a female-to-male ratio of 4-6:1 (1). First diagnosis is made by ultrasonic examination in most cases and confirmed by computed tomography (CT) scan or magnetic resonance imaging (MRI). Spontaneous rupture of LH is rarely reported. Treatment is indicated only for patients with intractable symptoms of pain proven to be related directly to the LH, with uncertain diagnosis, with increased size of lesions under follow up or with lesions causing Kasabach-Meritt Syndrome (1,2). Although liver resection is an old and still used approach among surgical options, enucleation is also applied as a parenchyma-sparing surgical approach after the 80s (2). In this study, hemangioma surgeries performed in a single center were examined retrospectively in terms of surgical technique, lesion size, patient characteristics and the effect of these features on the outcomes.

MATERIAL AND METHODS

Patients who underwent surgery with the diagnosis of LH between January 2007 and December 2018 at our institute were retrospectively extracted from the hospital database for this cohort study. The characteristics, preoperative and postoperative laboratory values, imaging studies, and follow-up of patients and hemangiomas were obtained from the hospital database, patient files and partially prospectively maintained hepatobiliary database. Diagnosis of cases were confirmed histologically as LH. Operations in which the hemangioma is selectively removed from the liver parenchyma border are named enucleation, and the operations in which the hemangioma is removed anatomically or non-anatomically with some liver parenchyma surrounding it are named liver resection. Four centimeters was considered as the lower limit for the definition of giant hemangioma (2). The surgical approach was chosen by the related surgeon. Complications were classified according to Clavien-Dindo classification, and accordingly, those with grade 3a and above, that is, those requiring intervention, progressing to organ failure or resulting in death, were defined as serious complications (3). Thrombocytopenia was defined as blood platelet count below 150×10^3/mL. The patients were informed about the surgeries in advance and their informed consents about surgeries and data collection for scientific purposes were obtained. Datafile is anonymized before analysis and original file was destroyed. The study has been reported in line with the STROCSS criteria (4). This study was approved by the Ethics Committee of Ankara University School of Medicine (İ07-457-22) and was registered at Clinicaltrials.gov (NCT04669314).

In the comparisons, categorical variables were shown as percentages and compared with the Chi square test, while continuous variables were shown with the mean and compared with Student's t-test. In cases where the number of cases of the compared groups was less than 30 and variances were not equal, the Mann-Whitney U Test was preferred for continuous variables and variables were shown with the median and minimum-maximum values. The data were analyzed with SPSS 20.0 and the 2-sided significance level was chosen as 0.05.

RESULTS

Forty-eight (69.6%) of 69 patients were female and mean patient age was 51.9 ± 11.0 (33-79). Reported indications of surgery were abdominal pain, enlarging or giant tumors, unidentified liver masses or thrombocytopenia, Abdominal pain was present in 32 (46.4%) patients. Moreover, hemangiomas were incidentally found in 32 (46.4%) among the patients. Mean lesion diameter was 7.5 cm (1.2-20) while 54 (78.3%) patients had lesions with diameters >4 cm so those are identified as giant hemangioma in most of the current literature. 27 (39.1%) of patients had multiple hemangiomas. Liver resection and enucleation were preferred for 37 (53.6%) and 32 (46.4%) patients respectively. Laparoscopic operation was performed for 8 (11.6%) patients. 43 (62.3%) patients required intraoperative erythrocyte transfusion. However, two patients (2.9%) experienced biliary leakage. Clavien-Dindo Grade 1 to 4b complication occurred in 24 (34.8%) cases. Grade 3a and more serious complication were reported in 6 (8.7%) cases. Median postoperative hospital stay was 9.6 days (2-137). No mortality occurred.

Intraoperative transfusion requirement was more common in enucleation than resections (78.1% vs. 48.6%, p=0.012). Two groups were found to be similar in terms of patient characteristics, disease presentation, complications and postoperative laboratory values (Table 1). Lesion diameters were also reviewed, and study cohort was splitted into two groups one with lesions with diameter of more than 4 cm (giant hemangioma) and one with lesions with diameter of 4 cm or less. Giant hemangiomas were found to be more common in females than males (85.4% vs. 61.9% p=0.029). Intraoperative erythrocyte transfusion requirement was more frequently reported in operations of giant hemangiomas (68.5% vs. 40.0%,

p=0.044). Complications were observed more frequently in giant hemangioma group regardless of grades (40.7% vs. 13.3%, p=0.049) (Table 2).

Table 1. Main characteristics and outcomes of study cohort	
	Mean (± SD) or n (%)
Female gender	48 (69.6%)
Age (years)	51.9 ± 11.0
Incidental	32 (46.4%)
Pain	32 (46.4%)
Platelet count (10^3/mm^3)	193.1 ± 64.3
Giant hemangioma	54 (78.3%)
Lesion diameter (cm)	7.5 ± 4.2
Number of lesions	1.6 ± 1.4
Enucleation	32 (46.4%)
Liver resection	37 (53.6%)
Laparoscopy	8 (11.6%)
Hospital stays (days)	9 (5-28)
Erythrocyte transfusion	43 (62.3%)
Postoperative peak ALT (U/L)	201.3 ± 307.8
Postoperative peak bilirubin (mg/dL)	1.1 ± 0.6
Postoperative biliary leak	2 (2.9%)
Complication	24 (34.8%)
≥ Grade 3a complication	6 (8.7%)

Table 2. Comparison of small hemangiomas vs. giant hemangiomas in terms of characteristics and outcomes			
	Small (n = 15)	**Giant (n = 54)**	**p**
Female gender	7 (46.7%)	41 (75.9%)	**0.029**
Age (years)	55.7 ± 10.5	50.8 ± 11.0	0.124
Incidental	7 (46.7%)	25 (47.2%)	0.973
Pain	4 (26.7%)	28 (51.9%)	0.084
Platelet count (10^3/mm^3)	175.3 ± 54.2	197.7 ± 66.3	0.248
Thrombocytopenia	5 (35.7%)	13 (24.1%)	0.379
Enucleation	6 (40.0%)	26 (48.1%)	0.576
Liver resection	9 (60.0%)	28 (51.9%)	0.576
Number of lesions	1.1 ± 0.4	1.8 ± 1.5	**0.001**
Margin positivity	3 (20.0%)	10 (18.5%)	0.897
Laparoscopy	3 (20.0%)	5 (9.3%)	0.250
Hospital stays (days)	6 (5-9)	7 (5-28)	0.593
Erythrocyte transfusion	6 (40.0%)	37 (68.5%)	**0.044**
Peak ALT (U/L)	143.1 ± 154.5	216.7 ± 336.3	0.430
Peak bilirubin (mg/dL)	1.3 ± 0.7	1.0 ± 0.5	0.168
Biliary complication	1 (6.7%)	1 (1.85%)	0.276
Any complication	2 (13.3%)	22 (40.7%)	**0.049**
≥ Grade 3a complication	2 (13.3%)	4 (7.4%)	0.471

Characteristics of incidentally discovered lesions were found to be statistically similar with symptomatic cases. Hospital stay, complications and serious complications also found to be similar between these groups. Pain is more frequently reported as a symptom in females than males. (54.2% vs 28.6%, p=0.044). Laparoscopic operations were performed for only female patients (16.8% vs 0%, p= 0.047). There was no significant difference between male and female gender in terms of complications and other preoperative characteristics.

Hence no mortality occurred after surgeries in the study, complications after surgery compared as endpoint of the study. Patients evaluated as two groups: complicated, 24 (34.8%) patients, experiencing any grade of complications and non-complicated, 45 (65.2%) patients without any complications. Giant hemangiomas are more likely to experience any complication (p=0.049). Mean lesion diameter of complicated cases were also significantly greater (10.5 ± 4.8 vs. 5.9 ± 2.7, p=0.001) than mean lesion diameter of non-complicated cases. Median duration of hospital stay of complicated cases was found to be significantly longer than non-complicated cases (16 days vs. 6 days, p=0.001). Transfusion requirement was more frequent in complicated cases than non-complicated cases (79.2% vs. 53.3%, p=0.035). Mean postoperative peak total bilirubin level was found significantly higher than mean postoperative peak total bilirubin level of non-complicated cases (1.3 ± 0.7 vs. 0.9 ±0.5 mg/dL, p=0.042) (Table 3).

Table 3. Comparison of complicated vs not complicated cases			
	Complicated (n = 24)	**Not complicated (n = 45)**	**p**
Female	16 (66.7%)	32 (71.1%)	0.702
Age (years)	49.9 ± 10.7	52.9 ± 11.1	0.289
Incidental	12 (50.0%)	20 (45.5%)	0.720
Pain	11 (45.8%)	21 (46.7%)	0.947
Platelet count (10^3/mm^3)	186.8 ± 72.0	196.5 ± 60.3	0.559
Thrombocytopenia	8 (33.3%)	10 (22.2%)	0.343
Enucleation	14 (58.3%)	18 (40.0%)	0.146
Liver resection	10 (41.7%)	27 (60.0%)	0.146
Giant hemangioma	22 (91.7%)	32 (71.1%)	**0.049**
Lesion diameter	10.5 ± 4.8	5.9 ± 2.7	**0.000**
Number of lesions	1.5 ± 0.7	1.7 ± 1.6	0.677
Laparoscopy	1 (4.2%)	7 (15.6%)	0.159
Hospital stays (days)	16 (7-28)	6 (5-14)	**0.001**
Erythrocyte transfusion	19 (79.2%)	24 (53.3%)	**0.035**
Peak bilirubin (mg/dL)	1.3 ± 0.7	0.9 ± 0.5	**0.042**
Peak ALT (U/L)	310.4 ± 480.9	140.4 ± 107.7	0.100

Cases were evaluated according to grade 3a or higher (serious) complications. Preoperative thrombocytopenia was found more frequent in cases with serious complications (66.7% vs 22.2%, p=0.019). Mean preoperative platelet count of cases with serious complication was found lower than cases with low grades of complications or without complication (124.5 ±58.9 10^3/mL vs 199.7 ± 61.2 10^3/mL, p=0.005). As can be expected median postoperative hospital stay was found longer in cases with serious complications (15.5 days vs. 7 days, p=0.004). Mean postoperative peak total bilirubin level was found higher in cases with serious complications (1.8 ± 0.8 mg/dL vs. 1.0 ± 0.5, p=0.001).

DISCUSSION

First endpoint of the study, comparison of enucleation and resection, resulted with no significant difference in terms of complications and hospital stay. Groups characteristics were similar by chance making the comparison more valuable. Although transfusion requirement is more common in enucleation group conflicting with most of the literature. Probably high number of non-anatomic and anatomic resections as well as living donor liver surgeries made the surgeons of the unit more familiar to resections than enucleations that are performed limited numbers of cases less than ten annually. Enucleation of LH was first reported by Alper et al. (5) in 1988 ninety years after first resection for LH was performed by Hermann Pfannenstiel in 1898 (6). Resections if performed in a standardized manner using meticulous technique under low central venous pressure cause minimum blood loss, especially anatomical resections following intersegmental planes that are including only tiny pedicles under Pringle maneuver. In the literature search, authors met two recent meta-analyzes comparing the type of surgery of LH and including mostly same studies. In the first one including 9 studies blood loss, surgical time and hospital stay were found significantly lower in enucleation which is why it should be preferred operation for suitable lesions according to the conclusion of this analysis (7). Meta-analysis of Cheng et al. included 7 studies involving 913 patients. Authors reported less blood loss, shorter operation time and lower rate of postoperative complication according to pooled analysis of studies while the analysis revealed similar transfusion rates and inflow occlusion times (8). Our results are more in line with the retrospective study of Giuliante et al. including 40 surgeries for LH and resulting with no significant difference between enucleation and resection in terms of transfusion, duration of postoperative hospital stay, duration of surgery and morbidity (9). In another study including 86 patients with giant LHs larger than 10 cm Zhang et al. (10) reported no significant difference between enucleation group and resection group in terms of amount of blood loss, transfusion requirement, surgical time and postoperative hospital stay.

Although there are authors who suggest a higher diameter limit for the definition of giant hemangioma, here we assumed 4 cm as a limit for definition of giant LH. Higher transfusion rates in giant LH operations may be due to the larger surface of the plane between the LH and the liver parenchyma. Zhang et al. (10) reported significantly more intraoperative blood loss and higher complication rates and longer operation times among patients with lesions ≥ 15 cm than patients with lesions < 15 cm. Longer operation times and might be because of the time spent for ligature of vessels on the larger surface. Giuliante et al. (9) concluded risk of bleeding and blood transfusion was related more with the large size of the tumor than the type of surgical technique in his series. In the era of modern surgical practice size of LH is not considered to be a sole indication for surgery. But patients undergoing surgery for larger lesions should be informed about increased risk of adverse events and probable necessity of transfusion. Complication rates were found to be higher in our series as well.

In comparisons pain symptom is more frequent in female gender probably due to the larger mean size of LHs in females. Interestingly eight laparoscopic operation were performed in female patients. Probably cosmetic concerns took place in decision for the type of operation. Operative trends for benign disease demonstrate that the proportion of cases performed laparoscopically is increasing. Laparoscopic liver resection for benign lesions has lower intraoperative blood loss, frequency of complications, postoperative analgesic requirements, time to oral intake, and a shorter hospital stay (11). However potential risk of uncontrollable bleeding and gas embolism are major concerns of many surgeons.

We experienced no mortality as it is rarely seen in hemangioma surgery, but adverse events occurred. Patients which experienced serious complications had significantly lower platelet counts while lesion diameters were similar. Probably it was because of high blood flow inside the lesion theorically have potential to result with loss of thrombocytes (12). When we are evaluating any grade of complication occurred lesion size seems to be a risk factor as mean lesion diameter is greater in complicated cases.

This factor should be taken into account before surgery and while informing patients before consent. Proportion of transfusion requirement was found to be greater in complicated cases as well indicating cause of significant proportion of complications were results of bleeding.

Rate of hemangioma surgeries are decreasing in recent year. Non operative treatments and observation deserve attention in evaluating patients with LH. In a meta-analysis including 1485 patients 402 of whom underwent surgery authors concluded that surgery might take more risks than benefits for non-emergency LH patients (13). In another retrospective study from US 289 patients with giant hemangioma responded the survey. Life threatening events occurred 2% in non-operated group and 7% in surgery group without statistical significance in a mean follow up of 11 years and observation is preferred in most patients. Authors concluded that surgical treatment should be reserved for patients with severe symptoms or disease-associated complications. Persistence of symptoms were reported in only 11% of non-operated patients (14).

Non-surgical interventions including microwave or radiofrequency ablation and angioembolization in the treatment of LHs have been increasingly accepted worldwide. Transarterial angioembolization have promising results to replace surgery in most cases in the future. Furumaya et al. (15) found decrease in lesion size in 89.9% of patients and relief of preoperative symptoms in 98.5% of patients in a review of 18 cohort studies including 1284 cases of transarterial embolization or lipiodolization. In the same article only 2.7% of cases underwent surgery after transarterial intervention. This option also takes role in control of bleeding of ruptured hemangioma and decreasing risk of intraoperative bleeding by preoperative embolization of feeder arteries (16). Response rate of 98% without fatal complications was reported in a meta-analyze of 21 publications including 1450 patients (17). Radiofrequency ablation which can be applied percutaneously, laparoscopically or as an open procedure is considered as a safe, feasible, and effective procedure for LHs, even huge LHs in a consensus report from a Chinese panel of experts. Minimal invasiveness, definite efficacy, high safety, fast recovery, relatively simple operation, and wide applicability were listed as advantages of the procedure (18). There are also several reports regarding to successful utilization of microwave for hemangioma ablation (19–21). Radiotherapy albeit effective is rarely applied to hemangiomas because of adverse effects such as radiation hepatitis, veno-occlusive disease, and hepatoma (22,23). Sixteen patients were reported to be underwent liver transplantation for LH until 2019. Main indications were respiratory distress, massive hemorrhage and Kasabach-Merritt syndrome. No mortality reported after transplantation (24).

Although study cohort is one of the largest series in the literature limitations of this study include the retrospective design and the absence of long term follow up for late complications.

CONCLUSION

LH has been a very rare indication for surgery due to emerging interventional treatments and imaging modalities. Although there is still a set of patients requiring surgery even liver transplantation. Enucleation and liver resection are two main surgical approaches with similar outcomes while enucleation is associated with higher transfusion rates according to our study. Morbidity after surgery for hemangioma is more related with the size of the lesion and preoperative thrombocytopenia.

DECLARATIONS

Funding

The authors received no funding for the research, authorship and/or publication of this article from any government or private institution.

Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical Approval

This study was approved by the Ethics Committee of Ankara University School of Medicine (İ07-457-22) and was registered at Clinicaltrials.gov (NCT04669314). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Availability of Data and Material

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Authors' Contributions

Elvan Onur KIRIMKER: Conceptualization, data curation, project administration, formal analysis, writing – original draft, writing – review and editing. Süleyman Utku ÇELİK: Data curation, formal analysis, writing – original draft, writing – review and editing. Deniz KÜTÜK: Data curation, writing – original draft, writing – review and editing.

Şiyar ERSÖZ: Data curation, writing – original draft, writing – review and editing. Can KONCA: Data curation, writing – original draft, writing – review and editing. Mehmet Ali KOÇ: Data curation, writing – original draft, writing – review and editing. Acar TÜZÜNER: Conceptualization, writing – original draft, writing – review and editing. Mehmet Kaan KARAYALÇIN: Conceptualization, writing – original draft, writing – review and editing. Deniz BALCI: Conceptualization, writing – original draft, writing – review and editing.

REFERENCES

1. Ishak KG, Rabin L. Benign tumors of the liver. Med Clin North Am. 1975; 59 (4): 995–1013.
2. Hamaloglu E, Altun H, Ozdemir A, et al. Giant liver hemangioma: Therapy by enucleation or liver resection. World J Surg. 2005; 29 (7): 890–3.
3. Clavien PA, Barkun J, de Oliveira ML, et al. The Clavien-Dindo classification of surgical complications. Ann Surg. 2009; 250 (2): 187–96.
4. Agha R, Abdall-Razak A, Crossley E, et al. STROCSS 2019 Guideline: Strengthening the reporting of cohort studies in surgery. Int J Surg. 2019; 72: 156–65.
5. Alper A. Treatment of liver hemangiomas by enucleation. Arch Surg. 1988; 123 (5):660.
6. Nichols FC, van Heerden JA, Weiland LH. Benign liver tumors. Surg Clin North Am. 1989; 69 (2): 297–314.
7. Liu Y, Wei X, Wang K, et al. Enucleation versus anatomic resection for giant hepatic hemangioma: A meta-analysis. Gastrointest Tumors. 2016; 3 (3–4): 153–62.
8. Cheng W, Qi Y, Wang B, et al. Enucleation versus hepatectomy for giant hepatic haemangiomas: a meta-analysis. Ann R Coll Surg Engl. 2017; 99 (3): 237–41.
9. Giuliante F, Ardito F, Vellone M, et al. Reappraisal of surgical indications and approach for liver hemangioma: Single-center experience on 74 patients. Am J Surg. 2011; 201 (6): 741–8.
10. Zhang W, Huang Z-Y, Ke C-S, et al. Surgical treatment of giant liver hemangioma larger than 10 cm. Medicine. 2015; 94 (34): e1420.
11. Croome KP, Yamashita MH. Laparoscopic vs open hepatic resection for benign and malignant tumors: An updated meta-analysis. Arch Surg. 2010; 145 (11): 1109–18.
12. Lim KJ, Kim KW, Jeong WK, et al. Colour Doppler sonography of hepatic haemangiomas with arterioportal shunts. Br J Radiol. 2012; 85 (1010): 142–6.
13. Tuxun T, Apaer S, Zhou C, et al. Surgery vs. observation for liver hemangioma: a systematic review and meta-analysis. Hepatogastroenterology. 2014; 61 (136): 2377–82.
14. Schnelldorfer T, Ware AL, Smoot R, et al. Management of giant hemangioma of the liver: Resection versus observation. J Am Coll Surg. 2010; 211 (6): 724–30.
15. Furumaya A, van Rosmalen BV, Takkenberg RB, et al. Transarterial (chemo-) embolization and lipiodolization for hepatic haemangioma. Cardiovasc Intervent Radiol. 2019; 42 (6): 800–11.
16. Talebpour M, Zabihi-Mahmoudabadi H, Payandemehr P, et al. An effective method for controlling bleeding in a ruptured hepatic hemangioma: A case report. Adv J Emerg Med. 2018; 3 (1): e10.
17. Torkian P, Li J, Kaufman JA, et al. Effectiveness of transarterial embolization in treatment of symptomatic hepatic hemangiomas: Systematic review and meta-analysis. Cardiovasc Intervent Radiol. 2021; 44 (1): 80–91.
18. Gao J, Fan R-F, Yang J-Y, et al. Radiofrequency ablation for hepatic hemangiomas: A consensus from a Chinese panel of experts. World J Gastroenterol. 2017; 23 (39): 7077–86.
19. Tang XY, Wang Z, Wang T, et al. Efficacy, safety and feasibility of ultrasound-guided percutaneous microwave ablation for large hepatic hemangioma. J Dig Dis. 2015; 16 (9): 525–30.
20. Liu F, Yu X, Liang P, et al. Ultrasonography-guided percutaneous microwave ablation for large hepatic cavernous haemangiomas. Int J Hyperthermia. 2018; 34 (7): 1061–6.
21. Tang X, Ding M, Lu B, et al. Outcomes of ultrasound-guided percutaneous microwave ablation versus surgical resection for symptomatic large hepatic hemangiomas. Int J Hyperthermia. 2019; 36 (1): 632–9.
22. Biswal BM, Sandhu M, Lal P, et al. Role of radiotherapy in cavernous hemangioma liver. Indian J Gastroenterol. 1995; 14 (3): 95–8.
23. Gaspar L, Mascarenhas F, Sáda Costa M, et al. Radiation therapy in the unresectable cavernous hemangioma of the liver. Radiother Oncol. 1993; 29 (1): 45–50.
24. Prodromidou A, Machairas N, Garoufalia Z, et al. Liver transplantation for giant hepatic hemangioma: A systematic review. Transplant Proc. 2019; 51 (2): 440–2.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 125-135
https://doi.org/10.31067/acusaglik.1195985

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Anatomy / Anatomi

Shape Analysis and Morphometric Evaluation of the Obturator Foramen in Dry Human Bones

Kemal Emre Özen[1], **Hüma Kaçar**[1]

[1]Department of Anatomy, Faculty of Medicine, İzmir Kâtip Çelebi University, İzmir, Turkey

Kemal Emre ÖZEN
Hüma KAÇAR

ABSTRACT

Purpose: This study aims to analyze the shape and morphometric features of the obturator foramen (OF) in dry human bones.

Methods: Forty-six (Right:15, Left:31) dry human coxal bones were evaluated. Photographs of samples for morphometric measurements were taken using a transparent osteometric box (TOB) designed for this study. Horizontal and vertical diameters of OF were measured according to two different principles. Measurements were taken to determine the localization of OF on the coxal bone (hip bone) relative to the acetabulum, pubis, and ischium. Shape analysis (visual classification) of OF was performed with the conventional method. In order to examine the shape variations of the OF in more detail, quantitative shape analysis based on Elliptic Fourier Analysis was performed with the SHAPE software.

Results: A significant difference was observed between the diameter measurements obtained by the two methods ($p<0,001$). After the qualitative shape analysis 6 types were determined in the qualitative shape analysis (oval, ellipsoid, piriform, trapezoidal, triangular, and atypical). Researchers agreed on the shape types of 16 bones. Quantitative shape analysis revealed 77 principal components (PC). The first nine significant PC explained the variation in the shape of OF cumulatively by 92,61%.

Conclusion: The standard position, defined for the first time in this study, is recommended as an easy-to-reproduce position for dry bone measurements or radiological morphometric studies. The conventional shape analysis method (visual typing) is not capable of sufficient evidence-based discrimination. Therefore, examining the shape features of OF based on quantitative findings such as Elliptic Fourier Analysis may yield more accurate results.

Keywords: Obturator foramen; Hip bone; Morphometry; Morphology; Elliptic Fourier Analysis; Principal Component Analysis

Kuru İnsan Kemiklerinde Foramen Obturatum'un Morfometrik Özellikleri ve Şekil Analizi

ÖZET

Amaç: Bu araştırmanın amacı foramen obturatum'un (FO) detaylı morfometrik ve morfolojik şekil analizinin yapılmasıdır.

Yöntem: Çalışmada 46 (sağ:15, sol:31) adet kuru os coxae incelenmiştir. Morfometrik ölçümlerde bu çalışma için tasarlanmış şeffaf osteometrik kutu kullanılarak standart bir pozisyon belirlenerek örneklerin fotoğrafları alınmıştır. FO'nun iki farklı prensibe göre horizontal ve vertikal çapları ölçülmüştür. FO'nun os coxa üzerindeki lokalizasyonun acetabulum'a, pubis'e ve ischium'a göre belirlenmesi için ölçümler alınmıştır. FO'nun konvansiyonel yöntemle şekil analizi (görsel tiplendirme) yapıldı. FO'nun şekil varyasyonlarının daha ayrıntılı incelenmesi için SHAPE yazılımı ile Eliptik Fourier Analizi temeline dayanan kantitatif şekil analizi yapılmıştır.

Bulgular: İki farklı yöntemle elde edilen çap ölçümleri arasında anlamlı farklılık bulunmaktadır ($p<0,001$). Kalitatif şekil analizinde 6 görsel tip tespit (oval, elips, piriform, yamuk, üçgen, atipik) edilmiştir. Araştırmacılar 16 kemiğin şekil tipi üzerinde mutabık kalmışlardır. Kantitatif şekil analizinde 77 temel bileşen (TB) ortaya çıkmıştır. İlk 9 anlamlı TB, FO'nun şeklindeki varyasyonu kümülatif olarak %92,61 oranında açıklamaktadır.

Sonuç: İlk kez bu çalışma ile tanımlanıp kullanılan standart pozisyon ile, kuru kemiklerde veya radyolojik morfometrik çalışmalar için literatüre standardize edilmesi kolay ve tekrarlanabilir bir pozisyon önerilmektedir. Konvansiyonel şekil analiz yöntemi (görsel tiplendirme) yeterli düzeyde kanıta dayalı diskriminasyon gücünde değildir. Bu nedenle FO'nu şekil özelliklerini Eliptik Fourier Analizi gibi kantitatif bulgulara dayanarak incelemek daha doğru sonuçlar verebilir.

Anahtar Kelimeler: Foramen obturatum; Coxa; Pelvis; Morfometri; Morfoloji; Eliptik Fourier Analizi, Temel Bileşen Analizi

Correspondence: Kemal Emre Özen
Department of Anatomy, Faculty of Medicine, İzmir Kâtip Çelebi University, İzmir, Turkey
Phone: +902322706015
E-mail: kemalemre9870@yahoo.com

Received: 31 October 2022
Accepted: 19 February 2023

The ilium, ischium, and pubis begin to fuse at 14-16 years of age and become a single bone and form the coxal bone (hip bone). The obturator foramen (OF) formed by the pubis and ischium is a structure with clinical and anthropometric importance. Especially the hip bone is one of the bones that allows us to reach reliable and accurate results in sex determination in anthropology (1). In the literature, the morphological features of OF have been examined together with other anatomical structures belonging to coxal bone (2, 3). There are studies investigating the dimorphic feature of OF according to gender (4). It has been reported that it is larger and oval in shape in men, and smaller and triangular in women (4). Morphometric details and shape type characteristics of OF can provide helpful information in forensic science, such as sex and age determination (5, 6). In addition to anthropological research, OF and surrounding anatomical structures are essential in clinical anatomy. In surgical procedures performed in this region (such as transobturator band placement, obturator nerve blockage, obturator bypass, tumor surgery, hernia repair, and traumas), care should be taken against the vascular structures (7-9). Considering the anatomical structure of OF and the morphometric relationship of the anatomical structures of the OF may reduce the risk of injuries to the neurovascular structures within the obturator canal during the procedures like surgical treatment of the urinary incontinence (8).

In the literature, it seems that the morphological features of OF have not been revealed in sufficient detail. Methodological standardization inconsistencies or uncertainties regarding morphometric methods for OF have also been observed. More detailed analysis of the morphological features of OF may lead to more successful results in areas such as sex or age determination. Based on these reasons, our research aimed to make a detailed morphometric/morphological analysis of OF. In this research, morphometric measurements were taken based on anthropometric points on the acetabulum, pubis, and ischium. The location of the OF on the coxal bone and its relations with the bone structures were examined. In addition, qualitative shape analysis and quantitative shape analysis based on the Elliptic Fourier method were used to explain the shape properties of OF.

Material and Method

Dry bone collection of the department of anatomy was evaluated. Coxal bones with any deformation in the OF were excluded. Forty-six (Right: 15, Left: 31) dry coxal bones were included in the study. There are no demographic documents such as age, gender, or cause of death of the donors of the bones. Right and left coxal bones are independent bones. They do not belong to the same individual. Institutional ethics committee approval was obtained prior to this study.

General Morphometric Measurements of the Coxal Bones

A digital caliper was used to measure the height and width of the coxal bones. The distance between the lowest point of the ischial tuberosity and the highest point of the iliac crest was measured for height. The distance between the anterior superior iliac spine and posterior superior iliac spine was measured for width (10).

Standard Position for Photograph in Morphological Evaluation

In our study, photographs of the hip bones were taken in a standard position. Canon 800D camera was used for photography. The studio environment used for taking photographs and the transparent osteometric box (TOB) designed for standardization of the position for photography are presented in Figure 1. In the photographing setup, spirit levels, bone landmarks, and a TOB were used to provide imaging standardization based on the principal plane and axes (Figure 1a). The movements of the bones depending on the planes and their rotation due to the axes are prevented. The TOB is made of transparent mica (Figure 1b). The TOB has a cubic design with six equal surfaces perpendicular to each other. (Figure 1c). The standard position description for photography is presented in Figure 2, accompanied by a visual.

Figure 1a. Photography methodology. Photographing setup

Figure 1b. Photography methodology. Transparent Osteometric Box (TOB)

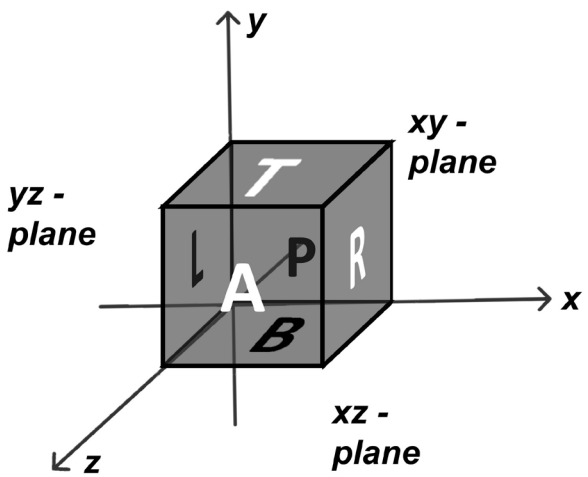

Figure 1c. Photography methodology. Design of the TOB. Surfaces of the TOB: Anterior (A), posterior (P), right (R), left (L), top (T), bottom (B)

Morphometric Evaluation of Obturator Foramen

ImageJ (Rasband, W.S., ImageJ, U. S. National Institutes of Health, Bethesda, Maryland, USA, https://imagej.nih.gov/ij, 1997–2018) software was used for measurements on photographs of hip bones.

Morphometric Landmarks and Measurements Regarding the Obturator Foramen

The landmarks and descriptions of morphometric measurements related to OF are presented in Figure 3. SHAPE v.1.3 software was used to measure the area of the OF (11).

Morphometric Landmarks and Measurements Regarding the Localization of the Obturator Foramen on the Coxal Bone

The landmarks and descriptions of morphometric measurements related to the localization of OF on the coxal bone are presented in Figure 3.

Shape Analysis

Qualitative Shape Analysis of Obturator Foramen

In the current study, conventional shape analysis (visual typing) was performed first for the shape typing of OF. Qualitative shape analysis (visual typing) was performed on photographs taken in standard position (Figure 2). Visual typing is based on OF's analogy to any geometric shapes. All photos have been reviewed several times. Then the geometric shape that each OF resembles was noted. In this preliminary examination, it was observed that five geometric models (shape types) were dominant. Then, OFs were re-evaluated and included in the appropriate type group. The atypical group was created for shapes that do not fit any typing. The dominant geometric models (shape types) determined for OF are presented in Figure 4.

Quantitative Shape Analysis of Obturator Foramen

In order to reveal the variations in the shape structure of the OF in more detail, a quantitative shape analysis based on Elliptic Fourier Analysis (EFA) was performed. SHAPE v.1.3 software was used for quantitative shape analysis of OF (11). EFA conducted by SHAPE seeks patterns in the expression of the shape and presents them as principal component analysis (PCA) findings. PCA detects the individual-to-individual variation in the shape by identifying the principal components (PC) (11). Elliptic Fourier Analysis (EFA) is a numerical method that allows the outline of a shape to be comprehensively measured and described (6). In addition, the SHAPE software ranks these PCs in decreasing order of importance; The first PC explains the most significant part of the shape variance, while the subsequent PCs explain less. For each of the PCs, a single numerical PC score is generated that describes the shape characteristics of that sample. The SHAPE software also creates a drawing of each PC in the sample, allowing the researcher to observe how that aspect of the shape changes across its endpoints. The mean shape of a significant PC is given as the reference point, and shapes within ±2 standard deviations from the mean shape are also produced (12). In order to perform the quantitative shape analysis of the OF, the OF images in the position described in Figure 2 were transferred to the SHAPE software after processing with the technical adjustments required by the software. As a result, EFA with the SHAPE software provided the PCs that affect the shape variation and the contribution ratios of PCs to the shape variation.

Figure 2. Standard photography position

Description of the standard position of photography:

- Anterior superior iliac spine (ASIS) (short black arrow, #1), the most lateral point of the ischial tuberosity (long black arrow, #2), and pubic tubercle (short white arrow, #3) are fixed on the A surface of the transparent osteometric box (TOB)
- ASIS (short black arrow, #1) and the most superior point of the articular surface of the pubic symphysis (long white arrow, #4) are fixed on the L surface of the TOB
- The optical axis of the camera is perpendicular to the A surface of the TOB and traverses through the center of the obturator foramen (OF)
- The center of the lens of the camera is fixed 30 cm away from the borders of the OF

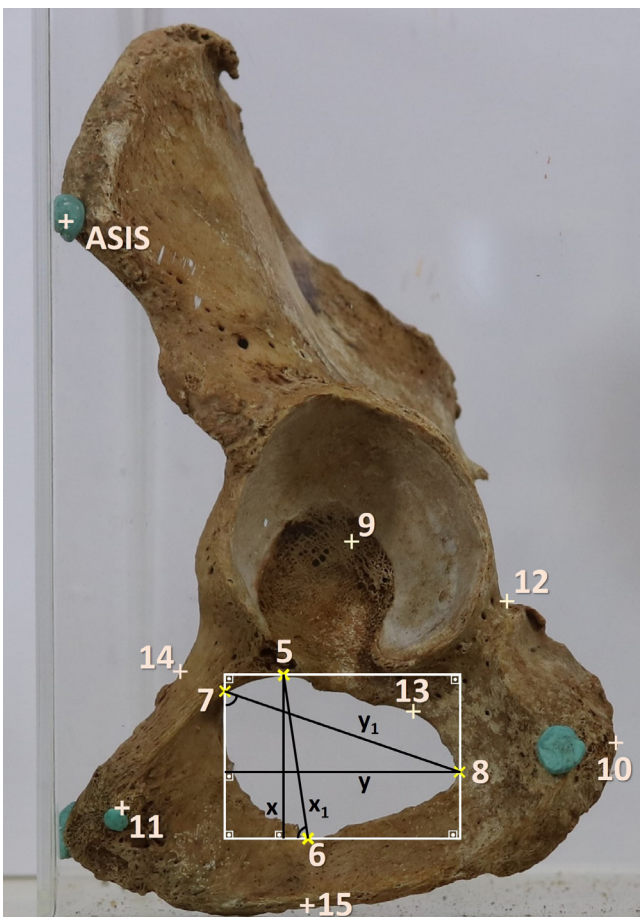

Figure 3. Osteometric landmarks and measurements on the left coxal bone

Osteometric Landmarks:

#5: The most superior point of the OF
#6: The most inferior point of the OF
#7: The most anterior point of the OF
#8: The most posterior point of the OF
#9: the intersection of the vertical and horizontal diameters of the acetabulum
#10: The most posterior point of the ischial tuberosity
#11: pubic tubercle
#12: The closest point to the margin OF located on the posterior aspect of the ischium
#13: The intersection point of the "margin of the OF" and "the perpendicular line from the #12 to the margin of the OF."
#14: The intersection point of "the pecten pubis (pectineal line)" and "the perpendicular line from the #7 to the pecten pubis (pectineal line)."
#15: The intersection point of the "lower border of the ischiopubic ramus, and "the perpendicular line from the #6 to the lower border of the ischiopubic ramus."
ASIS: Anterior Superior Iliac Spine

Morphometric Measurements:

A. Measurements regarding the OF

a) Vertical diameter measurements of OF
i) The direct distance between the most superior and the most inferior points of the OF (x1, between #5 and #6)
ii) The vertical distance between the tangents of the #5 and #6 (x, between #5 and the horizontal line traversing the #6)
b) Horizontal diameter measurements of OF
i) The direct distance between the most anterior and the most posterior points of the OF (y1, between #8 and #7)
ii) The horizontal distance between the tangents of the #8 and #7 (y, between the #8 and the vertical line traversing the #7)
c) Measurements regarding the thickness of the bony structures surrounding the OF
i) Distance from OF to Ramus of the ischium (between #12 and #13)
ii) Distance from the most anterior point of OF to Superior pubic ramus (between #7 and #14)
iii) Distance from the most inferior point of OF to ischiopubic ramus (between #6 and #15)

B. Measurements Regarding the Localization of the Obturator Foramen on the Coxal Bone

a) Measurements representing the morphometric relationship with the acetabulum
i) Distance from acetabulum to the most anterior point of OF (between #9 and #7)
ii) Distance from acetabulum to the most posterior point of OF (between #9 and #8)
iii) Distance from acetabulum to the most superior point of OF (between #9 and #5)
iv) Distance from acetabulum to the most inferior point of OF (between #9 and #6)
b) Measurements representing the morphometric relationship with the ischium
i) Distance from ischial tuberosity to the most anterior point of OF (between #10 and #7)
ii) Distance from ischial tuberosity to the most posterior point of OF (between #10 and #8)
iii) Distance from ischial tuberosity to the most superior point of OF (between #10 and #5)
iv) Distance from ischial tuberosity to the most inferior point of OF (between #10 and #6)
c) Measurements representing the morphometric relationship with the pubis
i) Distance from the pubic tubercle to the most anterior point of OF (between #11 and #7)
ii) Distance from the pubic tubercle to the most posterior point of OF (between #11 and #8)
iii) Distance from the pubic tubercle to the most superior point of OF (between #11 and #5)
iv) Distance from the pubic tubercle to the most inferior point of OF (between #11 and #6)

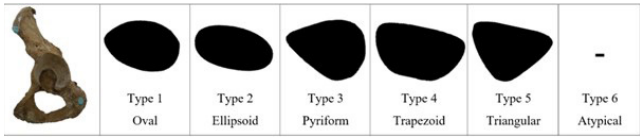

Figure 4. Visual types of obturator foramen detected by qualitative shape analysis

PC	Eigenvalue	Variation (%)	Cumulative Variation (%)	Superposition of the extreme variants (P← →A)	-2 SD	Mean	+2 SD
PC 1	2,25	41,69	41,69				
PC 2	1,11	20,57	62,26				
PC 3	6,13	11,37	73,63				
PC 4	3,02	5,60	79,23				
PC 5	2,32	4,31	83,54				
PC 6	1,63	3,02	86,57				
PC 7	1,30	2,41	88,98				
PC 8	1,07	1,98	90,96				
PC 9	8,89	1,65	92,61				

A: Anterior, P: Posterior, PC: Principal Component

Figure 5. Principal component analysis (PCA) for the shape of the obturator foramen (n=46)

Statistical Analysis

Statistical analyzes of the study were carried out with the IBM SPSS Statistics 25.0 (IBM Corp., Armonk, New York, USA). Descriptive statistics of the variables in the study, number of units, minimum value, maximum value, and mean±standard deviation (Mean±SD) values were presented. The distribution characteristics of the data were investigated with the Shapiro-Wilk test. All the data obtained by the measurements meet the parametric test assumptions. Side comparisons were examined with the independent samples T-test since the right, and left side bones did not belong to the same individual. Cohen's Kappa coefficient was used for the agreement of observers about the qualitative shape analysis findings. The statistical significance level was accepted as α=0.05.

Results

General Morphometric Measurements of the Coxal Bones

Depending on the deformations in coxal bones, measurements were taken from 44 samples for height and 34 for width. General morphometric variables of coxal bones are presented in Table 1. There was no statistically significant difference between the right and left sides for both height and width variables.

Morphometric Evaluation of Obturator Foramen

Measurements Regarding the Obturator Foramen

Measurements related to OF are presented in (Table 2). There were significant differences between the findings retrieved with different diameter measurements. "The direct distance between the most superior and the most inferior points of the OF (x1, distance between #5 and #6)" is significantly higher than the "The vertical distance between the tangents of the #5 and #6 (x, distance between #5 and the horizontal line traversing the #6)" ($p<0,001$, Table 2). "The direct distance between the most anterior and the most posterior points of the OF (y1, distance between #8 and #7)" is significantly higher than the "The horizontal distance between the tangents of the #8 and #7 (y, distance between the #8 and the vertical line traversing the #7)" ($p<0,001$, Table 2). The distance "from the most inferior point of OF to ischiopubic ramus (between #6 and #15)" was significantly higher on the left than on the right.

The area of OF was determined by SHAPE as 1072,68±170,97 (n:46) mm^2. There was no statistically significant difference between right side measurements [1123,30±207,24 (n:15)] and left side measurements [1048,19±148,00 (n:31)].

Measurements Regarding the Localization of the Obturator Foramen on the Coxal Bone

The findings of the variables representing the localization of OF are presented in Table 3. There was a statistically significant difference between the parties for the variable "Distance from acetabulum to the most superior point of OF (between #9 and #5)" ($p<0,05$, Table 3).

Shape Analysis

Qualitative Shape Analysis Results of Obturator Foramen

OF was assigned to 5 geometric model (shape types) types by two researchers. Those that could not be assigned to a particular geometric model were typed as atypical. The qualitative typing decisions of the two researchers and the number of cases they agreed and disagreed with are presented in Table 4. Cohen's Kappa coefficient was 0,50.

Table 1. General morphometric variables of the coxal bones (mm)						
Variable	**Side**	**n**	**Min**	**Max**	**Mean±SD**	**p***
Height of the coxal bones	Right	14	177,04	220,00	201,10±12,94	0,243
	Left	30	176,57	229,71	205,97±12,57	
	Total	44	176,57	229,71	204,42±12,75	
Width of the coxal bones	Right	10	128,16	169,01	151,11±12,57	0,854
	Left	24	125,49	172,34	150,33±10,64	
	Total	34	125,49	172,34	150,56±11,05	
** Independent samples T-test (comparison of the right and left sides)*						

Table 2. Measurements regarding the obturator foramen (OF) (n=46, mm).						
Variable (Measurement)	**Side**	**n**	**Min**	**Max**	**Mean±SD**	**p***
Vertical diameter measurements of OF						
The direct distance between the most superior and the most inferior points of the OF (x1, between #5 and #6)	Right	15	30,28	47,18	37,69±4,25	0,702
	Left	31	26,35	46,55	37,15±4,46	
	Total	46	26,35	47,18	37,33±4,35 [a]	
The vertical distance between the tangents of the #5 and #6 (x, between #5 and the horizontal line traversing the #6)	Right	15	28,46	46,00	36,54±4,41	0,715
	Left	31	26,00	46,23	36,05±4,14	
	Total	46	26,00	46,23	36,21±4,19 [a]	
Horizontal diameter measurements of OF						
The direct distance between the most anterior and the most posterior points of the OF (y1, between #8 and #7)	Right	15	43,65	58,95	50,62±3,79	0,794
	Left	31	43,86	57,45	50,32±3,58	
	Total	46	43,65	58,95	50,41±3,61 [b]	
The horizontal distance between the tangents of the #8 and #7 (y, between the #8 and the vertical line traversing the #7)	Right	15	40,38	58,80	47,99±4,81	0,902
	Left	31	40,70	55,38	47,83±3,55	
	Total	46	40,38	58,80	47,88±3,95 [b]	
Measurements regarding the thickness of the bony structures surrounding the OF						
Distance from OF to Ramus of the ischium (between #12 and #13)	Right	15	25,08	33,10	29,08±2,39	0,211
	Left	31	24,95	35,55	30,16±2,82	
	Total	46	24,95	35,55	29,80±2,71	
Distance from the most anterior point of OF to Superior pubic ramus (between #7 and #14)	Right	15	11,20	19,18	15,91±2,14	0,822
	Left	31	10,25	21,78	16,11±3,13	
	Total	46	10,25	21,78	16,04±2,82	
Distance from the most inferior point of OF to ischiopubic ramus (between #6 and #15)	Right	15	8,75	15,34	11,60±2,14	0,024
	Left	31	8,47	18,16	13,33±2,43	
	Total	46	8,47	18,16	12,77±2,46	
** Independent samples T-test (comparison of the right and left sides)* *[a] Significant difference between the findings of two vertical diameter measurement methods of OF (p<0,001).* *[b] Significant difference between the findings of two horizontal diameter measurement methods of OF (p<0,001*						

Table 3. Measurements regarding the localization of the obturator foramen (OF) on the coxal bone (n=46, mm)						
Variable (Measurement)	**Side**	**n**	**Min**	**Max**	**Mean±SD**	**p***
Measurements representing the morphometric relationship with the acetabulum						
Distance from acetabulum to the most anterior point of OF (between #9 and #7)	Right	15	36,40	57,70	45,18±6,86	0,811
	Left	31	38,08	56,12	45,59±4,66	
	Total	46	36,40	57,70	45,45±5,40	
Distance from acetabulum to the most posterior point of OF (between #9 and #8)	Right	15	47,50	61,34	54,78±4,05	0,530
	Left	31	45,00	62,27	55,60±4,17	
	Total	46	45,00	62,27	55,33±4,11	
Distance from acetabulum to the most superior point of OF (between #9 and #5)	Right	15	28,68	34,94	31,63±2,10	0,028
	Left	31	26,99	40,83	33,65±3,09	
	Total	46	26,99	40,83	33,00±2,94	
Distance from acetabulum to the most inferior point of OF (between #9 and #6)	Right	15	57,61	72,12	65,29±4,45	0,492
	Left	31	55,60	77,21	66,28±4,58	
	Total	46	55,60	77,21	65,96±4,52	
Measurements representing the morphometric relationship with the ischium						
Distance from ischial tuberosity to the most anterior point of OF (between #10 and #7)	Right	15	68,58	91,67	77,97±5,77	0,210
	Left	31	70,04	87,00	79,85±4,10	
	Total	46	68,58	91,67	79,23±4,73	
Distance from ischial tuberosity to the most posterior point of OF (between #10 and #8)	Right	15	27,20	38,95	31,56±2,96	0,465
	Left	31	27,57	37,21	32,17±2,47	
	Total	46	27,20	38,95	31,97±2,62	
Distance from ischial tuberosity to the most superior point of OF (between #10 and #5)	Right	15	52,81	81,26	66,84±6,78	0,365
	Left	31	53,71	81,71	68,90±7,32	
	Total	46	52,81	81,71	68,23±7,14	
Distance from ischial tuberosity to the most inferior point of OF (between #10 and #6)	Right	15	58,73	80,81	65,83±5,50	0,228
	Left	31	53,11	74,32	63,96±4,54	
	Total	46	53,11	80,81	64,57±4,89	
Measurements representing the morphometric relationship with the pubis						
Distance from the pubic tubercle to the most anterior point of OF (between #11 and #7)	Right	12	17,76	33,70	28,97±4,73	0,207
	Left	26	20,94	39,96	31,38±5,65	
	Total	38	17,76	39,96	30,62±5,43	
Distance from the pubic tubercle to the most posterior point of OF (between #11 and #8)	Right	12	62,93	75,96	71,49±4,26	0,229
	Left	26	66,01	86,20	73,59±5,18	
	Total	38	62,93	86,20	72,93±4,95	
Distance from the pubic tubercle to the most superior point of OF (between #11 and #5)	Right	12	28,29	49,39	43,87±5,52	0,403
	Left	26	34,31	54,26	45,48±5,41	
	Total	38	28,29	54,26	44,97±5,42	
Distance from the pubic tubercle to the most inferior point of OF (between #11 and #6)	Right	12	37,41	46,82	42,73±2,95	0,170
	Left	26	34,29	64,28	45,45±6,39	
	Total	38	34,29	64,28	44,59±5,64	

** Independent samples T-test (comparison of the right and left sides)*
Descriptions of the landmarks are presented in Figure 3

Table 4. Qualitative analysis of obturator foramen (OF). Researchers' agreement and consistency in visual typing (n, %)								
		2nd Researcher						
		Oval	Ellipsoid	Pyriform	Trapezoid	Triangular	Atypical	Total
1st Researcher	Oval	4*	0	1	3	0	2	10 (21,7)
	Ellipsoid	7	1*	0	1	0	3	12 (26,1)
	Pyriform	2	0	3*	3	0	1	9 (19,6)
	Trapezoid	1	0	0	1*	0	0	2 (4,3)
	Triangular	1	0	0	3	7*	0	11 (23,9)
	Atypical	1	0	0	1	0	0*	2 (4,3)
	Total	16 (34,8)	1 (2,2)	4 (8,7)	12 (26,1)	7 (15,2)	6 (13,0)	46 (100,0)
** Number of the cases in which the researcher agreed on a particular type*								

Quantitative Shape Analysis Results of Obturator Foramen

In the quantitative shape analysis of OF, 77 PCs were identified that explained the shape variation of OF. The PCs that had a significant effect on the shape of the OF are presented in Figure 5. The first nine significant PCs presented in Figure 5 explain the variation in the shape of the OF cumulatively at a rate of 92,61%. PC 1 has the most significant influence on explaining the variation of shape. PC 1 explains 41,69% of the variation in shape (Figure 5).

Discussion

Clinical anatomical evaluation of OF is essential regarding the neurovascular structures passing through it and the anatomical structures neighboring it. Morphometric data of OF can guide clinicians in procedures such as transobturator tape placement, obturator nerve blockade, and obturator bypass surgery (7-9). The femoral head may penetrate the OF in orthopedic conditions such as hip dislocation (13, 14). Morphometric evaluation of OF may increase surgical restoration's success in treating such traumatic problems (13, 14).

In forensic science or anthropology, sex determination is a greater problem in skeletal remains with missing bone structures than in whole skeletons (15). In such cases, the smallest bone fragment obtained would be expected to give any clue for identification. The pelvis is considered one of the most reliable bones for sex determination relative to other bones in the body. The characteristic morphology of the human pelvis, like many bones of the human skeleton, may differ in gender, age, and race (15-17). Although most of the sexual dimorphism of the pelvis is explained by size differences, the gender-related shape variation is also very striking (15). It cannot be accepted as an allometric result of differences in body measurements between the sexes (15). From this perspective, examining the FO as a major pelvis structure can yield evidence-based findings in anatomical, anthropological, and forensic sciences.

Explanation of skeletal system morphology with numerical data enables researchers to perform repeatable, objective, and structured tests. For this purpose, it has been tried to explain the shape variations in the skeletal system using the SHAPE software. SHAPE outputs consist of PCs and images related to the shape variation. There are reports using this software in the literature (5, 12, 18, 19).

The coxal bone is irregular and partially flat. Morphometric studies require measurements of the hip bone in a standard position for consistency and reproducibility. We could not reach sufficiently detailed and confidently reproducible position descriptions for morphometric measurements of an irregular bone such as coxal bone (10, 20-23). In our study, a reproducible standard photographic position was tried to be achieved by preventing rotation in three axes for the coxal bone. It is considered that measurement variability will be high in studies where the standard photographing method or measurement position is unclear. The landmarks used in the measurements of such studies may vary depending on the position of the bone in the three-dimensional environment. Methodologic standardization will increase reliability and reproducibility for both landmarks and measurements.

Since tools such as 3D (three-dimensional) digital modeling were not used in the methodology of this study, indirect measurements were taken on the projections of the axes and surfaces representing the three-dimensional environment. Pullanna et al. (24) used a three-sided osteometric board to measure the bone height of the hip bone. In some studies, reporting the measurements obtained

using an osteometric board, the position description of the bone was unclear, although the landmarks were defined (15, 24-27). In the current study, the box design of Pullana et al. (24) was improved, and the TOB was designed such standard position and photographing could be made more accurately (Figure 1).

It is thought that the TOB used in this study may also be helpful for further research on bone morphology. Transverse, sagittal, and frontal planes and vertical, sagittal, and transverse axes were used to ensure the position standard of the coxal bone in the TOB. (Figure 1). In order to prevent the rotation of the coxal bone in 3 axes, the bone was fixed in at least two planes using selected anatomical landmarks (Figure 2). With this principle, hip bone measurements can be standardized. The standard position of our method for coxa can be considered a strong aspect of the work in terms of easy applicability and reproducibility. In terms of reproducibility, this feature of current research may contribute to the standardization of bone positions not only for dry bone research but also for radiological studies using the digitally 3D reconstructed views of the individuals.

While some studies in the literature have reported findings similar to ours regarding the general morphometric findings of the coxa bone, some findings are not similar to ours (3, 10, 15). The variability in these findings may be due to racial or regional differences.

In our study, the vertical (x, x1, Figure 3) and horizontal (y, y1, Figure 3) diameters of the OF were measured with two different parameters. There is a significant difference between the results obtained with these methods. ($p<0,001$, Table 2). Some values about OF diameters have been reported by studies in the literature (28-30). The differences in the findings in the literature may be due to the measurement of the variables in different or non-standardized positions. Non-standardized positions may cause the osteometric points evaluated on the OF to shift. Research can be conducted on whether different diameter measurement methods can be used interchangeably. Our significantly different findings suggest that the methodologic differences may affect the findings regarding the diameter.

There were no statistically significant differences between the sides regarding the area of the OF [right: 1123,30±207,24 (n:15) and left: 1048,19±148,00 (n:31)] (Table 2). In the measurements regarding the thickness of the bony structures surrounding the OF, a statistical difference was found between the sides in the variable "Distance from the most inferior point of OF to ischiopubic ramus (between #6 and #15)" (Table 2). Examining this variable with studies conducted in larger numbers of coxal bones or whole pelvises (right and left sides belonging to the same individual) may provide more reliable interpretations. Data on the area of the OF and the thickness of the surrounding bone structures may provide an opportunity for analysis in terms of reconstructive surgery. In addition to these, as a secondary research finding, it was observed that variables regarding the OF was positively correlated with general morphometric measurements of the coxal bone.

There are few studies on OF shape analysis in the literature. In these studies, OF was categorized by analogy to two main shapes (ellipse/oval and triangle) (2, 3). OF types created with these geometric shapes are considered dimorphic in terms of gender. The OF is smaller and triangular in women, while it is larger and closer to oval in men (4). It was a simple visual classification. Although it is based on subjective observation, the contribution of the use of the shape feature of the bone is undeniable in anthropometric studies.

In order to define the OF shape, two different shape analysis methods were applied in our study.

In the first method, OF is visually typed with the conventional method, which is seen frequently in the current literature (2-4). No more than two types (triangular and elliptical/oval types) were observed in previous studies (2-4). In the current study, besides the commonly used triangle and ellipse/oval types, different geometric shapes had to be used to classify according to the visual analogy principle. In the present study, three new types (piriform, trapezoidal, and atypical) were defined in addition to oval, elliptical, and triangular OF types. The Cohen's Kappa coefficient, which indicates the agreement of the two researchers about the shape types they assigned to the OFs, was determined as 0.50. This finding has been interpreted as a disagreement in terms of typing. While researchers only agreed on the same type in sixteen bones, there were differences in their opinions on thirty bones (Table 4). The low number of FOs agreed on the shape suggests that the perception of edges and corners in visual typing may reveal differences that may lead to scientific deviations. It is interpreted that the shape analysis performed with this method should be handled with more suspicion in terms of objectively defining the OF shape.

It is thought that the shape analysis method discussed above may not have sufficient evidence-based discrimination power. Thus, in our research, EFA, carried out through the SHAPE software, was preferred as the second shape analysis method. Studies that carry out shape analysis with the EFA method based on quantitative evidence are available in the literature (6, 12, 19, 31, 32).

In the present study, 77 PCs were obtained using the EFA method with SHAPE. However, the effect of 9 PCs with the highest effect and significance on the shape of OF can be identified (Figure 5). The images obtained from the SHAPE software show the digital (numerical) differences that can be detected visually but cannot be verbally described precisely (Figure 5). In this context, these variations, which can be noticed with the naked eye, are defined and interpreted as follows: PC1 predominantly explains the variation in the tapering of the three corners observed in the OF. Thus, the ovality or triangularity of the OF can be interpreted by evaluating PC1. PC2 describes the convexity/concavity characteristic of the acetabulum side of the OF. In addition, it may provide information about the rotation of the OF margin relative to the center on the ischium side. PC3 describes the convexity/concavity changes on the pubic side of the OF. The first 3 PCs cumulatively explain 73.63% of the shape variation. Since the percentage of effect on shape variation is reduced, it becomes challenging to verbally describe changes in shape in subsequent PCs. PC4 and PC7 explain the shape variation on the acetabular side. PC5, PC6 and PC9 explain the minimal shape variations on the pubic side. PC8 seems related to the shape variation both on the pubic and acetabular sides.

Few studies in the literature explain the shape of OF with EFA. Kilmer et al. (5) also detected nine significant PCs for shape variation in FO, as in our study. They stated that PC2 expresses variation around the pubis, while PC3 captures shape changes related to ovality or triangularity (5). This result shows that the level of variational effect of PC definitions and rankings on OF in different populations may be variable. Therefore, it should be considered that the shape variations of OF may also differ between races (5).

This study has some limitations. In our study, there is a lack of demographic information such as age, gender, race, low number of bones and pelvises that do not have integrity. Therefore, the evaluation of OF-related morphometric measurements and shape analysis data of OF has been limited. The materials and methods used in our study may yield more robust or comparable results in study populations with fewer limitations mentioned above.

Conclusion

As far as we know, the standard position used for the first time in this study for morphometric measurements is thought to have a high repeatable character. A repeatable and easy to standardize position is proposed for morphometric research on radiologic or dry bone specimens. The location of the OF on the coxal bone was described for the first time by morphometric measurements.

It was observed that the researchers who conducted this study could not reach an absolute consensus on OF's visual (qualitative) typing. In the quantitative shape analysis of OF, the shape of OF was expressed numerically, and variational analyzes were performed on the outline of the shape. The lack of demographic information on the bones we used in the study prevented us from deepening the quantitative analysis interpretations. Quantitative shape analyzes on dry bones, cadavers, or radiological images for which demographic information is known will likely provide more detailed, descriptive, and distinctive information about the shape of OF.

Declarations

Authors declare no conflict of interests.

Ethical Approval

Ethical approval from the Ethics Board of İzmir Kâtip Çelebi University (Turkey) was obtained before the commencement of the study [Decree date and number: 21.09.2021 and 390). Our research has been approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and all subsequent revisions.

REFERENCES

1 Klales AR. Sex estimation using pelvis morphology. In: Klales AR, ed. Sex Estimation of the Human Skeleton: Elsevier; 2020. p. 75-93.

2 Akhlaghi M, Azizian A, Sadeghian MH, et al. Comparing the Accuracy of Morphometric and Morphological Criteria of Hip Bone in Gender Determination. IJMTFM. 2019;9:57-64.

3 Gupta S and Arora K. Study of significance of total pelvic height and pelvic width in sex determination of human innominate bone in Gujarat region. GCSMC Journal of Medical Sciences. 2013;2:38-40.

4 Tubbs RS. Pelvic Girdle And Lower Limb. In: Standring S, ed. Gray's Anatomy: The Anatomical Basis of Clinical Practice. 41. ed. Philadelphia USA: Elsevier; 2016. p. 1316-83.

5 Kilmer K and Garvin H. Outline analysis of sex and population variation in greater sciatic notch and obturator foramen morphology with implications for sex estimation. Forensic Sci Int. 2020;314:110346-54.

6 Caple J, Byrd J and Stephan CN. Elliptical Fourier analysis: fundamentals, applications, and value for forensic anthropology. J Forensic Leg Med. 2017;131:1675-90.

7 Mnari W, Hmida B, Maatouk M, et al. Strangulated obturator hernia: a case report with literature review. Pan Afr. Med. 2019;32:144.

8 Emre H, Mehmet E, Aydoğan B, et al. Anatomic transobturator tape (TOT) technique: clinical anatomic landmarks of obturator foramen on female cadavers. Anatomy. 2015;9:38-41.

9 Singh R. Bony spurs projecting in the obturator foramen. Folia Morphol. 2012;71:125-7.

10 Kausar Z, Bhat GM, Shahdad S, et al. Morphometry of the adult human dry hip bone in Kashmiri population. J Res Med Sci. 2018;6:3494-8.

11 Iwata H and Ukai Y. SHAPE: a computer program package for quantitative evaluation of biological shapes based on elliptic Fourier descriptors. J. Hered. 2002;93:384-5.

12 Nawrocki SP, Latham KE, Gore T, et al. Using Elliptical Fourier Analysis to Interpret Complex Morphological Features in Global Populations. In: Latham KE, Bartelink EJ and Finnegan M, eds. New Perspectives in Forensic Human Skeletal Identification. e-book: Elsevier; 2018. p. 301-12.

13 Kenan S, Stein S, Trasolini R, et al. Iatrogenic Obturator Hip Dislocation with Intrapelvic Migration. Case Rep Orthop. 2018:5072846.

14 Pankaj A, Sharma M, Kochar V, et al. Neglected, locked, obturator type of inferior hip dislocation treated by total hip arthroplasty. Arch Orthop Trauma Surg. 2011;131:443-6.

15 Shathviha PC, Babu KY and Mohanraj KG. Assessment of sexual differences in the bony pelvis by pelvimetry using simple morphometric parameters. Drug Invent. Today. 2018;10:1939-42.

16 Basheer MSM, Tabhane M and Ksheersagar D. Sexual Dimorphism in Human Hip Bone-A Review. J Cont. Med A Dent. 2015;3:4-6.

17 Singh I. Functional asymmetry in the lower limbs. Acta anatomica. 1970;77:131-8.

18 Mcdowell JL, L'abbe EN and Kenyhercz MW. Nasal aperture shape evaluation between black and white South Africans. Forensic Sci Int. 2012;222:397(e.1–e.6).

19 Gore T, Nawrockı SP, Langdon J, et al. The use of elliptical Fourier analysis on orbit shape in human skeletal remains. In: Lestrel PE, ed. Biological Shape Analysis-Proceedings Of The 3rd International Symposium. Japan: World Scientific; 2015. p. 242-65.

20 Solomon LB, Howie DW and Henneberg M. The variability of the volume of os coxae and linear pelvic morphometry. Considerations for total hip arthroplasty. J Arthroplasty. 2014;29:769-76.

21 Hohenberger GM, Schwarz AM, Weiglein AH, et al. Morphological side differences of the hemipelvis. J Anat Soc India. 2020;69:201-6.

22 Bhosale YJ, Khushale KD and Shyamkishore K. Uncommon Parameters for Hip bone sexing. Natl J Integr Res Med. 2016;7:14-6.

23 Jeyashree T, Sangeetha S and Premavathy D. Quantitative and qualitative morphometry of hip bone for determining sex. Drug Invent. Today. 2019;11:2590-2.

24 Pullanna B, Bindhu S, Avadhani R, et al. Morphometry Of The Adult Human Dry Hip Bone In South Indıan Populatıon. Int J Anat Res. 2019;7:6178-82.

25 Shah S, Zalawadia A, Ruparelia S, et al. Morphometric study of greater sciatic notch of dry human hip bone in Gujarat region. Nat J Integrated Res Med. 2011;2:27-30.

26 Raut RS, Hosmani PB and Kulkarni P. Role of greater sciatic notch in sexing human hip bones. Int. j. recent trends sci. technol. 2013;7:119-23.

27 Gomez-Valdes JA, Torres Ramirez G, Baez Molgado S, et al. Discriminant function analysis for sex assessment in pelvic girdle bones: sample from the contemporary Mexican population. J Forensic Sci. 2011;56:297-301.

28 Sitek A, Fijalkowska M, Zadzinska E, et al. Biometric characteristics of the pelvis in female-to-male transsexuals. Arch Sex Behav. 2012;41:1303-13.

29 Patriquin ML, Steyn M and Loth SR. Metric assessment of race from the pelvis in South Africans. Forensic Sci Int. 2002;127:104-13.

30 Smrke D and Biščević M. Variation of Pelvic Diameters Due to Different Scanning Positions–The Experimental Study. Coll Antropol. 2007;31:661-6.

31 Courtiol A, Ferdy JB, Godelle B, et al. Height and body mass influence on human body outlines: a quantitative approach using an elliptic Fourier analysis. AJPA. 2010;142:22-9.

32 Schmittbuhl M, Le Minor J, Taroni F, et al. Sexual dimorphism of the human mandible: demonstration by elliptical Fourier analysis. J Forensic Leg Med. 2001;115:100-1.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 136-140
https://doi.org/10.31067/acusaglik.1216539

Evaluation of a Pain Identification and Treatment Training for Medical Students Based on the "Good Medical Practice" Framework

Şebnem Rumeli[1] , Gülçin Gazioğlu Türkyılmaz[2]

[1]Mersin University School of Medicine, Division of Algology, Mersin, Turkey

[2]Bursa City Hospital, Department of Algology, Bursa, Turkey

Şebnem RUMELİ

Gülçin GAZİOĞLU TÜRKYILMAZ

Correspondence: Şebnem Rumeli
Mersin University School of Medicine, Division of Algology, Mersin, Turkey
Phone: +905063337733
E-mail: sebnemrumeli66@gmail.com

Received: 09 December 2022
Accepted: 27 February 2023

ABSTRACT

Purpose: The aim of this study was to evaluate the effectiveness of a pain identification and treatment training program for medical students based on the "good medical practice" framework.

Methods: A questionnaire was used to collect data from a total of 732 students who received the 3-day pain identification and treatment training held by the algology department between 2014 and 2021. The questionnaire included 8 questions about the definition of pain, types of pain, assessing pain, treatment methods and analgesic drugs. The students completed the questionnaire in person before training and 3 months after the training. A total of 732 pre-training and 230 post-training questionnaires were included in the analysis.

Results: Correct response rates before and after the training, respectively, were 11.3% (n=83) and 77.4% (n=178) for knowing which nerve fibers conduct pain; 22.3% (n=163) and 74.8% (n=172) for knowing what "VAS" stands for; 76% (n=556) 90.4% (n=208) for giving correct examples of chronic pain; 6.3% (n=46) and 63.5% (n=146) for knowing what the World Health Organization's analgesic ladder is; and 24.8% (n=178) and 87.7% (n=202) for giving correct examples of strong opioid analgesics (p<0.001 for all).

Conclusion: It is known that pain is one of the main reasons for presenting to primary health care services. Therefore, we believe it is important for medical students to learn the diagnosis and treatment of pain in programs that use different teaching methods and encourage active participation of the student in order to ensure the permanence of knowledge, increase physician competence and confidence, and prevent the mismanagement of pain.

Keywords: good medical practices, definition of pain, pain management, medical student

Tıp Fakültesi Öğrencilerine 'İyi Hekimlik Uygulamaları' Kapsamı İçerisinde Yapılandırılmış Ağrının Tanımlaması ve Tedavisi Eğitiminin Değerlendirilmesi

ÖZET

Amaç: Bu çalışma ile tıp fakültesi öğrencilerine uygulanan 'iyi hekimlik uygulamaları' kapsamındaki yöntemlerle yapılandırılmış 'ağrının tanımlaması ve tedavisi' eğitim programının etkinliğinin değerlendirilmesi amaçlandı.

Gereç ve Yöntem: Algoloji Bilim Dalı tarafından 2014-2021 yılları arasında, üç günlük staj sırasında farklı eğitim yöntemleri kullanılarak uygulanan, ağrı tanımlanması ve tedavisi eğitimini alan, 732 öğrenciye, eğitim öncesi ve sonrasında uygulanan anket değerlendirildi. Ankette ağrının tanımı, ağrı türleri, ağrının değerlendirilmesi, tedavi yöntemleri ve analjezik ilaçlar ile ilgili 8 soru yer aldı. Öğrenciler anketi eğitimden önce ve eğitimden 3 ay sonra bizzat doldurmuştur. Toplam 732 eğitim öncesi ve 230 eğitim sonrası anket analize dahil edilmiştir.

Bulgular: Ağrı taşıyan sinir liflerini doğru yanıtlayanların oranı eğitim öncesi %11.3 (n=83) sonrası %77.4 (n=178) idi. "VAS" teriminin açılımının doğru olarak bilenlerin oranı eğitim öncesi %22.3 (n=163) iken, eğitim sonrası % 74.8 (n=172) idi. Eğitim öncesi kronik ağrılara doğru örnek verenlerin oranı %76 (n=556) iken sonrası %90.4 (n=208) saptandı. DSÖ'nün basamak tedavisini bilen öğrencilerin oranı eğitim öncesi % 6.3 (n=46), eğitim sonrası %63.5 (n=146) idi. Kuvvetli opioid analjeziklere eğitim öncesi doğru örnek verebilen %24.8 (n=178) iken sonrası %87.7 (n=202) bulundu. Bütün soruların eğitim öncesi ile sonrası doğru cevap oranları karşılaştırıldığında, eğitim sonrası doğru cevap verme oranı anlamlı olarak daha yüksek bulundu(p=0.00).

Sonuç: Ağrılı hasta başvurularının birinci basamak hekimliğine en sık başvuru nedenlerinden birisi olduğu bilinmektedir. Bu nedenle tıp fakültesi öğrencilerine, ağrı tanı ve tedavisiyle ilgili bilgilerin, farklı eğitim yöntemlerinin kullanıldığı ve eğitime aktif katılımlarının sağlandığı programlar ile gerçekleştirilmesinin, bilginin kalıcılığı, hekimin kendini yetkin hissetmesi ve yanlış ağrı yönetiminin önüne geçilmesi açısından önemli olduğu kanısındayız.

Anahtar kelimeler: ağrı, ağrı yönetimi, tıp öğrencileri, eğitim teknikleri

Pain is among the most common reasons for presentation to primary care, and in 2000 the World Health Organization (WHO) declared that pain is the fifth vital sign that must be monitored. Therefore, medical education should ensure that physicians are competent in recognizing and evaluating patients with pain and providing first-line treatment. Studies have shown that the pain education received in medical school is not adequate for physicians to meet the needs of the population after graduation (1, 2). It has also been reported that primary care physicians lack training on pain management and have limited confidence in their abilities to treat pain effectively (3, 4). Unfortunately, there are very few countries in the world in which the medical school curriculum provides comprehensive and compulsory education on the diagnosis and treatment of pain. In 2013, the European Pain Federation (EFIC) developed the "Pain Management Core Curriculum for European Medical Schools" training program for third- to fifth-year medical students, which includes basic pain diagnosis and treatment options and common pain syndromes (5).

The intensity of the theoretical information delivered during medical education can be confusing for learners, and information that is believed to be learned is often forgotten. This exposes the need to improve medical education by enhancing educational programs with motivational teaching methods that aim to make learning permanent and meaningful (6-8). The Good Medicine Practice (GMP) program was designed in line with this need and has been implemented in many medical schools in our country, including ours. The GMP program is designed on the basis of communication skills and is supported and enriched with practices in which students acquire professional and examination skills, discuss ethical and professional values, make clinical visits, investigate the relationship between medicine and the humanities, and evaluate evidence-based medical studies (9).

In 2014, a "pain identification and treatment training" for fifth-year students of Mersin University School of Medicine was designed within the scope of the GMP by the algology department. The aim of this study was to evaluate the effectiveness of the pain identification and treatment training program implemented by the Department of Algology of the Mersin University School of Medicine.

MATERIALS AND METHODS

Ethics committee approval was obtained for this study (decision date 29/12/2021, number 2021/788). Between 2014 and 2021, fifth-year students interning in the anesthesiology and reanimation department were asked to complete a questionnaire after the introductory class on the first day of the internship. The students were informed about the purpose and nature of the questionnaire before it was distributed. Identifying information such as name, surname, and student number were not collected. The questionnaire items and response options were designed according to the principle of impartiality and avoiding leading questions. The survey included a total of 8 items (open-ended or multiple-choice) in a specified order. The questions asked about pain identification, pain types, assessment and treatment methods, and analgesic drugs used in treatment (Table 1). After the students completed the post-internship pain identification and treatment training, the same students were invited to complete the questionnaire again online 3 months after the training. Completed questionnaires were returned by all 732 students before receiving the training and 230 students after receiving the training.

Table 1. Questionnaire Items and Response Variables

Questions	Variables
Define the term "algology."	Correct Incorrect No answer
Which nerve fibers conduct pain sensation?	A delta+C Others
Write an example of acute pain.	Correct Incorrect No answer
Write an example of chronic pain.	Correct Incorrect No answer
What does "VAS" stand for?	Visual Analog Scale Others
Have you heard of the WHO analgesic ladder for pain treatment?	Yes No
Write an example of weak opioid analgesics.	Correct Incorrect No answer
Write an example of strong opioid analgesics.	Correct Incorrect No answer

Algology training program: The students participated in a 3-day instructor-led training program on pain diagnosis and treatment consisting of 4 hours of theoretical and 6 hours of practical course content. Theoretical lessons covered pain conduction routes, definitions of acute and chronic pain, pain scoring methods, opioid analgesics used in chronic pain, and the WHO analgesic ladder. In addition, the students were shown the pain scoring methods (visual analog scale [VAS], numerical rating scale [NRS],

Analog Chromatic Scale, and Wong-Baker Face Scale), provided information on the pharmacology of analgesic drugs and considerations for prescribing weak and strong opioids, and given practice in writing prescriptions.

They watched videos of different types of pain described by patients, performed one-to-one bedside follow-up with chronic pain patients, and participated in case discussion meetings.

Statistical Analysis

For statistical analyses, the data were entered into IBM SPSS Statistics version 24.0 software and the e-PICOS software was used for calculations based on MedicReS Good Biostatistics Practices. Categorical variables were summarized using descriptive statistics; frequency calculations were expressed as percentage. Chi-square test was used for comparisons. P values of <0.05 were accepted as statistically significant.

RESULTS

Of the fully answered questionnaires, 732 were returned by students before receiving the training and 230 were returned after the training.

Before the training, 50.3% (n=368) of the students correctly defined the term algology, while 97% (n=223) of the students answered correctly after the training.

The proportion of students who knew that A delta and C fibers conduct pain was 11.3% (n=83) before the training and 77.4% (n=178) after the training.

Less than a quarter of the students knew what VAS stood for before training (n=163, 22.3%), whereas nearly three-quarters correctly answered this question after training (n=172, 74.8%).

Correct examples of acute and chronic pain respectively were given by 76% (n=556) and 62.6% (n=458) of students before training, and these rates increased to 93% (n=214) and 90.4% (n=208) after training.

Very few students knew what the WHO analgesic ladder was before training (n=46, 6.3%), while 63.5% (n=146) knew after training.

Similarly, correct examples of weak and strong opioid analgesics respectively were given by only 7.5% (n=55) and 24.8% (n=178) of the students before the training, whereas 71.3% (n = 164) and 87.7% (n = 202) of the students were able to give examples after training.

Compared to before the training, a significantly greater proportion of students gave correct responses after the training for the definition of algology, the pain-conducting fibers, the meaning of VAS, examples of acute and chronic pain, the WHO analgesic ladder, and examples of weak and strong opioid analgesics (p<0.001 for all) (Figure 1).

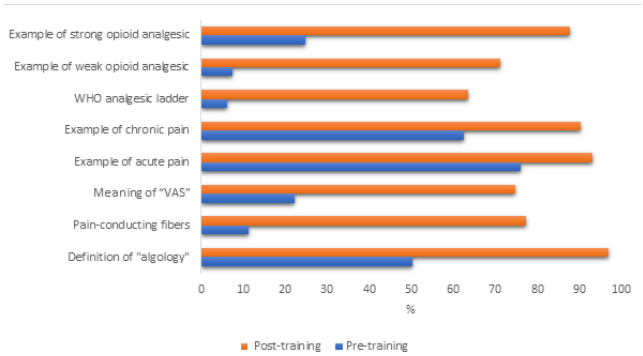

Figure 1. Comparison of correct response rates for the questionnaire items before and after the training (p<0.001)*

DISCUSSION

This is the first study to evaluate knowledge about pain identification and treatment before and after a training program for medical students in Turkey prepared within the GMP framework. The results demonstrated that students effectively retained information about the term algology, pain-conducting fibers, the meaning of VAS, acute and chronic pain, the WHO analgesic ladder, and correct prescribing of opioids three months after the training.

When creating training programs for medical schools, not only advances in medicine but also the needs of the country should be taken into account (10). In particular, training should be structured in accordance with topics relevant to primary care (11). Pain is the most common reason that patients present to primary care (12). Therefore, general practitioners should be trained to recognize and assess patients with acute and chronic pain and manage their first-line treatment after graduation(13). In a survey conducted at Tufts University School of Medicine in the United States, it was determined that graduate medical students felt inadequate in the assessment and management of chronic pain.

The authors suggested that restructuring pain education in medical school by enriching it with seminars, discussions, and clinical observations could contribute to clinicians' competence in the care and evaluation of patients with pain (14, 15). In our study, the low correct response rates for all questions in the questionnaire before the training program revealed that fifth-year medical students had insufficient knowledge regarding the identification and treatment of pain.

There seems to be no standardized instructional content on pain in medical curricula worldwide(16). A review of 14 studies published between 1987 and 2018 showed that the majority of pain education in the 383 medical schools examined was included in courses designed by the anesthesia and pharmacology departments. Countries with the most time devoted to pain education were Poland (39 hours) and Finland (30 hours), while countries with the least time devoted to pain education were Italy and Romania (4 hours). A lack of published literature on pain education from South America, Asia, and Africa was noted (17). In another study evaluating the pain medicine education of schools in 15 European countries during the 2012-13 academic year, it was stated that pain education was compulsory in 55% of schools, was provided in other education modules, and lasted an average of 21 hours (18). In Mersin University School of Medicine, a total of 18 class hours are devoted to pain education in different years of study, starting from the first year. In addition to this, the students receive the 3-day training program organized by our algology department, which includes 4 hours of theoretical and 6 hours of practical training.

Medical education is a challenging and labor-intensive process that requires many years to complete. Students face many difficulties during the education process, such as not knowing how to learn or having different learning speeds. Such problems make learning strategies one of the most important issues in the field of education(19). In the literature, there are studies stating that the curriculum related to pain management should be designed not only to focus on theoretical knowledge, but also support it with interview skills and pain assessment practices so that the knowledge will facilitate clinical practice(4, 8, 20-22). GMP, which is applied in many medical schools in our country, is a program designed on the basis of communication skills and is supported and enriched with practices in which students acquire professional and examination skills, discuss ethical and professional values, make clinical visits, investigate the relationship between medicine and the humanities, and evaluate evidence-based medical studies (9). We structured our program within the algology internship using the content of this program as an example. We believe that the varied training we created, which includes videos in which patients describe different types of chronic pain, bedside visits to inpatients with acute and chronic pain, observations of history-taking and examinations of patients presenting to the algology outpatient clinic, introduction to opioid analgesics by presenting drug preparations followed by prescribing practice, and case discussion meetings with the specialist physician, makes pain education more memorable for our physician candidates.

This study has certain limitations. Firstly, the single-center study design limits the generalization of the results. Second, the post-training sample size was much smaller than the pre-training sample. We attribute the low response rate in the post-training data collection to administering the questionnaire online 3 months after the training.

CONCLUSION

Despite the brevity of our pain identification and management training program, the combined use of various educational methods that increase learning motivation and ensure active learner participation resulted in effective knowledge attainment. We believe that implementing such programs in medical schools will support physicians in feeling more competent and confident in pain management.

DECLARATIONS

Funding
None.

Conflicts of Interest/Competing Interests
None.

Ethics Committee Approval
Our study was approved by the Local Ethics Committee of Mersin University Rectorate Clinical Research Ethics Committee (board decision dated 29/12/2021 and numbered 2021/788).

Availability of Data
Available upon request.

Authors' Contributions
Gülçin GAZİOĞLU TÜRKYILMAZ, Şebnem RUMELİ conducted this study and wrote the article.

REFERENCES

1. Ponte CD, and Johnson-Tribino J. Attitudes and knowledge about pain: an assessment of West Virginia family physicians. Family medicine. 2005;37(7):477-80.
2. Rice K, Ryu JE, Whitehead C, et al. Medical Trainees' Experiences of Treating People With Chronic Pain: A Lost Opportunity for Medical Education. Academic medicine : journal of the Association of American Medical Colleges. 2018;93(5):775-80.
3. Upshur CC, Luckmann RS, and Savageau JA. Primary care provider concerns about management of chronic pain in community clinic populations. Journal of general internal medicine. 2006;21(6):652-5.
4. Leila NM, Pirkko H, Eeva P, et al. Training medical students to manage a chronic pain patient: both knowledge and communication skills are needed. European journal of pain (London, England). 2006;10(2):167-70.
5. The Pain Management Core Curriculum for European Medical Schools. European Federation of IASP Chapters. 2013.
6. Seren LP, Yakıncı C. Tıp eğitiminde akılda kalıcılığı nasıl sağlarız? Çocuk Sağlığı ve Hastalıkları Dergisi. 2015;58:123-30.
7. Scheidecker A, Green A, Syed MH, et al. Introducing Simulation-Based Learning for Trainees in Chronic Pain Medicine: Needs Assessment and Suggestions for Training Scenarios. Medical science educator. 2021;31(4):1463-9.
8. Vargovich AM, Schumann ME, Xiang J,et al. Difficult Conversations: Training Medical Students to Assess, Educate, and Treat the Patient with Chronic Pain. Academic psychiatry : the journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry. 2019;43(5):494-8.
9. Elçin M, Odabaşı O, Turan S, et al. 2016-17 Öğretim Yılı İyi Hekimlik Uygulamaları. 14.ed. Ankara, Hacettepe Üniversitesi Basımevi; 2016.
10. Uğurlu A. Do The Needs of Society Require to Restructure Medical Education? Ankara Medical Journal. 2012;12(2):95-9.
11. Solakoğlu Z, Darendeliler F. Daha İyi Tıp Eğitimi İçin Tartışılan Güncel Görüşler Yükseköğretim Dergisi. 2013;3(3):165-8.
12. Mäntyselkä P, Kumpusalo E, Ahonen R, et al. Pain as a reason to visit the doctor: a study in Finnish primary health care. Pain. 2001;89(2-3):175-80.
13. Holman H. Chronic disease--the need for a new clinical education. Jama. 2004;292(9):1057-9.
14. Bradshaw YS, Patel Wacks N, Perez-Tamayo A, Myers B, Obionwu C, Jr., Lee RA, et al. Deconstructing One Medical School's Pain Curriculum: II. Partnering with Medical Students on an Evidence-Guided Redesign. Pain medicine (Malden, Mass). 2017;18(4):664-79.
15. Heirich MS, Sinjary LS, Ziadni MS, et al. Use of Immersive Learning and Simulation Techniques to Teach and Research Opioid Prescribing Practices. Pain medicine (Malden, Mass). 2019;20(3):456-63.
16. Mezei L, and Murinson BB. Pain education in North American medical schools. The journal of pain. 2011;12(12):1199-208.
17. Shipton EE, Bate F, Garrick R, et al. Systematic Review of Pain Medicine Content, Teaching, and Assessment in Medical School Curricula Internationally. Pain and therapy. 2018;7(2):139-61.
18. Briggs EV, Battelli D, Gordon D, et al. Current pain education within undergraduate medical studies across Europe: Advancing the Provision of Pain Education and Learning (APPEAL) study. BMJ open. 2015;5(8):e006984.
19. Ten Cate O. Competency-Based Postgraduate Medical Education: Past, Present and Future. GMS journal for medical education. 2017;34(5):Doc69.
20. Brenner GJ, Newmark JL, and Raemer D. Curriculum and cases for pain medicine crisis resource management education. Anesthesia and analgesia. 2013;116(1):107-10.
21. Hoelzer BC, Moeschler SM, and Seamans DP. Using simulation and standardized patients to teach vital skills to pain medicine fellows. Pain medicine (Malden, Mass). 2015;16(4):680-91.
22. Singh N, Nielsen AA, Copenhaver DJ, et al. Advancing Simulation-Based Education in Pain Medicine. Pain medicine (Malden, Mass). 2018;19(9):1725-36.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 141-146
https://doi.org/10.31067/acusaglik.1217574

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Orthopedics and Traumatology / Ortopedi ve Travmatoloji

Long-Term Results of Open Arthrolysis for Elbow Stiffness

Onur Tunalı[1], Mehmet Kapıcıoğlu[2], Ali Erşen[3], Ata Can Atalar[4], Mehmet Demirhan[5], Hayati Durmaz[3]

[1]Acıbadem Health Group Maslak Hospital and Zekeriyaköy Outpatient Clinic Orthopedics and Traumatology Department, Istanbul,Turkey

[2]Bezmialem Vakıf University Faculty of Medicine, Department of Orthopedics and Traumatology, İstanbul, Turkey

[3]Istanbul University İstanbul Faculty of Medicine, Department of Orthopedics and Traumatology, İstanbul, Turkey

[4]Acıbadem Mehmet Ali Aydınlar University School of Medicine Orthopedics and Traumatology Department, İstanbul, Turkey

[5]Koç University Faculty of Medicine, Department of Orthopedics and Traumatology, İstanbul, Turkey

Onur TUNALI
Mehmet KAPICIOĞLU
Ali ERŞEN
Ata Can ATALAR
Mehmet DEMİRHAN
Hayati DURMAZ

Correspondence: Onur Tunalı
Acıbadem Health Group Maslak Hospital and Zekeriyaköy Outpatient Clinic Orthopedics and Traumatology Department, Istanbul,Turkey
Phone: -
E-mail: dronurtunali@gmail.com

Received: 11 December 2022
Accepted: 27 February 2023

ABSTRACT

Purpose: Stiff elbow is a common upper extremity problem which can limit patients' daily life activities. The purpose of this study was to evaluate the long-term outcomes of open arthrolysis for stiff elbow. Our hypothesis was that open arthrolysis would yield good functional results and patient satisfaction.

Methods: This retrospective study assessed 110 patients who underwent surgery for stiff elbow in a single institute between 2003-2012. Twenty-four of the patients who underwent open arthrolysis without heterotopic ossification excision and minimum followed up for 24 months were included in this study. All patient's surgical procedure, ulnar nerve and radial head management, preoperative and postoperative ranges of elbow motion and complications were noted. Functional outcomes were evaluated with Quick-DASH and Mayo Elbow Performance score (MEPS).

Results: The mean age of the patients was 36.1 years at the time of open arthrolysis and mean follow-up period was 50.6 months. The mean preoperative flexion–extension arc increased form 52.4° to 96.5° and preoperative supination–pronation arc increased form 103.3° to 137.8°($p<0.05$). The mean MEPS score was 81.6 and the Q-DASH score was 6.3. Complication occurred in 9 patients (37.5%) and 4 patients required additional surgery.

Conclusion: Open arthrolysis is an effective treatment method for stiff elbows, with reliable long-term functional outcomes. The complication rates are high; however, they are generally minor and temporary.

Keywords: Stiff elbow, open arthrolysis, ulnar nerve

Dirsek Sertliğinde Açık Kapsüler Gevşetmenin Uzun Dönem Sonuçları

ÖZET

Amaç: Sert dirsek hastaların günlük yaşam aktivitelerini kısıtlayabilen ve sık karşılaşılan bir üst ekstremite patolojisidir. Çalışmamızın amacı sert dirsek hastalarında uygulanan açık kapsüler gevşetme yönteminin uzun dönem sonuçlarını değerlendirmekti. Hipotezimiz, açık kapsüler gevşetme ile başarılı fonksiyonel sonuçlar ve hasta memnuniyeti elde edebileceğimizdi.

Yöntem: Bu retrospektif çalışmada, 2003-2012 yılları arasında tek bir merkezde sert dirsek tanısı ile ameliyat edilen 110 hasta incelendi. Heterotopik ossifikasyon eksizyonu yapılmadan yalnızca açık kapsüler gevşetme uygulanan ve minimum 24 ay süre ile takip edilen 24 hasta çalışmaya dahil edildi. Bütün hastalara uygulanan cerrahi prosedür, ulnar sinir ve radius başı yönetimi, preop ve postop dirsek hareket açıklıkları not edildi. Fonksiyonel sonuçlar Mayo Dirsek Performans Skoru (MEPS) ve hızlı DASH (Q-DASH) skorları ile değerlendirildi.

Bulgular: Hastaların açık kapsüler gevşetme yapıldığı sıradaki yaş ortalaması 36.1 yıldı. Ortalama takip süresi 50.6 aydı. Hasaların ortalama preop fleksiyon-ekstansiyon hareket arkı 52.4°'den 96.5°'ye yükselirken, ortalama preop supinasyon-pronasyon hareket arkı 103.3°'den 137.8°'ye yükseldi ($p<0.005$). Ortalama MEPS skoru 81.6 ve Q-DASH skoru 6.3 bulundu. Hastaların dokuzunda (%37.5) komplikasyon gelişti ve bu hastaların dördünde ek cerrahi girişim uygulandı.

Sonuç: Açık kapsüler gevşetme sert dirsek hastalarında uygulanan, güvenilir uzun dönem sonuçları olan etkili bir tedavi yöntemidir. Komplikasyon oranı yüksek olmakla beraber bu komplikasyonlar genellikle geçici ve yönetilebilirdir.

Anahtar Kelimeler: Sert dirsek, açık kapsüler gevşetme, ulnar sinir

Elbow function is crucial for activities of daily living. Flexion is more important than extension for activities such as eating, washing hair, and using cell phones. Morrey et al. (1) defined a functional elbow arc between 30° and 130° of flexion-extension which is sufficient for most daily activities. A reduced of range of motion of the elbow joint under 30°–130° in the flexion-extension arc, and 50°–50° in the supination-pronation arc is defined as stiff elbow.

The elbow joint is particularly prone to stiffness owing to its complex anatomy (2). The presence of three articulations, congruent skeletal anatomy, collateral ligaments stability, and a close relationship of the muscles with the capsule makes the elbow prone to stiffness (3). Morrey (4) classified the causes of elbow stiffness as intrinsic, extrinsic or mixed. Intrinsic factors are intra-articular fracture, malunion, and adhesions, as well as cartilage damage. Extraarticular malunion, heterotopic ossification (HO), joint capsule contracture, and soft tissue contractures are the main extrinsic factors. Generally, elbow stiffness occurs as because of both intrinsic and extrinsic factors.

Treatment for stiff elbow should be decided after careful evaluation of the patient's elbow function and expectations. All causes of elbow contracture should be addressed before treatment. Conservative treatment such as early rehabilitation and progressive splinting should be considered, especially in elbow stiffness due to extrinsic factors (5, 6). If nonoperative treatment fails after 3-6 months or if the patient has heterotopic ossification or malunion, surgical treatment should be considered. Several surgical methods have been described in the literature, including open arthrolysis (7), arthroscopic capsular resection (8), heterotopic ossification excision (9, 10), distraction interposition arthroplasty (11) and total elbow arthroplasty (12).

Although there is a tendency towards arthroscopic surgery in orthopedics, open arthrolysis is still the initial treatment choice for stiff elbow, especially in patients who had previous elbow surgery, need for hardware removal, ulnar nerve problems, osteoarthritis, or heterotopic ossification. The purpose of this study was to evaluate the long-term outcomes of open arthrolysis for stiff elbow. We hypothesized that open arthrolysis would yield good functional results and patient satisfaction.

Materials and Methods

The medical records of patients who underwent surgery for stiff elbow at a single institute during 2003-2012 years were retrospectively reviewed. A total of 110 patients were identified, who underwent arthroscopic release, open arthrolysis or heterotopic ossification excision procedures. Patients who had undergone open arthrolysis without HO excision, were older than 18 years, and had a minimum of 24 months of follow-up were included in the study. Patients with elbow instability, severe arthrosis, heterotopic ossification, or severe deformities were excluded. We identified 24 patients eligible for the study. The patients' demographic data, initial injury, initial treatment method, surgical procedure, ulnar nerve and radial head management, and complications were noted. All patients' preoperative and postoperative ranges of elbow motion were measured using a goniometer. To evaluate functional outcomes the Quick-DASH and Mayo Elbow Performance Score (MEPS) were used at the last visit.

Surgical Technique

All patients underwent surgery under general anesthesia, and a supraclavicular catheter was applied for postoperative analgesia and physiotherapy. The patients were placed in the supine position, and a sterile tourniquet was placed. To determine the surgical approach prior surgeries and main pathology of the stiffness were considered. A lateral approach or a combination of medial and lateral approaches was used. First, the radiocapitellar joint was exposed using a lateral Kocher approach. The lateral ulnar collateral ligament was preserved. The brachialis was released from the anterior capsule. An anterior capsulectomy was performed. Loose bodies or osteophytes of the coronoid were excised and the coronoid fossa was debrided. Radiocapitellar joint debridement or radial head excision was performed if rotational movements were also restricted. Posterior capsulectomy was performed. The tip of the olecranon and olecranon fossa were debrided and osteophytes were excised.

If an adequate range of motion was regained (Fig. 1) and the patient did not have any symptoms of preoperative ulnar neuropathy, the operation was finalized. Otherwise, a medial release was performed. First, the ulnar nerve was released and posteromedial capsulectomy was performed. The posterior bundle of the medial collateral ligament was then released. After all releases were completed, hardware removal was performed if necessary. The elbow was tested for instability. Then the tourniquet was deflated, and an intra-articular drain was placed after hemostasis.

After wound closure, the patients' elbow was held in extension with an anterior long-arm splint. All operations were performed by two experienced shoulder and elbow surgeons at a single institution.

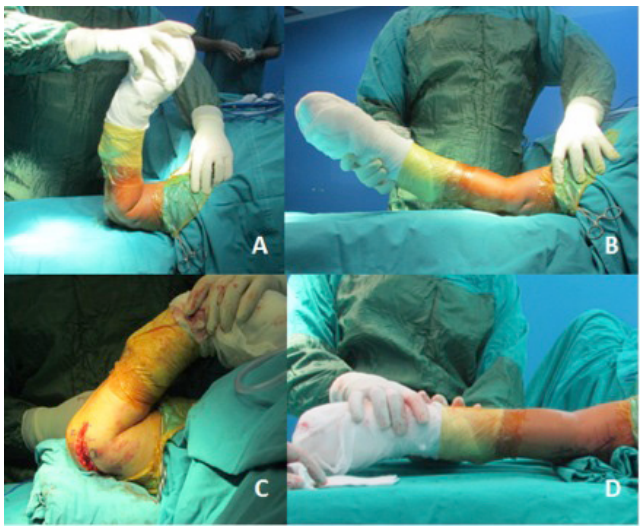

Figure. 1 A-B *Preoperative flexion-extension arc of the patient* ***C-D*** *Peroperative flexion-extension arc of the patient after open arthrolysis*

Postoperative Care

Passive and active assisted range of motion exercises were started on the first postoperative day. A supraclavicular catheter was used for analgesia for three days. The patients were discharged on the 3rd or 4th postoperative day. Outpatient physiotherapy was continued until the desired range of motion was achieved. A night splinting or external hinged brace could be used for flexion or extension to protect the gained range of motion. All patients received 75 mg/day indomethacin for 6 weeks for HO prophylaxis.

Statistical Analysis

The distribution of variables was analyzed using the Kolmogorov–Smirnov and Shapiro-Wilk tests. Statistical analyses were performed using the Student's t-test for parametric data, the Mann Whitney U test (Wilcoxon rank test), and the Kruskal-Wallis test for non-parametric data. SPSS Version 20.0 (SPSS Inc, Chicago, IL, USA) was used, and statistical significance was defined as p value <0.05.

Results

Open capsular release was performed for 42 patients. Twenty-four patients who had closed physis, and were followed-up for at least 24 months, and did not have severe arthrosis or HO were included in this study. The mean age of the patients was 36.1 (range 17–73) years at the time of surgery. One-third of the patients were female and 16 were male. The etiology of elbow stiffness was post-traumatic in 16 patients, early arthrosis in 4, secondary to coagulopathy in 3, and inflammatory arthritis in 1.

The lateral approach was performed in seven patients and the combined mediolateral approach was performed in 17 patients. The mean follow-up time was 50.6 (range 24–130) months. The mean preoperative flexion–extension arc was 52.4°(range 20°–75°), and the mean preoperative supination–pronation arc was 103.3°(range 0°–160°). The postoperative mean flexion–extension increased to 96.5° (range 60°–135°) ($p<0.05$), and the mean supination–pronation arc increased to 137.8° (range 90°–170°) at the last visit ($p<0.05$). The mean postoperative MEPS score was 81.6 (range 70–100) and the Q-DASH score was 6.3 (range 0–20.4). Fifteen patients reported being very satisfied, seven were satisfied, and two were dissatisfied at their last follow-up.

In addition to capsular release, implant removal was performed in five patients who had previously undergone surgery for distal humerus fracture. Radial head resection was needed in 8 patients who had severe supination–pronation restriction. Ulnar nerve neurolysis or subcutaneous ulnar nerve transposition was performed in 17 patients who had preoperative ulnar nerve neuropathy or elbow flexion <90° preoperatively.

Complications occurred in 9 patients (37.5%). A perioperative supracondylar humerus fracture developed in one patient and was fixed with a plate. Hematoma occurred in two patients, and surgical drainage was performed in the first postoperative week. Ulnar neuropathy developed in two patients and resolved spontaneously within 6 months. One patient had superficial infection and was treated with a debridement and antibiotic therapy. HO occurred in five patients. Two of them did not have any functional limitations and were classified as Hastings Class I. Three patients who had functional limitations were defined as Hastings Class IIA. None of the patients who developed HO needed any further surgery.

Discussion

Elbow stiffness remains a challenging problem. The etiology of elbow stiffness is multifactorial, and although new surgical techniques have been developed, the treatment of all of these factors is still demanding. In this study, 24 patients underwent open arthrolysis for elbow stiffness. Significant improvements in the flexion–extension arc and supination–pronation arc were maintained, and 91.6% of the patients were satisfied or very satisfied with their final result at a mean of 50.6 months postoperatively. In this study, the mean motion gain was 44.1° in flexion–extension and 34.5° in the rotational arc. In the literature, the reported improvements with open arthrolysis in the flexion–extension arc were ranged from 40° to 64°(13), which was similar to our results. The results of open capsular release reported in the literature are summarized in Table 1 (3, 7, 9, 14-20).

Table 1. Results of Open Capsular Release for Stiff Elbow

Study	Number of Patients	Mean Follow up (months)	Preop Flex-Ext. Arc	Postop Flex-ext. Arc	Mean Motion Gain
Mansat, 1998	38	43	49°	94°	45°
Wada, 2000	14	57	46°	110°	64°
Marti, 2002	47	120	44°	99°	55°
Park, 2004	27	23	46°	102°	56°
Tan, 2006	52	18	57°	116°	59°
Ring, 2006	46	48	48°	99°	51°
Gundlach, 2008	21	24	69°	113°	44°
Higgs, 2012	81	15	69°	109°	40°
Pettersen, 2016	43	41	50°	106°	56°
Haglin, 2017	103	14.7	60°	112°	52°
Our Study	24	50.6	52.4°	96.5°	44.1°

Compared with other studies in the literature, our study had a smaller population. The main reason for this situation was that patients with HO were not included, and we maintained a minimum follow-up period of 24 months. Therefore, our study had a longer follow-up period in a more homogenous group. Furthermore, excluding patients with HO could diminish the degree of improvement in the flexion–extension arc in our study. Haglin et al.(3) showed that patients who underwent HO excision with capsular release experienced significantly greater increases in their flexion–extension arc than patients with only capsular release (53.3° vs 44.2°). The mean motion gain in our study was similar to that in patients who underwent capsular release only (44.1° vs 44.2°).

Functional range of motion (>100° of flexion–extension) was achieved in 75% (18/24) of the patients in this study. Six patients who had a range of motion arc less than 100° did not undergo any further surgeries. In the literature, complication rates after open capsular release have been reported to vary from 10% to 47% (20, 21). The complication rate in our study was 37.5%; however, only 4 patients required reoperation (16%). Most of the complications were minor and transient, and were treated conservatively.

Some authors suggested routine ulnar nerve decompression or transposition in all stiff elbow procedures to prevent postoperative ulnar neuropathy symptoms (22, 23). However, some authors advised ulnar nerve decompression only when the patient had preoperative ulnar nerve symptoms or less than preoperative 100° of elbow flexion (20, 24). In our study, ulnar nerve decompression or transposition was performed in 17 patients with preoperative neuropathy symptoms or preoperative elbow flexion <90°.

Routine HO prophylaxis after capsular release procedure remains controversial. Some studies support the use of HO prophylaxis after elbow surgery, whereas others do not support it (3). We preferred 75 mg indomethacin per day for HO prophylaxis in all cases. Although we did not include the patients who had HO and underwent routine prophylaxis, HO occurred in 5 patients. However, none of the patients required HO excision.

This study had several limitations. First, it was a retrospective study. Second, the number of study cohort was small. We could explain this with the exclusion of patients who had HO and had a follow-up period of less than 24 months. Using these criteria, we were able to evaluate the long-term results in a more homogenous cohort. Third, the study did not include a comparison group. Arthroscopic capsular release is another treatment method that is mostly used for stiff elbow. However, it is difficult to compare these methods because their indications are not the same.

Arthroscopic release is generally performed for patients with isolated capsular contractures and mild stiffness. Patients who had hardware, a history of ulnar transposition, heterotopic ossification or severe stiffness open arthrolysis were preferred.

Conclusion

Open arthrolysis is an effective treatment method for stiff elbows, with reliable long-term functional outcomes. Ulnar nerve decompression should be performed in patients with preoperative ulnar neuropathy or elbow flexion <90°. The risk of contracture recurrence should be considered, and the patients must be informed about the possibility of further operations.

Declarations

Conflicts of Interest

All of the authors declare that they have no conflict of interest.

Funding

None of the authors did not receive any grant or outside funding for this study.

Ethics Approval

This retrospective study was approved by the Institutional Review Board of İstanbul University İstanbul Medical Faculty Orthopaedics and Traumatology Department in 2013. This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

Availability of Data and Material

Available upon request.

Authors' Contributions

OT: conceived and designed the analysis, contributed data and analysis tools, wrote the paper.

MK: conceived and designed the analysis, collected the data (patient evaluation), performed statistical analysis.

AE: participated in the design of the study and made revisions of the manuscript.

ACA: conceived and designed the analysis, one of the surgeons who made open arthrolysis.

MD: conceived and designed the analysis, one of the surgeons who made open arthrolysis.

HD: conceived and designed the analysis.

All authors read and approved the final manuscript.

REFERENCES

1 Morrey BF, Askew LJ and Chao EY. A biomechanical study of normal functional elbow motion. J Bone Joint Surg Am. 1981;63:872-7.

2 Adolfsson L. Post-traumatic stiff elbow. EFORT Open Rev. 2018;3:210-6. DOI:10.1302/2058-5241.3.170062

3 Haglin JM, Kugelman DN, Christiano A, et al. Open surgical elbow contracture release after trauma: results and recommendations. J Shoulder Elbow Surg. 2018;27:418-26. DOI:10.1016/j.jse.2017.10.023

4 Morrey BF. Post-traumatic contracture of the elbow. Operative treatment, including distraction arthroplasty. J Bone Joint Surg Am. 1990;72:601-18.

5 Doornberg JN, Ring D and Jupiter JB. Static progressive splinting for posttraumatic elbow stiffness. J Orthop Trauma. 2006;20:400-4. DOI:10.1097/00005131-200607000-00006

6 Muller AM, Sadoghi P, Lucas R, et al. Effectiveness of bracing in the treatment of nonosseous restriction of elbow mobility: a systematic review and meta-analysis of 13 studies. J Shoulder Elbow Surg. 2013;22:1146-52. DOI:10.1016/j.jse.2013.04.003

7 Mansat P and Morrey BF. The column procedure: a limited lateral approach for extrinsic contracture of the elbow. J Bone Joint Surg Am. 1998;80:1603-15.

8 Tucker SA, Savoie FH, 3rd and O'brien MJ. Arthroscopic management of the post-traumatic stiff elbow. J Shoulder Elbow Surg. 2011;20:S83-9. DOI:10.1016/j.jse.2010.11.029

9 Marti RK, Kerkhoffs GM, Maas M, et al. Progressive surgical release of a posttraumatic stiff elbow. Technique and outcome after 2-18 years in 46 patients. Acta Orthop Scand. 2002;73:144-50. DOI:10.1080/000164702753671713

10 Kapıcıoğlu M SY, Erşen a, Atalar a, Demirhan M,Durmaz H. Does Resection of Heterotopic Ossification of the Elbow Result in Satisfactory Functional Outcomes? Bezmiâlem Science. 2019;7:124-31. DOI:10.14235/bas.galenos.2018.2467

11 Larson AN and Morrey BF. Interposition arthroplasty with an Achilles tendon allograft as a salvage procedure for the elbow. J Bone Joint Surg Am. 2008;90:2714-23. DOI:10.2106/JBJS.G.00768

12 Mansat P and Morrey BF. Semiconstrained total elbow arthroplasty for ankylosed and stiff elbows. J Bone Joint Surg Am. 2000;82:1260-8. DOI:10.2106/00004623-200009000-00006

13 Streubel PN and Cohen MS. Open surgical release for contractures of the elbow. J Am Acad Orthop Surg. 2015;23:328-38. DOI:10.5435/JAAOS-D-14-00051

14 Wada T, Ishii S, Usui M, et al. The medial approach for operative release of post-traumatic contracture of the elbow. J Bone Joint Surg Br. 2000;82:68-73. DOI:10.1302/0301-620x.82b1.9782

15 Park MJ, Kim HG and Lee JY. Surgical treatment of post-traumatic stiffness of the elbow. J Bone Joint Surg Br. 2004;86:1158-62. DOI:10.1302/0301-620x.86b8.14962

16 Tan V, Daluiski A, Simic P, et al. Outcome of open release for post-traumatic elbow stiffness. J Trauma. 2006;61:673-8. DOI:10.1097/01.ta.0000196000.96056.51

17 Ring D, Adey L, Zurakowski D, et al. Elbow capsulectomy for posttraumatic elbow stiffness. J Hand Surg Am. 2006;31:1264-71. DOI:10.1016/j.jhsa.2006.06.009

18 Gundlach U and Eygendaal D. Surgical treatment of posttraumatic stiffness of the elbow: 2-year outcome in 21 patients after a column procedure. Acta Orthop. 2008;79:74-7. DOI:10.1080/17453670710014798

19 Higgs ZC, Danks BA, Sibinski M, et al. Outcomes of open arthrolysis of the elbow without post-operative passive stretching. J Bone Joint Surg Br. 2012;94:348-52. DOI:10.1302/0301-620X.94B3.27278

20 Pettersen PM, Eriksson J, Bratberg H, et al. Increased ROM and high patient satisfaction after open arthrolysis: a follow-up-study of 43 patients with posttraumatic stiff elbows. BMC Musculoskelet Disord. 2016;17:74. DOI:10.1186/s12891-016-0928-8

21 Zhang D, Nazarian A and Rodriguez EK. Post-traumatic elbow stiffness: Pathogenesis and current treatments. Shoulder Elbow. 2020;12:38-45. DOI:10.1177/1758573218793903

22 Blonna D and O'driscoll SW. Delayed-onset ulnar neuritis after release of elbow contracture: preventive strategies derived from a study of 563 cases. Arthroscopy. 2014;30:947-56. DOI:10.1016/j.arthro.2014.03.022

23 Shuai C, Hede Y, Shen L, et al. Is routine ulnar nerve transposition necessary in open release of stiff elbows? Our experience and a literature review. Int Orthop. 2014;38:2289-94. DOI:10.1007/s00264-014-2465-0

24 Williams BG, Sotereanos DG, Baratz ME, et al. The contracted elbow: is ulnar nerve release necessary? J Shoulder Elbow Surg. 2012;21:1632-6. DOI:10.1016/j.jse.2012.04.007

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 147-154
https://doi.org/10.31067/acusaglik.1217464

The Spiritual Wellbeings of Cancer Patients in Turkey and Affecting Variables

Zübeyde Candan[1] , Özlem Uğur[2]

[1]Nursing, KahramanMaraş Sütçü İmam University Faculty of Medicine, KahramanMaraş, Turkey

[2]Department of Oncology Nursing, Dokuz Eylül University Faculty of Nursing, İzmir, Turkey

Zübeyde CANDAN

Özlem UĞUR

Correspondence: Özlem Uğur
Department of Oncology Nursing, Dokuz Eylül University Faculty of Nursing, İzmir, Turkey
Phone: +902324124785
E-mail: ozlemugur21@gmail.com

Received: 11 December 2022
Accepted: 19 February 2023

ABSTRACT

Aim: Spirituality has so many advantage such as preventing ,healing and dealing with illness and also furthering health. This searching aims to identify cancer patient's spiritual wellbeing conditions and their spiritual care necessity and also draw attention to spirituality when care is planned.

Material and Methods: The population are made up of 100 patients who are treated in hematology – oncology clinic in Kahramanmaraş Sütçü İmam University Health Practice And Research Hospital. The study data was collected by using the "Questionnaire for Identifying the Spiritual Well-Beings of Patients Diagnosed with Cancer" and ECOG Performance Scale. The descriptive statistical methods were used for evaluation of data; the nonparametric tests (Mann-Whitney U test, Kruskal Wallis H test) were used since the survey and sub-dimensions did not show a normal distribution.

Results: When it is examined how the patients in high level, 66.0 percent of patients have always the same spiritual necessity with the diagnosis, 39.0 percent of patients pray being a spiritual necessity, 85.0 percent of patients don't share any spiritual necessity with healthcare personnels. With the results of the highest susceptibility and the lowest specificity, is identified being 2.47 break point. According to this point, the spiritual wellbeing level of patients who take part in this searching is found in the highest degree with 2.53.

Conclusion: According to these results; it is detected that our patients have the highest spiritual wellbeing status but they are not able to talk enough with the healthcare professionals.

Keywords: Cancer, spirituality, well being

Türkiye'deki Kanser Hastalarının Manevi İyilik Durumları ve Etkileyen Değişkenler

ÖZET

Amaç: Spritüalitenin hastalıkları önleme, iyileştirme, tedavi etme ve sağlığı geliştirme gibi pek çok avantajı vardır. Bu araştırma kanser hastalarının spritüel iyilik durumlarını ve bakım gerekliliğini belirlemeyi amaçlamaktadır.

Gereç ve Yöntemler: Örneklem Kahramanmaraş Sütçü İmam Üniversitesi Sağlık Uygulama ve Araştırma Hastanesi Hematoloji - Onkoloji Kliniğinde tedavi gören 100 hastadan oluşmaktadır. Araştırma verileri "Kanser Tanısı Alan Hastaların Spritüel İyilik Durumlarını Belirleme Anketi" ve ECOG Performans Ölçeği kullanılarak toplanmıştır. Verilerin değerlendirilmesinde tanımlayıcı istatistiksel yöntemler ile anket ve alt boyutların normal dağılım göstermemesi nedeniyle parametrik olmayan testler (Mann-Whitney U testi, Kruskal Wallis H testi) kullanılmıştır.

Bulgular: Hastaların yüzde 66'sının tanı ile birlikte spritüel gereksinimlerinin değişmediği, yüzde 39'unun dua ettiği, yüzde 85'inin herhangi bir ruhsal gereksinimi sağlık personeli ile paylaşmadıkları saptanmıştır. Çalışmada spritüel duyarlılık kırılma noktası olarak 2.47 belirlenmiş ve ruhsal iyilik düzeylerinin en yüksek 2.53 olduğu bulunmuştur.

Sonuç: Bu sonuçlara göre; hastalarımızın ruhsal iyilik durumlarının yüksek olduğu ancak sağlık çalışanları ile yeterince konuşamadıkları tespit edilmiştir.

Anahtar Kelimeler: Kanser, maneviyat, iyilik durumu

In the cancer, the people want to regain their body balances to get healthy again. They want to fulfill their rituals, religious beliefs and spiritual requirements which will make them feel good, protect their hopes and maintain their balances (1,2). The spiritual care is a concept, which organizes the relationship between the persons and their social surroundings and other individuals and helps them to discover and restructure the meaning of life and to prepare for death, and in which the religious requirements are fulfilled (3). The spiritual care covers all cares supporting the values, personal beliefs and religious practices of patient. The spiritual care is very important in the chronic illnesses such as cancer which threatens the life and causes a crisis for the patient and his/her family and during which the meaning of life and the death are questioned (3,4). The individuals diagnosed with a chronic illness such as cancer begin to question the meaning of life. The reason why the spiritual care come to forefront for chronic patients is that it helps individuals to accept the illness, maintain their hope, make plan for future and improve their life qualities (3,5). However, it was diagnosed that the cancer patients were not able to fulfill their spiritual requirements in the clinics although 52-63% of patients had spiritual requirements 6. It is important to identify the spiritual requirements of patients and help to patient and family by making proper interventions within the scope of nursing care (7). It is notified that listening the spiritual requirements of individuals, showing empathy towards them and planning the spiritual care interventions by nurses in the crises are important for ensuring the adaptation in tougher times since they decrease the pains and anxieties of patients while increasing the physiological, psychological and mental comfort and communication, strengthening the emotion of feeling themselves strong and the strategies for coping with the illness and raising the life qualities (8). There are limited number of studies concerning the identification of spiritual requirements with cancer patients in Turkey (9). İt was aimed to investigate the spiritual well-beings of patients with cancer and the variables affecting spiritual well-being in this study.

MATERIAL AND METHODS

Study Design

This study was planned as a descriptive study.

Place and Time of Research

The research was conducted in Kahramanmaraş Sütçü İmam University Health Application and Research Hospital Hematology-Oncology Service between September 2016 – March 2017.

Participants and Setting

Research Population; the patients who were hospitalized in Kahramanmaraş Sütçü İmam University Health Application and Research Hospital Hematology-Oncology Service; the sampling consisted of patients who were admitted to hospital between September 2016 – March 2017 and fulfilled the election criteria.

As a *selection criterion* in the research were as follows; being admitted to hospital for chemotherapy, radiotherapy or other supportive cares, being elder than 18 years old, being diagnosed with cancer in the last 6 months and knowing his/her diagnosis and giving consent to participate in the study. The *exclusion criteria* in the study were as follows: being diagnosed with cancer earlier than 6 months, being within the period of pregnancy/lactation, being on a psychotic/antidepressant medication at least for 6 weeks, having brain metastasis, not having a good cooperation and not being able to establish a verbal communication. Since the exact number of patients coming to the clinics in the study was not known, it was calculated that 169 patients were required to reach 80% sampling power. There are similar studies in the literature (10). However, due to the limited number of patients visiting the hospital, patients who met the criteria for selection between Sempter 2016 - March 2017 and accepted to participate in the study were included in the study.

Data Collection

The study data was collected by using the "Questionnaire for Identifying the Spiritual Well-Beings of Patients Diagnosed with Cancer" and ECOG Performance Scale.

Questionnaire for Identifying the Spiritual Well-Beings of Patients Diagnosed with Cancer; it was prepared by the researchers by taking support from literature (11-13). This form is a form prepared by studies taking expert opinions. In the form, there are open-ended questions generally including opinions about the life philosophy, hope, belief-confidence, divine power and his/her own image to determine the demographic data, ECOG performance score and spiritual well-being of patient.

When preparing the survey questions, the four subdimensions of spiritual care were questioned and the questions were asked in a mixed order. The questions numbered 1, 3, 8, 11, 18 took place with the subdimension of hope; the questions numbered 4,5,12,13,14 took place within the subdimension of belief-confidence; the questions numbered 6,10,16,17 took place within the subdimension of divine power and his/her own image. Before starting the implementation for questionnaire, the opinions of 9 experts were received and the consistency between the experts was determined as 0,89. The experts who were considered suitable for receiving opinion, consisted of 3 specialist nurses, 5 academic staffs and 1 physician who had studies on patients with cancer. Within the direction of feedbacks from experts, the arrangements were made on the clauses and the questionnaire was put into final form in this way. The reliability coefficients of questionnaire clauses were determined as follows: 0.81 in the subdimension of life philosophy, 0.85 in the subdimension of hope, 0.60 in the subdimension of belief and confidence, 0.56 in the subdimension of divine power and 0.91 in the subdimension of general spirituality. The reliability coefficient varied between 0.56-0.91. This indicates that the responses given to questions were consistent.

ECOG Performance Scale; it is scale which is widely used for evaluating the functional status of patient. The scale is used for identifying the performance statuses of patients with cancer. A score varying between 0-5 is given. 0 indicates the good health status while 5 indicates the death (14) .

Statistical Analyses

The data obtained from research was analyzed by using SPSS 24.0 program. The descriptive statistical methods (number, percentage, averaging, standard deviation) were used for evaluation of data; the nonparametric tests (Mann-Whitney U test, Kruskal Wallis H test) were used since the survey and sub-dimensions did not show a normal distribution. The "Reliability Analysis" was conducted wit the aim of testing the reliability of surveys.

Ethics Committee Approval

This study was approved by the Ethics Committee of the Faculty of Medicine of Dokuz Eylül University with the decision numbered (protocol number:2016/25-16).

RESULTS

In this part, the findings were discussed by identification of sociodemographic attributes of patients, illness properties and spiritual well-being with the scope of the relationship between subdimensions of survey and spiritual well-being and sociodemographic attributes.

It was determined that 64.0% of patients participated in the study were male and their ages varied between 60.51±13.56, 86.0% of patients were married, 76.0% of patients were primary school graduate and 95.0% of patients were not employed. It was determined that 86.0% of patients' cancer types was oncology, 68.0% of patients' cancer stage was 4th stage, 41.0% of patients underwent symptomatic treatment, 94.0% of patients' time of diagnosis varied between 1-5 years and 51.0% of patients did not have another chronic illness. It was found that 61.0% of patients was hospitalized for 1-5 times in the recent year and 35% of patients' ECOG performance score was 2 (they spent more than 50% of day in a standing position and they could take their own care). 86% of patients expressed that they received good family support while 49% of patients found the treatment applied as moderately effective. When the level of change of the patients' spiritual requirements along with diagnosis was questioned, it was determined that 66.0% of patients' spiritual requirements did not change; and 39.0% of patients prayed to feel them better and 85.0% of patients did not share their spiritual requirements with healthcare professionals (Table 1).

In the survey identifying the spiritual requirements of patients, it was determined that the life had a meaning for them (82%), they looked at the future with hope (69%), they believed in God (100%), they had spiritual practices according to their beliefs (96%), their decisions had an influence on their own life (42%), they had an optimistic personality (80%), they perceived what they lived as a positive experience (77%), they did not consider the illness as a punishment (62%) and they had difficulty partially (47%), they believed that everything will be fine (57%), their beliefs and practices helped them to feel relaxed in stressful circumstances (83%) and the illness strengthened their spiritual dimension (51%) and they thought that God supported them within the process of illness (81%), they did not have pessimistic personality (77%), they believed that they were in the driver's seat with respect to what they lived (37%), they thought that they were protected by God constantly (85%) and they enjoyed the life partially (38%) (Table 2).

Table 1. Sociodemographic Attributes of Patients and Properties of Illness			
Descriptive Attributes (n:100)	**Number (n)**	**Min-Max**	**X±SD**
Age	100	20-88	60.51±13.56
Age groups	**Number (n)**	**Percentage (%)**	
20-55	25	25.0	
56-70	33	33.0	
71-88	42	42.0	
Sex			
Female	36	36.0	
Male	64	64.0	
Marital Status			
Married	86	86.0	
Single	14	14.0	
Educational Background			
Primary school	76	76.0	
Secondary school	10	10.0	
Highschool	9	9.0	
University/college	5	5.0	
Employment Status			
Yes	5	5.0	
No	95	95.0	
Type of Cancer			
Hematology	14	14.0	
Oncology	86	86.0	
Stage of Cancer			
Stage 2	15	15.0	
Stage 3	17	17.0	
Stage 4	68	68.0	
Mode of Treatment			
CT	34	34.0	
RT	14	14.0	
Surgery	7	7.0	
Symptomatic treatment	41	41.0	
Other (hormone therapy, biologic therapy, etc.)	4	4.0	
Time of Diagnosis			
6-12 monts	20	20.0	
13- 24 monts	46	46.0	
25 monts and above	34	34.0	
Existence of Chronic Illness			
Available	51	51.0	
N/A	49	49.0	
Status of Hospitalization in One Year			
1-5	61	61.0	
6-10	32	32.0	
11 and above	7	7.0	
ECOG Performance Score			
0	12	12.0	
1	19	19.0	
2	35	35.0	
3	22	22.0	
4	12	12.0	
Influence of Treatment			
Low	18	18.0	
Moderate	49	49.0	
High	33	33.0	
Family Support			
Bad	3	3.0	
Moderate	11	11.0	
Good	86	86.0	
Change of Spiritual Requirement Along with Diagnosis			
Yes	34	34.0	
No	66	66.0	
Spiritual Requirements			
Praying	39	39.0	
Worshipping	38	28.0	
Other	23	23.0	
Sharing His/her Spiritual Requirements with Healthcare Professionals			
Yes	15	15,0	
No	85	85,0	

Based on the results of Spiritual Well-Being Identification Survey and ROC analysis conducted with the aim of determining the cutpoint of subdimensions: the average corresponding to the point where the precision was highest and the specificity was lowest, was determined as 2.47. The ones whose average of spiritual well-being levels was below 2.47 had low level of spiritual well-being while the ones whose average of spiritual well-being levels was above 2.47 had high level of spiritual well-being. In the survey, it was determined that the sub-dimension of "life philosophy" had a low level of spiritual well-being since it was 2.37 and the sub-dimension of "divine power" had a low level of spiritual well-being since it was 2.34 while the subdimension of "hope" had a high level of spiritual well-being since it was 2.63 and the subdimension of "belief and confidence" had a high level of spiritual well-being since it was 2.75 (Table 3).

Table 2. Identification of Spiritual Well-Beings of Patients							
Results of Identification of Spiritual Well-Being	I disagree		I agree partially		I agree		X±SD
	S	%	S	%	S	%	
1- The life has a meaning for me	7	7.0	11	11.0	82	82.0	2.75±0.58
2- I look at future with hope	12	12.0	19	19.0	69	69.0	2.57±0.70
3- My illness prevents me from clinging to life	52	52.0	26	26.0	22	22.0	2.30±0.81
4- I believe in the existence of a great power (God, Allah, soul, evil eye talisman, lucky stone, etc.)	0	0.0	0	0.0	100	100.0	3.00±0.00
5- I have spiritual practices according to my belief (praying, meditation, yoga, etc.)	1	1.0	3	3.0	96	96.0	2.95±0.26
6- My decisions have an influence on what I lived	36	36.0	22	22.0	42	42.0	2.06±0.89
7- I have an optimistic personality	5	5.0	15	15.0	80	80.0	2.75±0.54
8- I believe that what I live is a positive experience for me	8	8.0	15	15.0	77	77.0	2.69±0.62
9- I believe that everything will be fine whatever my illness is	12	12.0	31	31.0	57	57.0	2.45±0.70
10- I think that my illness is a punishment inflicted on me	62	62.0	28	28.0	10	10.0	2.52±0.67
11- I don't feel any challenge in my illness	28	28.0	47	47.0	25	25.0	1.97±0.73
12- My beliefs and practices allow me to feel relaxed under stressful conditions.	2	2.0	15	15.0	83	83.0	2.81±0.44
13- My illness has strengthened my spiritual side.	29	29.0	20	20.0	51	51.0	2.22±0.87
14- I think that Allah/God supports me within the process of my illness	2	2.0	17	17.0	81	81.0	2.79±0.46
15- I have a pessimistic personality	77	77.0	22	22.0	1	1.0	2.76±0.45
16- I think that I am in the driver's seat with respect to what I will live	37	37.0	29	29.0	34	34.0	1.97±0.85
17- I think that Allah/God always protects me	3	3.0	12	12.0	85	85.0	2.82±0.46
18- I enjoy the life	25	25.0	38	38.0	37	37.0	2.12±0.78

Table 3. Average and Standard Deviation Values of Subdimensions of Survey Identifying the Spiritual Well-Beings of Patients		
Subdimensions	X	SD
Life philosophy	2.37	0.53
Hope	2.63	0.51
Belief and Confidence	2.75	0.31
Divine Power	2.34	0.48
General Spiritual Well-Being	2.53	0.40

When the spiritual well-being and sociodemographic attributes of patients were reviewed, it was seen that there a statistically significant relationship between the type of treatment and subdimensions of general spirituality level (X^2: 14.375, P: 0.006), divine power (X^2: 14.561, P: 0.006) and belief and confidence (X^2: 10.757, P: 0.029) and the existence of a chronic illness and subdimensions of general spirituality level (930.500, X^2: -2.205, P: 0.027), divine power (X^2: -2.222, P: 0.026), hope (X^2: -1.311 P: ,0.190) and belief and confidence (X^2: -1.228, P: 0.220) and the status of hospitalization and subdimensions of general spirituality level (X^2: 9.954, P: 0.007), hope (X^2 :12.240, P: 0.002.) and belief and confidence (X^2 :6.166, P: 0.046*) and the status of ECOG performance and subdimensions of general spirituality level (X^2:13.987, P: 0.008), life philosophy (X^2: 11.642, P: 0.020), divine power (X^2: 11.469, P: 0.022) and hope (X^2: 10.184, P: 0.037) and the change of spiritual requirements and subdimensions of general spirituality level (X^2: -2.287, P: 0.022), divine power (X^2:-3.517, P: 0.000) and belief and confidence (X^2: -3.031, P: 0.002) ($p<0.05$). Moreover, no statistically significant relationship was determined with the sex, marital status, employment status, educational background, cancer type, stage of cancer, illness period, spiritual requirements and spiritual well-being ($p>0.05$) (Table 4).

Table 4. Relationship between Subdimensions of Patients' Spiritual Well-Being and Affecting Variables

	Life philosophy		Hope		Belief and Confidence		Divine power		General Spirituality and Well-Being Level	
	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank	n	Mean Rank
	X^2	p	X^2	p	X^2	p	X^2	p	X^2	p
Type of treatment										
- CT (1)	34	50.94	34	51.99	34	55.43	34	53.63	34	51.82
- RT (2)	14	50.00	14	45.43	14	49.21	14	58.36	14	54.46
- Surgical (3)	7	77.21	7	76.00	7	76.00	7	79.64	7	86.36
- Symptomatic (4)	41	46.10	41	46.94	41	43.33	41	42.46	41	42.87
- Other (5)	4	46.88	4	47.50	4	42.00	4	27.75	4	40.88
	7.104	0.130	7.527	0.111	10.757	0.029	14.561	0.006	14.375	0.006
						3>4		3>4, 3>5		3>4, 3>1
Illness Period										
- 6-12 monts	20	20.34	20	20.59	20	20.49	20	20.22	20	20.11
- 13 – 24 monts	46	49.37	46	46. 69	46	46.54	46	49.67	46	42.80
- 25 monts and above	34	39.29	34	32.72	34	32.97	34	30.11	34	37.09
	241.000	-0.601	197.500	-1.311	203.500	-1.228	277.000	-0.074	225.500	-0.822
		0.548		0.190		0.220		0.941		0.411
Existence of a chronic illness										
- Available (1)	51	47.92	51	44.90	51	44.75	51	44.28	51	44.25
- N/A (2)	49	53.18	49	56.33	49	56.48	49	56.97	49	57.01
	1118.000	-0.916	964.000	-2.105	956.500	-2.177	932.500	-2.222	930.500	-2.205
		0.359		0.03		0.029		0.026		0.027
Status of hospitalization										
- 1-5 years (1)	61	56.99	61	57.36	61	55.56	61	54.33	61	57.43
- 6-10 years (2)	32	44.31	32	42.81	32	40.97	32	42.66	32	41.83
- 11 and above	7	22.21	7	25.86	7	50.00	7	53.00	7	29.79
	11.406	0.003	12.240	0.002	6.166	0.046	3.568	0.168	9.954	0.007
		1>3		1>2, 1>3		1>2				1>2
Status of ECOG Performance										
- 0 (1)	12	57.83	12	60.63	12	52.92	12	68.75	12	68.75
- 1 (2)	19	65.84	19	60.63	19	62.34	19	61.89	19	61.89
- 2 (3)	35	48.34	35	50.79	35	48.66	35	44.07	35	44.07
- 3 (4)	22	46.61	22	45.41	22	44.64	22	45.75	22	45.75
- 4 (5)	12	32.29	12	32.83	12	45.46	12	41.67	12	41.67
	11.642	0.020	10.184	0.037	5.401	0.249	11.469	0.022	13.987	0.008
		1>4								1>4
Opinions on the treatment applied										
- Low (1)	18	26.75	18	26.75	18	36.64	18	33.72	18	26.25
- Moderate (2)	49	48.24 2>1	49	48.24	49	46.15	49	44.46	49	46.52
- High (3)	33	66.80 3>1	33	66.80	33	64.52	33	68.62	33	69.64
	26.038	0.000	26.038	0.000	14.992	0.001	21.718	0.000	27.994	0.000
				3>1, 3>2>1		3>1, 3>2		3>1, 3>2		2>1
Family Support										
- Bad (1)	3	29.50	3	30.50	3	30.67	3	37.33	3	34.83
- Moderate (2)	11	23.27	11	21.41	11	28.41	11	29.73	11	21.91
- Good (3)	86	54.72	86	54.92	86	54.02	86	53.62	86	54.70
	13.359	0.001	16.552	0.000	10.502	0.005	7.490	0.024	13.430	0.001
		3>2		3>2		3>2		3>2		3>2
Change of spiritual requirements										
- Yes (1)	34	51,44	34	53,87	34	61,87	34	64,49	34	59,72
- No (2)	66	50,02	66	48,77	66	44,64	66	43,30	66	45,75
	-0.235	0.814	-0.891	0.373	-3.031	0.002	-3.517	0.000	-2.287	0.022
Sharing with healthcare professionals										
- Yes (1)	15	70,77	15	63,17	15	69,13	15	69,00	15	72,97
- No (2)	85	46,92	85	48,26	85	47,21	85	47,24	85	46,54
	-2.966	0.003	-1.961	0.050	-2.907	0.004	-2.723	0.006	-3.261	0.001

DISCUSSION

In our study, it was determined that majority of patients looked at the future with hope, believed in the existence of a great power believed that the illness would help them to be stronger spiritually and they had spiritual practices based on their beliefs. In the literature, it was notified that the patients with cancer had a positive perception about their prognosis, their spiritual well-being status scores were high and there was a positive relationship between their prognosis perceptions (11,15). In their study, Mordiyano,Songwathans & Petpichetchian (1) determined that reading Quran, performing salah, saying and commemorating prayer strengthened the beliefs of Muslim patients to God and they believed in God and its power. Moreover, they determined that they regulated their relationships with God, felt good and felt relaxed and they reconstructed the spirit-body balance by fulfilling their religious tasks. In the literature, there are researches supporting this (9,16).

In our study, no relationship was determined between the existence of oncological or hematological malignity and spiritual well-being of individuals ($p>0.05$). In a similar manner with the literature, it was determined that the cancer diagnosis types of patients did not affect the spiritual attitudes (15). However, Phelps et al. (17) determined that the spiritual coping methods of patients with lung and colon cancer were different than the methods of patients with other cancer types and they applied to religious practices (performing salah, fasting, etc.) as spiritual coping method. This can be correlated with to what extent the person has approached himself/herself to death in accordance with the cancer type. To illustrate, the patients diagnosed with lung cancer consider their illnesses and treatments as a struggle to stay alive (2). In this study, it was determined that the time of diagnosis of 94.0% of patients were 1-5 years. In the further analysis made, no significant relationship between the illness period and spiritual well-being was determined ($p>0.05$). This result can be attributed to the limited time that the patients in the sampling group lived with diagnosis. In the literature, it was emphasized that the spiritual well-being and requirements of patients underwent a change as long as the time spent with diagnosis held over 18.

In our study, the patients stated that they were receiving family support at a good level (54%). In his study, Taylor (3) emphasized that the family/caregivers of patients with cancer mostly carry out activities strengthening their spiritual well-beings such as hope, power of self-confidence, loving, being loved, maintaining compatible relationships, support of talking, etc. In our study, a significant relationship was determined with the existence of chronic illness and spiritual well-being ($p<0.05$). In other words, it was seen that the ones with a chronic illness had a lower spiritual well-being compared to the ones without a chronic illness. However, no literature support was found concerning that the spiritual well-beings of individuals having another chronic illness as well as cancer were affected positively or adversely.

When ECOG performance values of patients were reviewed, it was found that the ones whose scores were 1, had a higher well-being level. Getting 1 point in the ECOG performance evaluation indicated that the individual fulfilled daily life activities independently and this positively affected his/her life philosophy and hope by affecting his/her struggle with illness. The findings of our study showed similarity with the literature (15).

There was a statistically significant difference between the opinions of patients under the influence of treatment and their spiritual well-beings. It was concluded that the ones who deemed the influence of treatment according to well-being level as moderate were different from the ones who deemed it as low while the ones who deemed it as high were different from the ones who deemed it as moderate and low. Although there are studies showing similarity with our study (15). Besides that the diagnosis of cancer caused the individual questioning the life, it also brought along the struggle for life. Being treated and the progress, stop or extinction of illness positively affected the spiritual well-being as well as that it raised the life qualities of patients (3,15). These data show similarity with our study.

A significant relationship was determined between being diagnosed with an illness and spirituality ($p<0.05$). In the literature, there are similar studies (15). It was found that 86.0% of participants had good support from their families. This conforms to traditional Turkish family structure. In the advanced analyses made, it was found that there was a positive relationship between family support and their well-beings. Our findings were in conformity with the study of Seyedrasooly et al.(11). In the study, it was determined that 39% of patients prayed for fulfilling their spiritual needs while 28% of patients worshipped or they fulfilled their spiritual needs in other ways (silence, tranquility). It was found that the requirements of 66.0% of patients did not change along with the diagnosis.

In the literature, it was stated that Muslim patients prayed, performed the salah, visited the shrines, made a tow and scarified an animal, visited the hodjas, wore an amulet and lucky charm, visited the herbalists, poured lead to repel evil eye and drank holly waters (zam-zam) for recovering their health (3,9).

In our study, it was determined that 85.0% of patients did not share any moral requirement with healthcare professionals. This indicated that the spiritual care was overlooked by healthcare professionals or it was not given a place in the intervention priority. Our findings show similarity with the literature. In the studys conducted by, it was determined that 65.2% of nurses participated the research received no information concerning spirit while 50% of the ones who received information, received insufficient information. In a study which identified the spiritual requirements of mothers whose children were in the intensive care unit, it was found that the mothers did not share their spiritual requirements with healthcare professionals and they did not receive support spiritually (4, 19-21).

CONCLUSION

it was determined that the patients with cancer had spiritual requirements and they considered this significant to heal and raise their life qualities, but they did not share their spiritual requirements with healthcare professionals and they did not receive enough support. The restriction of research is that it was centered on one hospital and conducted with limited number of sampling. Within the direction of results, it can be suggested that the study is conducted with a wider population and in different region hospitals, the health professionals are sensitive to and diagnose the spiritual requirements of patients with cancer well, they develop scales which will diagnose the spiritual requirements specific to culture in Turkish society, the spiritual care concepts are emphasized in the curriculums more effectively, the spiritual care issues are discussed with team in the in-service trainings and the necessary importance is placed.

Author Contributions

Idea/Concept: Z.A., Ö.U; Design: Z.A., Ö.U.; Data Collection and/or Processing: Z.A; Analysis and/or Interpretation: Z.A. ; Literature Review: Z.A., Ö.U.; Writing the Article: Z.A., Ö.U.; Critical Review: Ö.U.

REFERENCES

1. Mordiyano MNS, Songwathans P, Petpichetchian W. Spritüality intervention and qutcomes: corner stone of holistic nursing practice. Nurs Media J Nurs. 2011; 1(1):117-127.
2. Mazières J, Pujol JL, Kalampalikis N, et al. Perception of lung cancer among the general population and comparison with other cancers. J Thorac Oncol.. 2015;10(3):420-5.
3. Taylor EJ. Spiritual Needs Of Patients With Cancer And Family Caregivers, Cancer Nursing. 2003; 26(4), 260-266.
4. Uğurlu ES. Hemşirelikte Manevi Bakımın Uygulanması. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi. 2014; 5(3):187-191.
5. Surbone A, Baider L. The spritüel dimension of cancer care. Critical Rewiews in Oncology. 2010; 73: 228- 235.
6. Kang J, Shin DW, Choi JY, et al. Addressing the religious and spiritual needs of dying patients by healthcare staffin Korea: patient perspectives in a multi-religious Asian country. Psychooncology. 2012; 21(4):374-81.
7. Uğurlu ES, Başbakkal Z. Spiritual Care Requirements of the Mothers of the Hospitalized Children in Intensive Care Units. Journal of the Turkish Society of Intensive Care. 2013; 11(1): 17-24.
8. Wong KF, Yau S. Nurses' experiences in spirituality and spiritual care in Hong Kong. Applied Nursing Research. 2009; 23(4):242-244.
9. Dedeli O, Yıldız E, Yüksel Ş. Assessing the Spritüel Needs and Practices of Oncology Patients in Turkey. Holist Nurs Pract. 2015; 29(2):103-13.
10. Calderia S, Timmins F, Carvalho CE, Vieira M. Spritüel Well- Being and Spritual Distress in Cancer Patients Undergoing Chemotherapy: Utilizing the SWBQ as Component of Holistic Nursing Diagnosis. J Relign. Health. 2017; 56(4): 1489- 1502.
11. Seyedrasooly A, Rahmani A, Zamanzadeh V., et al. Association between Perception of Prognosis and Spiritual Well-being among Cancer Patients. J Caring Sci.. 2014; 3(1): 47–55.
12. Yılmaz M. Holistik bakımın bir boyutu: spiritualite, doğası ve hemşirelikle ilişkisi. Anadolu Hemşirelik ve Sağlık Bilimleri Dergisi. 2011; 14: 2.
13. Çelik AS, Ozdemir F, Durmaz, H, Pasinlioğlu T. Hemşirelerin Maneviyat ve Manevi Bakımı Algılama Düzeyleri ve Etkileyen Bazı Faktörlerin Belirlenmesi. Hacettepe Üniversitesi Hemşirelik Fakültesi Dergisi. 2014; 1–12.
14. http://ecog-acrin.org/resources/ecog-performance-status
15. Yazgan EO. Kemoterapi Alan Kanser Hastalarında Dini İnanç Ve Maneviyatın Depresyon Düzeyi Ve Yaşam Kalitesine Etkisinin Belirlenmesi. Ankara Üniversitesi Sağlık Bilimleri Enstitüsü Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi, Ankara, Türkiye. 2014.
16. Dehghani Z. Impact of prayer on spritüel well being in cancer patients undergoing chemotherapy. Paper presented at: Third International Congress on Supportive and Pallative Car in Cancer. 2011; Tehran, Iran.
17. Phelps AC, Maciejewski PK, Nilsson M, et al. Religious coping and use of intensive life prololing care near death in patients with advanced cancer. JAMA. 2009; 301(11):1140-7
18. Koenig GH, George KL, Titus P, Meador GK. Religion, spirituality and acute care hospitalization and long term care use by older patients. Arch Intern Med. 2004; 164(14):1579-85
19. Eğlence R, Şimşek N.Hemşirelerin Maneviyat ve Manevi Bakım Hakkındaki Bilgilerinin Değerlendirilmesi. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi. 2014; 5(1):48-53.
20. Uygur D. Hemşirelerin Spiritüalite ve Spiritüel Bakım Algısının Belirlenmesi ve İş Doyumu ile Arasındaki İlişkinin İncelenmesi. Abant İzzet Baysal Üniversitesi Sağlık Bilimleri Enstitüsü Hemşirelik Anabilim Dalı, Yüksek Lisans Tezi,Bolu, Türkiye. 2016
21. Korkut OF, Demirbaş ÇN, DoğanT. Üniversite Öğrencilerinde Goodlik halinin yordayıcısı olarak psikolojik sağlamlık. Elektronik Sosyal Bilimler Dergisi. 2017; 16(64):1461-1469

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 155-160
https://doi.org/10.31067/acusaglik.1174274

Is Groin Hernia Associated with Pubic Edema Severity in Footballers?

Ali Eraslan[1]

[1]University of Health Sciences, Antalya Training and Research Hospital, Department of Sports Medicine, Antalya, Turkiye

Ali ERASLAN

Correspondence: Ali Eraslan
University of Health Sciences, Antalya Training and Research Hospital, Department of Sports Medicine, Antalya, Turkiye
Phone: +905053518874
E-mail: eraslanali@yahoo.com

Received: 13 September 2022
Accepted: 31 December 2022

ABSTRACT

Objective: The groin area, with its complex anatomical structure, can have different athletic problems simultaneously. In this study, it was aimed to investigate whether groin hernia had a relationship with pubic bone marrow edema (BME) severity in footballers.

Method: Among the athletes with painful groin from different sports, only male footballers who had pubic BME in pelvic MRI report were included in the study. The included athletes underwent a second archive scan for groin hernia (hernia symptoms, previous hernia surgery, sonography report). Then, the MRI sections of hernia-related cases were re-evaluated. For this purpose, right and left pubic BME signal intensities (SI) were quantitatively measured using the "region of interest (ROI)" program module on T2 fat-suppressed images.

Results: A total of 93 footballers with pubic BME were found. Eleven of them (11.8%) had a concurrent hernia, while five (5.4%) had a repaired hernia before the study. ROI measurements of these sixteen athletes revealed that the pubic bones on the side of concurrent / repaired hernias had a significantly greater mean BME intensity than opposite pubic bones (1049 SI versus 796 SI, $p<0.001$).

Conclusion: A groin hernia can be seen concurrently in one-tenth of footballers with pubic BME. Whether the hernia is concurrent or repaired, its side overlaps with the side of serious pubic BME. There is a significant association between hernia and pubic BME severity in terms of groin selection. Strength / flexibility imbalance between the groin sides or dominant (kicking) leg effect can be a research subject in this context.

Keywords: Football, Athlete, Groin Hernia, Bone Marrow Edema

Kasık Fıtığı Futbolcularda Pubik Ödemin Şiddeti ile İlişkili midir?

ÖZET

Amaç: Karmaşık anatomik yapısı ile kasık bölgesi aynı anda farklı atletik problemleri barındırabilir. Bu çalışmada, kasık fıtığının futbolcularda pubik kemik iliği ödem (KİÖ) şiddeti ile ilişkisi olup olmadığını araştırmak amaçlandı.

Yöntem: Ağrılı kasığı olan farklı dallardan sporcular arasından, pelvik MR raporunda pubik KİÖ bulunan sadece erkek futbolcular çalışmaya dahil edildi. Dahil edilen sporculara kasık fıtığı için ikinci bir arşiv taraması yapıldı (fıtık semptomları, önceki fıtık ameliyatı, sonografi raporu). Ardından fıtık ile ilişkili olguların MR kesitleri yeniden değerlendirildi. Bu amaçla, T2 yağ-baskılı görüntüler üzerinde "ilgi bölgesi (ROI)" program modülü kullanılarak sağ ve sol pubik KİÖ sinyal yoğunlukları (SI) sayısal olarak ölçüldü.

Bulgular: Pubik KİÖ'ye sahip toplam 93 futbolcu bulundu. Bunlardan onbirinde (%11.8) eşzamanlı fıtık, beşinde (%5.4) çalışma öncesi onarılmış fıtık vardı. Bu on altı sporcunun ROI ölçümleri, eşzamanlı / onarılmış fıtık tarafındaki pubik kemiklerin, karşı pubik kemiklerden önemli ölçüde daha yüksek bir ortalama KİÖ yoğunluğuna sahip olduğunu ortaya koydu (1049 SI'ye karşı 796 SI, $p<0.001$).

Sonuç: Pubik KİÖ'ye sahip futbolcuların onda birinde eşzamanlı kasık fıtığı görülebilir. Fıtık ister eşzamanlı ister onarılmış olsun, pubik KİÖ'nün şiddetli olduğu taraf ile örtüşmektedir. Kasık seçimi açısından fıtık ile pubik KİÖ şiddeti arasında anlamlı bir ilişki vardır. Kasık tarafları arasındaki kuvvet / esneklik dengesizliği veya dominant bacak etkisi bu bağlamda araştırma konusu olabilir.

Anahtar Kelimeler: Futbol, Sporcu, Kasık Fıtığı, Kemik İliği Ödemi

Groin pain is a serious problem forcing athletes to career limiting/ending, and has a negative impact on the worldwide sports economy (1). Athletic groin pain may arise from pelvic osseous, muscular, tendinous, bursal, articular (hip), neural or urogenital structures (1,2). Football is a risky sport for groin pain conditions. The percentage of groin injuries to all injuries was 11.1% in amateur football players (3), while it was reported as 14% in professional players (4).

Pubic region pain is frequently seen in sports that require kicking, rotation, sudden acceleration and deceleration movements (1,2). Painful and tender pubic bones do not allow the athlete to train or compete on high levels (2,5). Increased pubic bone marrow edema (BME) signal on magnetic resonance imaging (MRI) is a common manifestation in the painful athletic groin (5-12). BME reflects a stress reaction of the pubic bone to excessive athletic loading. In a histologic study conducted on athletes with chronic groin pain, pubic bone biopsies taken from the high MRI signal intensity areas showed the existence of increased osteoblastic activity, new bone formation and neovascularization. The findings were found to be compatible with pubic bone stress injury (13).

It is unlikely to observe a frank hernial swelling in the groin area of athletes, however, a pain provoked by valsalva maneuver often exists (2,14). During the sportive activity, adductor and abdominal actions generate tractional and shearing forces on the posterior inguinal wall. The wall is composed by the fascia transversalis and lies within the Hesselbach's triangle. Factors such as groin weakness, muscle imbalance, poor coordination and groin overuse may lead to a fascial defect in this region and pave the way for hernia formation in athletes (2,14-16). Although a groin hernia is not easily detected by physical examination in athletes, it can be diagnosed by dynamic inguinal sonography (14,15,17,18).

The groin area, which has a complex anatomical structure, can host multiple athletic problems at the same time. Some of these may be linked to each other (2,6,16,19,20). Based on the above informations, this study aimed to research whether there is an association between groin hernia and pubic BME severity in football players with the painful groin.

MATERIAL AND METHOD

Study Design and Population

This retrospectively designed study was approved by the Ethics Committee of Antalya Training and Research Hospital and carried out by the principles of the Declaration of Helsinki.

The hospital's online information system (SARUS) and patient medical charts were used for data searching. Athletes who were consecutively admitted to the Sports Medicine department for painful groin were scanned. Age, gender, sports branch, clinical history (symptoms, pain duration, pain localization), physical examination findings and radiological analyses were examined. Only male footballers aged between 18 and 45 years were included in the study, while females and non-football athletes were not included. Another inclusion criterion was that "pubic BME" had been documented in the magnetic resonance imaging (MRI) report.

Then, a second archive search was performed to find which ones of these footballers were associated with groin hernia. History of hernia symptoms (increasing groin pain with sneezing, coughing or straining), history of a previous hernia operation, sonography reports and surgery referrals were checked. Sonographic reports in favor of a bulging that contains peritoneal fat or intestinal structure within the Hesselbach's triangle were considered as hernia.

Measurement of Bone Marrow Edema

Previous MRI pictures of the athletes who were found related to hernia were re-evaluated. Pubic BME signal intensity (SI) values were quantitatively measured on fat-suppressed T2 sequences. For this purpose, the "region of interest (ROI)" module of a software program was used (Sectra Workstation IDS7, Sectra AB, Sweden). SI values were measured by determining ROI areas about of 50 mm^2 within the highest signal zone of the right and left pubic bones of each athlete.

Statistical Analysis

Statistical analyses were performed using the SPSS package for Windows 18.0 (SPSS Inc, Chicago, Illinois, USA). Categorical variables were defined as percentage distribution (%). Continuous variables were defined as mean (± standard deviation), minimum (min) and maximum (max) values. Independent Samples T-test was used to compare the means of age and Mann Whitney U test was used to compare the means of symptom duration. The mean pubic BME signal intensity values of hernia-related groins and opposite groins were compared using the Wilcoxon Signed Ranks test. P values less than 0.05 were considered

as significant. Post hoc power analysis of the study was calculated with the G.Power program (version 3.0.10).

RESULTS

As a result of data searching, 93 male footballers with pubic BME on MRI reports were found. All athletes had pubic bone tenderness with digital palpation. Also, resisted "sit-ups" and "adductor squeeze" tests were painful in all. Two-thirds (61/93) of the footballers were professional athletes. Twenty eight were amateur players and 4 were football referees. The mean age was 25.1±7.3 years (min 18 years, max 45 years), and the mean duration of groin pain was 3.2±3.3 months (min 1 week, max 18 months).

The second archive scan revealed that 16 athletes were related to hernia (Figure 1). In the history of 5 athletes (5.4%), it was found that they had undergone hernia surgery before applying to the clinic. Three had been operated from the right and two from the left groin. The remaining 11 athletes (11.8%) who complained of hernia symptoms had a concurrent hernia in their sonography reports. On physical examination, only one (patient 9) had a bulge by valsalva maneuver. The side of the hernia was right in five athletes and left in six athletes (Table 1).

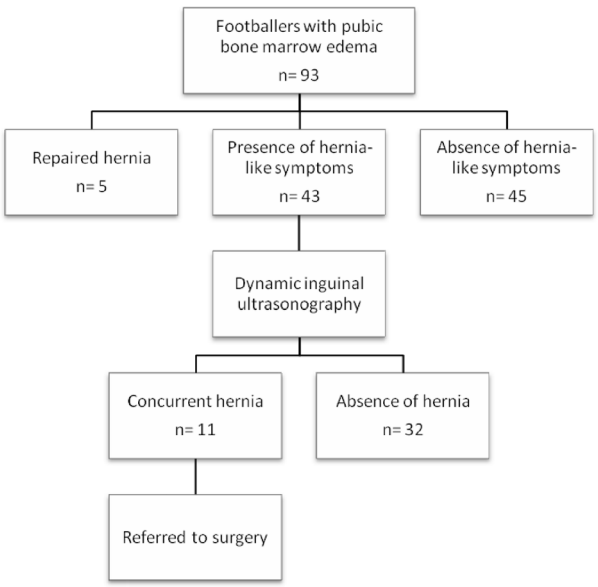

Figure 1. *The diagram shows the distribution of the footballers related to hernia.*

ROI measurement of these sixteen athletes revealed that the pubic BME signals on the side of concurrent or repaired hernia were more intense than those of opposite pubic bones. The mean pubic BME intensity value of the hernia-related groins was significantly higher (1049±380 SI, min 503 SI, max 1613 SI) than those of the opposite groins (796±280 SI, min 392 SI, max 1376 SI) (p<0.001). Figure 2 shows the ROI measurement on an athlete's MRI (patient 10). Figure 3 shows the pubic BME signal intensities of sixteen athletes and intensity means according to the groin sides.

The mean age of isolated BME cases (24.1±6.7 years) was lower than those with concurrent hernia (28.5±7.7 years, p=0.053) and repaired hernia (32±10.6 years, p=0.018). Also, the mean symptom duration was lower in isolated BME cases (2.8±2.8 months) than those with concurrent hernia (6.1±5.7 months, p=0.003) and repaired hernia (3.5±2.3 months, p=0.600).

Power Calculation

Post hoc power analysis of the study revealed that a sample size of 93 subjects had a power of 100% (1- β) based on an effect size of 0.74 and a two-sided α level of 0.05.

DISCUSSION

Groin problems reduce the athletic performance and lead to significant time and economic losses in football, which is the most popular and financial sport worldwide. Clinicians should not ignore that more than one condition can exist concurrently, especially when evaluating a footballer with prolonged groin pain (6,10,19,20). The present study showed that 11.8% of the footballers with pubic BME had a concurrent hernia as a second groin problem. This concurrency became more visible with the increasing age and pain duration, while the age and pain duration of isolated BME cases were remarkably lower. On the other hand, 5.4% of the athletes had a repaired hernia before inclusion in the study. They were the oldest group, but had shorter pain duration possibly due to a previously repaired hernia.

Pubic BME is a frequently encountered condition in footballers with a painful groin. Despite many MRI studies describing pubic BME (5-12), only three of them reported the concurrency of groin hernia and pubic BME (6,10,11). Different from the previous studies, this study tried to question the relationship between groin hernia and pubic BME. For this purpose, it was focused on the quantitative value of pubic BME by using the bilateral ROI method. The edema intensity value was directly measured in this study, instead of defining it as *"absence / presence of BME"* (6,8-10) or grading it as *"0=normal / 1=minimal / 2=moderate / 3=severe BME"* (5,7,11,12). The measurements revealed that the pubic BME on the side of concurrent hernia had a higher intensity than opposite side. Even if the hernia had been previously repaired, pubic BME severity was higher on the operated side. There is no study reporting such an outcome in the literature.

Table 1. Footballers with repaired or concurrent hernia

Patient	Age	Football level	Symptom duration	Side of hernia	Sonography report
1	38	amateur	2 months	right (repaired 8 years ago)	non-available
2	34	amateur	3 weeks	right (repaired 5 years ago)	non-available
3	25	amateur	6 months	left (repaired 4 years ago)	non-available
4	45	amateur	3 months	right (repaired 2 years ago)	non-available
5	18	professional	6 months	left (repaired 1 year ago)	non-available
6	29	professional	3.5 months	left	18 x 4 mm focal adipose tissue herniation
7	20	professional	12 months	right	bulging of the omental fat tissue with valsalva
8	22	professional	3 months	right	fat structures displacing with valsalva
9	41	amateur	18 months	left	3.5 x 2.5 cm heterogeneous echo structured adipose tissue herniation in the axial plane
10	18	professional	2 months	left	convex hernial bulging of fat tissue with valsalva maneuver
11	29	amateur	4 months	left	fat tissue volume becoming prominent in the proximal of the canal with valsalva
12	30	referee	2 weeks	right	anterior bulging of peritoneal fat tissue
13	38	professional	1.5 months	left	herniation extending to the mid-canal level with valsalva maneuver
14	34	amateur	2 months	left	bulging adipose tissue volume in adjacent to the rectus muscle
15	20	professional	9 months	right	fat tissue volume becoming prominent with valsalva
16	33	amateur	12 months	right	displacing omentum anteriorly with forced valsalva maneuver

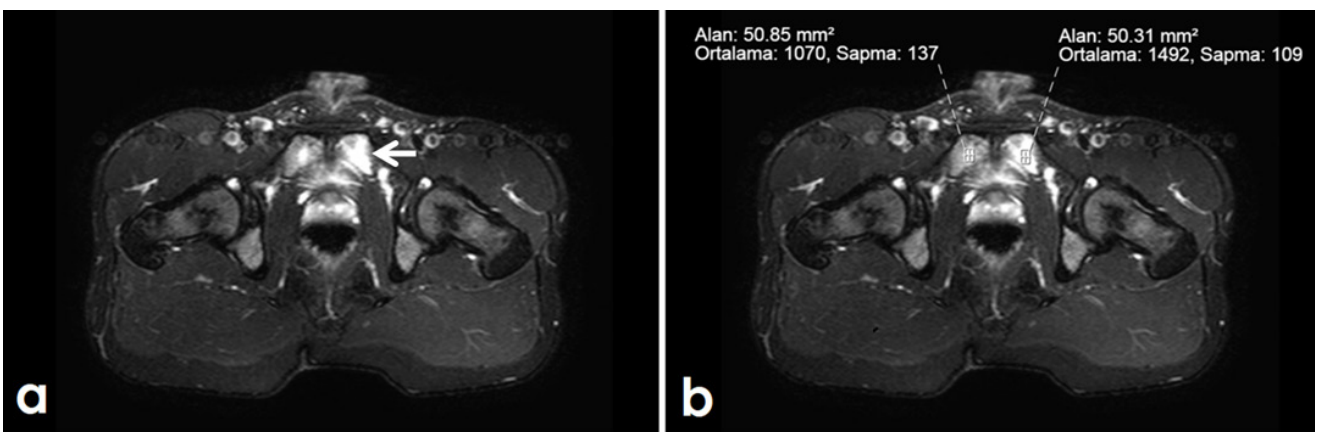

Figure 2. (a) *Coronal MRI section of an 18-year-old professional footballer (patient 10) shows the left pubic bone having more hyperintense BME (arrow) compared to the right.*
(b) *ROI measurement on axial image revealed the BME intensity difference between the pubic bones. (BME: bone marrow edema, ROI: region of interest).*

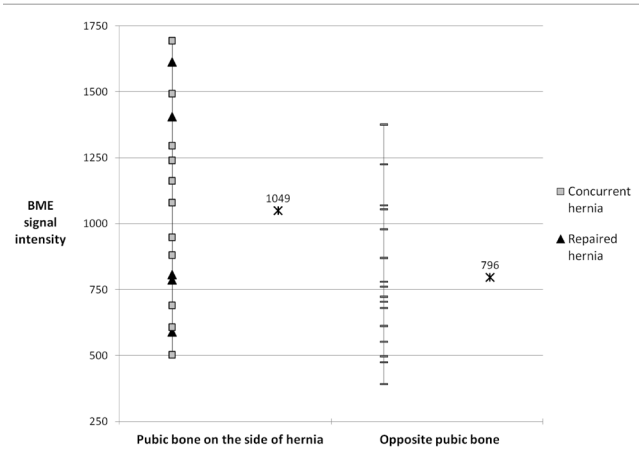

Figure 3. *The graph shows the pubic bone marrow edema (BME) signal intensities of footballers with concurrent hernia (n=11) and repaired hernia (n=5). Significantly different means (1049 SI versus 796 SI, p<0.001) between the groin sides are seen.*

Besides the selection of the same groin, both conditions (hernia and pubic BME) are anatomically in near adjacency. They probable originate from the similar injury pathways. The younger age of isolated BME cases in this study may indicate that pubic BME is the first developing condition and hernia is added to the clinical picture later. Excessive tractional and shearing forces on the weak groin side may cause both pubic bone stress and inguinal wall deterioration (2,10,16). Strength/flexibility imbalance between the groin sides, leg dominancy or asymmetric loading may play a predisposing role in the etiology. In studies conducted on footballers, hip adductor strength in the dominant (kicking) leg was found to be higher than in the non-dominant leg, but no difference was found between abductors (21,22). Asymmetric strengthening of the dominant adductors may lead to compensatory abdominal muscles hypertrophy through the pubic bone where they attach (23).

The present study has some strengths. First, to the best of current knowledge, this is the first study reporting as a significant association that the more severe pubic edema is seen in the same groin side with the hernia. Second, different from the previous studies evaluating the severity of pubic BME subjectively (5-12), this study objectively measured its quantitative value by bilateral ROI evaluation. Third, the high number of subjects is another strong aspect of this study. The athletic cohort had sufficient power and was larger than similar studies' cohorts (5,6,9-11). Fourth, subjects from the same-sex and from the same-sport provided the homogeneity of this study.

Although groin hernia was detected by sonography in one-tenth of footballers, the possible undetectable ones could be considered as a study limitation. Sonography is a safe, fast, cost-effective and non-invasive method providing bilateral groin evaluation. Many authors emphasize its importance in the diagnosis of occult groin hernias (14,15,17,24). However, sonographic results are user-dependent and hernia diagnoses may be missed sometimes. Therefore, surgical exploration has evolved into a diagnostic method in many institutions worldwide. This issue should be taken into account for future prospective studies.

CONCLUSION

One should be aware of the athletic problems that cause pain at different anatomical points of the groin region. At least one-tenth of footballers with pubic BME can have a sonography-detectable concurrent hernia. This concurrency appears to be proportional to the athlete's age and symptom duration. Pubic bones on the side of concurrent or repaired hernia have a more intense edema signal than opposite pubic bones. The signs indicate that groin hernia and serious pubic BME tend to occur in the same groin side of footballers, perhaps via similar injury pathways. To investigate this association, strength / flexibility imbalance between the groin sides and leg dominancy can be subject of the next research.

DECLARATIONS

Conflicts of Interest / Competing Interests

None.

Funding

There was no financial support for this study.

Ethics Approval

Institutional Ethics Committee approval number: 15 - 54/8.

Authors' Contributions

AE: Design, data collection, analysis and writing.

REFERENCES

1. Davies AG, Clarke AW, Gilmore J, Wotherspoon M, Connell DA. Imaging of groin pain in the athlete. Skeletal Radiol. 2010;39:629-644. DOI: 10.1007/s00256-009-0768-9
2. Macintyre J, Johson C, Schroeder EL. Groin pain in athletes. Curr Sports Med Rep. 2006;5:293-299. DOI: 10.1097/01.CSMR.0000306433.28983.c7

3. Van Beijsterveldt AM, Steffen K, Stubbe JH, Frederiks JE, van de Port IG, Backx FJ. Soccer injuries and recovery in Dutch male amateur soccer players: results of a prospective cohort study. Clin J Sport Med. 2014;24:337-342. DOI: 10.1097/JSM.0000000000000028
4. Werner J, Hägglund M, Ekstrand J, Waldén M. Hip and groin time-loss injuries decreased slightly but injury burden remained constant in men's professional football: the 15-year prospective UEFA Elite Club Injury Study. Br J Sports Med. 2019;53:539-546. DOI: 10.1136/bjsports-2017-097796
5. Slavotinek JP, Verrall GM, Fon GT, Sage MR. Groin pain in footballers: the association between preseason clinical and pubic bone magnetic resonance imaging findings and athlete outcome. Am J Sports Med. 2005;33:894-899. DOI: 10.1177/0363546504271206
6. Albers SL, Spritzer CE, Garrett WE Jr, Meyers WC. MR findings in athletes with pubalgia. Skeletal Radiol. 2001;30:270-277. DOI: 10.1007/s002560100335
7. Verrall GM, Slavotinek JP, Fon GT. Incidence of pubic bone marrow oedema in Australian rules football players: relation to groin pain. Br J Sports Med. 2001;35:28-33. DOI: 10.1136/bjsm.35.1.28
8. Cunningham PM, Brennan D, O'Connell M, MacMahon P, O'Neill P, Eustace S. Patterns of bone and soft-tissue injury at the symphysis pubis in soccer players: observations at MRI. Am J Roentgenol. 2007;188:W291-296. DOI: 10.2214/AJR.06.0051
9. Verrall GM, Slavotinek JP, Fon GT, Barnes PG. Outcome of conservative management of athletic chronic groin injury diagnosed as pubic bone stress injury. Am J Sports Med. 2007;35:467-474. DOI: 10.1177/0363546506295180
10. Paajanen H, Brinck T, Hermunen H, Airo I. Laparoscopic surgery for chronic groin pain in athletes is more effective than nonoperative treatment: a randomized clinical trial with magnetic resonance imaging of 60 patients with sportsman's hernia (athletic pubalgia). Surgery. 2011;150:99-107. DOI: 10.1016/j.surg.2011.02.016
11. Kuikka L, Hermunen H, Paajanen H. Effect of pubic bone marrow edema on recovery from endoscopic surgery for athletic pubalgia. Scand J Med Sci Sports. 2015;25:98-103. DOI: 10.1111/sms.12158
12. Schöberl M, Prantl L, Loose O, Zellner J, Angele P, Zeman F, et al. Non-surgical treatment of pubic overload and groin pain in amateur football players: a prospective double-blinded randomised controlled study. Knee Surg Sports Traumatol Arthrosc. 2017;25:1958-1966. DOI: 10.1007/s00167-017-4423-z
13. Verrall GM, Henry L, Fazzalari NL, Slavotinek JP, Oakeshott RD. Bone biopsy of the parasymphyseal pubic bone region in athletes with chronic groin injury demonstrates new woven bone formation consistent with a diagnosis of pubic bone stress injury. Am J Sports Med. 2008;36:2425-2431. DOI: 10.1177/0363546508324690
14. Muschaweck U, Berger LM. Sportsmen's Groin-Diagnostic Approach and Treatment With the Minimal Repair Technique: A Single-Center Uncontrolled Clinical Review. Sports Health. 2010;2:216-221. DOI: 10.1177/1941738110367623
15. Orchard JW, Read JW, Neophyton J, Garlick D. Groin pain associated with ultrasound finding of inguinal canal posterior wall deficiency in Australian Rules footballers. Br J Sports Med. 1998;32:134-139. DOI: 10.1136/bjsm.32.2.134
16. Harmon KG. Evaluation of groin pain in athletes. Curr Sports Med Rep. 2007;6:354-361. DOI: 10.1097/01.CSMR.0000305612.13543.b0
17. Bradley M, Morgan D, Pentlow B, Roe A. The groin hernia - an ultrasound diagnosis? Ann R Coll Surg Engl. 2003;85:178-180. DOI: 10.1308/003588403321661334
18. Vasileff WK, Nekhline M, Kolowich PA, Talpos GB, Eyler WR, van Holsbeeck M. Inguinal Hernia in Athletes: Role of Dynamic Ultrasound. Sports Health. 2017;9:414-421. DOI: 10.1177/1941738117717009
19. Ekberg O, Persson NH, Abrahamsson PA, Westlin NE, Lilja B. Longstanding groin pain in athletes. A multidisciplinary approach. Sports Med. 1988;6:56-61. DOI: 10.2165/00007256-198806010-00006
20. Lovell G. The diagnosis of chronic groin pain in athletes: a review of 189 cases. Aust J Sci Med Sport. 1995;27:76-79.
21. Thorborg K, Couppe C, Petersen J, Magnusson SP, Holmich P. Eccentric hip adduction and abduction strength in elite soccer players and matched controls: A cross-sectional study. Br J Sports Med. 2011;45:10-13. DOI: 10.1136/bjsm.2009.061762
22. Griffin VC, Everett T, Horsley IG. A comparison of hip adduction to abduction strength ratios, in the dominant and non-dominant limb, of elite academy football players. J Biomed Eng Inform. 2016;2:109-118. DOI: 10.5430/jbei.v2n1p109
23. Idoate F, Calbet JAL, Izquierdo M, Sanchis-Moysi J. Soccer Attenuates the Asymmetry of Rectus Abdominis Muscle Observed in Non-Athletes. PLoS One. 2011;6:e19022. DOI: 10.1371/journal.pone.0019022
24. Ugwu A, Khan KS, Chow K. Accuracy of Ultrasound as a Diagnostic Tool for the Assessment of Occult Groin Hernias. J Surg. 2020;8:38-42. DOI: 10.11648/j.js.201200801.18

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 161-165
https://doi.org/10.31067/acusaglik.1228218

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Geriatrics and Gerontology / Geriatri ve Gerontoloji

The Link Between COVID-19 and Executive Functions in the Geriatric Population: A Descriptive Cross-Sectional Study

Merve Çebi[1], **Oğuzhan Kaplan**[1]

[1]Uskudar University, Faculty of Humanities and Social Sciences, Psychology Department, İstanbul, Turkey

ABSTRACT

Objective: Geriatric population is known to be at a greater risk for the Coronavirus-19 (COVID-19). Previous literature provided evidence for the association between viral infections and cognitive decline. The aim of this study was to evaluate executive functions in older adults who were infected by COVID-19.

Material and Methods: A total of 47 participants with healthy cognition over the age of 65 (M:75.4±5.91, minimum-maximum:65-85) were enrolled in the study. The sample was selected from older adults residing in a nursing home in Istanbul. Based on their history of COVID-19 infection, the sample was divided into two groups as COVID-P (22 participants who got Covid-19 in the last six months) and COVID-N (25 participants who did not get Covid-19) which did not significantly differ in terms of age and education. A mini mental state examination was applied to verify the mental status of participants. Trail Making Test (TMT) and Clock Drawing test (CDT) were used to assess executive functions.

Results: The analyses showed that COVID-P group displayed significantly lower performance in the completion time of TMT as compared to COVID-N group ($p < .05$ for both TMT-A and TMT-B). However, groups did not significantly differ in their CDT performance ($p > .05$).

Conclusion: Based on the findings, it is possible to conclude that COVID-19 can negatively affect the executive functions in the old age population.

Keywords: COVID-19; aging; cognition; executive functions

Geriatrik Popülasyonda COVID-19 ve Yürütücü İşlevler Arasındaki İlişki: Tanımlayıcı Kesitsel Bir Çalışma

ÖZET

Amaç: Geriyatrik popülasyonun Koronaviruse (COVID-19) yakalanma riskinin daha yüksek olduğu bilinmektedir. Geçmiş literatüre bakıldığında, viral enfeksiyonlar ile bilişsel bozulma arasında bir ilişki görülmektedir. Bu çalışmanın amacı COVID-19 geçirmiş yaşlılarda yürütücü işlevlerin değerlendirilmesidir.

Gereç ve Yöntem: Çalışmaya 65 yaş ve üzeri (M:75.4±5.91, minimum-maksimum:65-85) toplam 47 bilişsel olarak sağlıklı yaşlı dahil edilmiştir. Örneklem, İstanbul'da bir huzurevinde ikamet eden yaşlı bireylerden oluşturulmuştur. COVID-19 öyküsüne göre, örneklem COVID-P (son 6 ayda Covid-19 geçirmiş olan 22 katılımcı) ve COVID-N (Covid-19 geçirmemiş 25 katılımcı) olmak üzere yaş ve eğitim düzeyi açısından anlamlı fark bulunmayan iki gruba ayrılmıştır. Katılımcıların mental durumlarının değerlendirilmesi amacıyla Mini Mental Durum Testi uygulanmıştır. Yürütücü işlevler, İz Sürme Testi (İST) ve Saat Çizimi Testi (SÇT) uygulanarak ölçülmüştür.

Bulgular: Yapılan analizler sonucunda COVID-P grubunun İST tamamlama süresi performansı her iki form için de COVID-N grubuna göre daha düşük bulunmuştur (hem İST-A hem İST-B için $p < .05$). Öte yandan gruplar SÇT performansı açısından istatistiksel olarak farklı bulunmamıştır ($p > .05$).

Sonuç: Elde edilen bulgulara göre, COVID-19'un yaşlı popülasyonda yürütücü işlev performansını negatif yönde etkilediği sonucuna varmak mümkün olabilir.

Anahtar Kelimeler: COVID-19; yaşlanma; biliş; yürütücü işlevler

Merve ÇEBİ
Oğuzhan KAPLAN

Correspondence: Merve Çebi
Uskudar University, Faculty of Humanities and Social Sciences, Psychology Department, İstanbul, Turkey
Phone: +905357685257
E-mail: merve.cebi@uskudar.edu.tr

Received: 02 January 2023
Accepted: 19 February 2023

As leading to a severe acute respiratory syndrome, the COVID-19 pandemic has affected more than 400 million people throughout the world and resulted in approximately 6 million deaths (https://covid19.who.int/). We witnessed that older population was one of the highest risk groups to experience adverse effects of the virus and potential deaths.

Even though COVID-19 infection mainly targets the human respiratory system, it is now clear that COVID-19 can lead to long-lasting damages in multiple systems including the nervous system. Accordingly, a reasonable number of COVID-19 cases has been found to develop neurological symptoms. In parallel with this, COVID-19 infection has been also associated with impairment in different cognitive domains ranging from attention to executive functions (1). In addition to the direct neurological impact, long-term self-isolation periods as well as the traumatic stress of the disease itself can have a negative impact on cognition of older population (2).

In a cohort study conducted with COVID-19 survivors in Wuhan, it was shown that severe COVID-19 as compared to nonsevere COVID-19 was significantly related to progressive cognitive decline in older adults (3). In another study, worsening of cognitive decline was reported as a significant impact of COVID-19 on people with dementia (4). Also, older adults who cleared the virus were found to experience executive dysfunction as well as increased anxiety and depression (2). Recently, a study conducted with Turkish population evaluated post-covid cognitive deficits and a positive correlation was reported between patients' initial Serum C-reactive protein (CRP) levels and severity of cognitive impairment (5). In addition, cognitive performance of the patients who were hospitalized due to COVID-19 were reported to be worse than the patients who were not hospitalized. In fact, the effect of viral infections other than COVID-19 on neurocognitive functioning had been previously reported in several studies (6-8).

Given that old age people are more vulnerable to this infection, their risk of post-COVID-19 cognitive decline should be a topic of concern. Therefore, the aim of this study was to evaluate the impact of COVID-19 on executive functions among older adults.

Material and Methods

Study Design

The study was designed as a descriptive cross-sectional research model. The study was conducted in accordance with Helsinki Declaration Principles. An informed consent was taken from all participants before collecting the data. The study was approved by Uskudar University Non-Interventional Research Ethics Committee, report number of 61351342/07/2021-30 (29 July 2021).

Sample

Twenty-two participants with the history of COVID-19 (COVID-P) and 25 participants without the history of COVID-19 (COVID-N) were included in the study. Since the target population of the study was old age people, participants were recruited from a nursing home in Istanbul. Participants' mental state was assessed by MMSE and a total score of less than 26 was set as an exclusion criterion. Illiteracy and any history of neurological and psychiatric disorder were also set as exclusion criteria. Being aged 65 or above, having a total score of more than 26 in MMSE and the absence of any neurological and psychiatric disorder were set as inclusion criteria.

Measurement Tools

Clock Drawing Test (CDT)

Clock Drawing Test (CDT) is one of the most widely used and easily applied tests to assess executive functions. Despite its several versions and scoring methods, the general procedure includes instructing participants to draw a cycle to be a clock, then to add the numbers appropriately and finally to set the time to 11.10. In this study, Shulman method was used to evaluate CDT, since it is accepted to be one of the most commonly used scoring systems (9). According to the Shulman method, the score ranges between 0 and 5 with the highest score being 5. Zero point means there is no representation of a clock, 1 point is given for a severe disorganization of numbers which do not represent a clock, 2 point is given for moderate disorganization, 3 point is given for acceptable organization with inaccurate hands, 4 point is given for minor organizational errors, and 5 point stands for the well-organized numbers with hands accurately placed.

Trail Making Test (TMT):

Trail Making Test (TMT) is a well-known neuropsychological test to measure executive functions. It consists of two parts as part A and part B. In both parts, participants are given a sheet of paper where they are instructed to connect 25 circles. In part A, circles only include numbers from 1 to 25 and participants are required to draw a line to connect them in an ascending pattern. In part B, circles include both numbers (from 1 to 13) and letters (from A to ..) and participants are required to connect them in an

alternating pattern (e.g. 1-A-2-B-3-C etc.). The completion time of both parts as well as the number of errors were recorded. The normative data of TMT for the Turkish older population was reported by Cangöz et al. (10).

Mini Mental State Examination (MMSE):
The MMSE is a widely used bedside test to screen mental state, consisting of subdomains measuring orientation, registration, attention, recall and language (11). The Turkish version of MMSE was standardized by Gungen et al. (12). The maximum score of MMSE is 30.

Statistical Analyses
For assessing the normality of data, skewness and kurtosis of the distribution were checked. Since the scores were found to fall within the normal range (-1.5 - +1.5 for the skewness and -3 - +3 for the kurtosis), parametric analyses were performed. Independent samples t-test was used to examine group differences in executive function performance. Pearson correlation analyses were applied to examine the relationship between executive function tests as well as sociodemographic variables. All statistical analyses were performed using SPSS version 24 (SPSS Inc., Chicago, IL, USA) and the significance level was set at p<.05; two-tailed for all analyses.

Results

The mean age of COVID-P group (n: 22) was 76.95±6.6 and the mean education year was 11.45±3.2. The mean age of COVID-N group (n: 25) was 74.16±5.01 and the mean education year was 12.44±3.44. An independent sample t-test revealed that there was no significant difference between the COVID-P and COVID-N group in terms of age and education (p>.05 for both). The gender distribution among the groups was also normal (p>.05).

The independent t-test showed that neither the total MMSE score nor the subscores were statistically different between COVID-P and COVID-N group (p>.05 for all). The MMSE scores for both groups and significance levels were presented in Table 1.

Regarding the executive function tests, test completion time for TMT-A was significantly longer for COVID-P group as compared to COVID-N group [t(44)= 2.126, p < .039]. The test completion time for TMT-B was also significantly longer for COVID-P group [t(44)= 1,894 p< .045]. In addition, the number of errors in TMT-A was significantly higher for the COVID-P group than the COVID-N group [t(44)= 1.990, p< .041]. However, groups did not have a significantly different performance on CDT (p> .05).

Table 1. Mean scores of cognitive tests for each group

	COVID-P group M±SD.	COVID-N group M±SD.	Significance level
MMSE total score	26.7±2.14	27.72 ±1.02	NS
Orientation	9.40± .73	9.64± .56	NS
Registration	2.81± .5	2.84± .37	NS
Attention	3.54±1.22	4.08±.90	NS
Recall	2± .75	2.28± .61	NS
Language	8.72± .55	8.84± .37	NS
TMT-A completion time	173.644±42.42	110.32±64.17	.039
TMT-B completion time	382.05± 101.62	265.80± 115.14	.045
TMT-A error	1.18± 1.4	.56±.65	.041
TMT-B error	4.27±3.23	3.4±3.2	NS
CDT score	4.36 ± .84	4.24± .87	NS

MMSE: Mini mental state examination, TMT: Trail Making Test, CDT: Clock Drawing Test NS: Nonsignificant

As expected, there was a positive correlation between age and test completion time for TMT-A (r=.424, p<.001), test completion time for TMT-B (r=.482, p<.001), and the number of errors for TMT-B (r=.508, p<.001). Also, age was found to be negatively correlated with CDT performance (r= -.589, p<.001). Education year, however, was not found to be correlated with any of the test scores (p>.05, for all).

In order to clarify if age had a moderator effect on the relationship between COVID-19 condition and executive functions, we performed a moderation analysis using PROCESS (Model 1). The outcome variables were completion time for TMT-A and completion time for TMT-B, respectively. The analysis showed that the interaction between COVID-19 group and age was not statistically significant for the TMT-A completion time, b= .0044, t(47)= -.4973, p= .62. Similarly, the interaction between COVID-19 group and age did not statistically contribute to the TMT-B completion time, b= .0025, t(47)= -.3807, p= .70.

Discussion

It is a well-known fact that brain aging is often associated with cognitive decline. Since the role of previous viral infections on cognitive decline has been widely discussed in the literature, currently, there is a growing interest among researchers to study the neurocognitive effects of COVID-19. Given that the older population is assumed to have a greater risk for COVID-19, its effects on mental health should be noticed. In this study, we compared executive functions in older adults who experienced COVID-19 infection in the last 6 months with another group of older adults who did not infected by the virus. Accordingly, the present study provided one of the first pieces of evidence for the negative impact of COVID-19 on executive functions in older adults. Namely, the COVID-P group displayed significantly lower performance on TMT, which is considered to be one of the most widely used and reliable tests to evaluate executive functions.

Since neurological manifestations are shown to be notably common in patients with COVID-19, the presence of acute cognitive complaints should not be surprising (13). However, while there is preliminary evidence of post-infectious cognitive decline, long-term cognitive consequences are still not well established in the literature. Recently, Liu et al. (14) reported that both severe and non-severe COVID-19 survivors experienced cognitive difficulties and almost 60% of severe COVID-19 survivors displayed longitudinal cognitive decline. In another study, executive dysfunction, apathy and cognitive fatigue were reported in people following COVID-19 infection (15).

A limited number of studies also suggested worsening of cognitive functions in people with dementia after being infected by COVID-19 (16). Likewise, older adults with dementia were shown to be more likely to experience COVID-19 in a more severe form, including increased risk of death (17). In an extensive meta-analysis, it was reported that the risk of being infected by COVID-19 is significantly higher in patients with dementia as compared to healthy controls (18). Therefore, identification of the bidirectional link between COVID-19 and dementia during pandemic is crucial to minimize the risk of infection in older adults.

Increasing evidence suggests that COVID-19 has an impact on the central nervous system. Although the exact mechanism underlying its effect on brain structure and function has not been clearly elucidated, some potential causes have been reported (15). Firstly, a considerable amount of evidence suggests hypoxia as the major cause, since prolonged oxygen deficiency is known to damage neurons. Researchers revealed that even silent hypoxia, where the patients do not experience any covert breathing difficulty despite insufficient oxygen saturation level, may induce damage to the brain (19). Accordingly, both structural and metabolic changes in the brain are linked to COVID-19 in the literature. Namely, studies reported frontotemporal hypoperfusion as well as structural abnormalities in temporal regions in COVID-19 survivors (19-20). In an animal study conducted with mice, reduced hippocampal volume following COVID-19 was observed, which is well known as a critical brain region for attention and memory processes (21).

In addition to direct effects of COVID-19 on the brain, researchers suggest the existence of multiple contributing factors (22). For example, in one study, increased depressive symptoms and anxiety has been related to cognitive complaints in patients who recovered from COVID-19.1 Additionally, Amanzio et al. (23) reported lockdown fatigue as an indirect contributor to poorer cognition by altering mood in a negative way. A recent study in Turkey aimed to examine the traumatic effect of COVID-19 on mental health and reported COVID-19 as a severe trauma directly or indirectly affecting executive functions (24). However, their measure of executive function was based on participants' self-reports. Neuropsychological evaluation is essential to verify COVID-19 survivors' executive function performance, as in our study.

Lack of brain imaging data might be listed as the foremost limitation of this study. Since our findings solely rely on the neuropsychological assessment, it is required to enlighten the possible underlying neurological basis of the deficit. Second most important limitation of the study is the relatively small sample size. Finally, since the principal goal of this study was to examine whether COVID-19 has a deteriorative effect on executive functions, we only included relevant instruments to measure participants' executive test performance. However, application of a wider neuropsychological battery might shed light on COVID-19-dependent cognitive decline in older adults. Therefore, future studies with larger sample sizes combined with structural or functional neuroimaging data are still required to better understand the association between COVID-19 and cognitive decline.

Conclusion

In this study, it was aimed to determine the role of COVID-19 on the executive functions in older people. Accordingly, we compared the executive function performance of a group of older people living in a nursing home who were previously infected by COVID-19 and who were not infected. In summary, we demonstrated that executive functioning in older adults who were previously infected by COVID-19 was lower as compared to those who were not infected. Given that the sample of this study was comprised of elderly with normal cognition, whose executive functions were found to be linked to their history of COVID-19, exploring the possible effects of this virus on people having cognitive decline should be noteworthy in order to help elderly to maintain a more successful aging.

Declarations

Funding

No financial support was received for the study.

Conflicts of Interest

No potential conflict of interest was reported by the authors.

Ethics Approval

The study was approved by Uskudar University Non-Interventional Research Ethics Committee, report number of 61351342/07/2021-30 (29 July 2021).

Availability of Data and Material

The dataset of this study are available from the corresponding author on a reasonable request.

Authors Contributions

Both authors contributed equally to all parts of the study.

References

1. Almeria M, Cejudo JC, Sotoca J, et al. Cognitive profile following COVID-19 infection: Clinical predictors leading to neuropsychological impairment. Brain, behavior, & immunity-health. 2020;9:100163.
2. Alonso-Lana S, Marquié M, Ruiz A, et al. Cognitive and neuropsychiatric manifestations of COVID-19 and effects on elderly individuals with dementia. Frontiers in aging neuroscience. 2020;369.
3. Liu YH, Chen Y, Wang QH, et al. One-year trajectory of cognitive changes in older survivors of COVID-19 in Wuhan, China: a longitudinal cohort study. JAMA neurology. 2022; 79(5), 509-517.
4. Tondo G, Sarasso B, Serra P, et al. The Impact of the COVID-19 Pandemic on the Cognition of People with Dementia. International Journal of Environmental Research and Public Health. 2021;18(8):4285.
5. Arica-Polat BS, Gündoğdu AA, Cinar N, et al. Evaluation of cognitive deficits in patients infected with COVID-19. European Review for Medical and Pharmacological Sciences. 2022;26(2):678-685.
6. Itzhaki RF and Wozniak MA. Viral infection and cognitive decline. Journal of the American Geriatrics Society. 2007;55:131–131. https://doi.org/10.1111/j.1532-5415.2006.01001.x
7. Sochocka M, Zwolińska K and Leszek J. The infectious etiology of Alzheimer's disease. Current Neuropharmacology. 2017;15:996–1009. https://doi.org/10.2174/1570159x15666170313122937
8. Muñoz LS, Garcia MA, Gordon-Lipkin E, et al. Emerging viral infections and their impact on the global burden of neurological disease. Seminars in Neurology. 2018;38:163–175. https://doi.org/10.1055/s-0038-1647247
9. Mainland BJ, Shulman KI. Clock drawing test. In Cognitive screening instruments. Cham: Springer International Publishing, 2017. p. 67-108
10. Cangoz B, Karakoc E and Selekler K. Trail Making Test: normative data for Turkish elderly population by age, sex and education. Journal of the neurological sciences. 2009;283(1-2):73-78.
11. Folstein MF, Folstein SE and McHugh PR. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. Journal of psychiatric research. 1975;12(3):189-198.
12. Güngen C, Ertan T, Eker E, et al.. Reliability and validity of the standardized Mini Mental State Examination in the diagnosis of mild dementia in Turkish population. Turk psikiyatri dergisi= Turkish journal of psychiatry. 2002;13(4):273-281.
13. Mao L, Wang M, Chen S, et al. Neurological manifestations of hospitalized patients with COVID-19 in Wuhan, China: a retrospective case series study. MedRxiv. 2020.
14. Liu YH, Wang YR, Wang QH, et al. Post-infection cognitive impairments in a cohort of elderly patients with COVID-19. Molecular neurodegeneration. 2021;16(1), 1-10.
15. Ortelli P, Ferrazzoli D, Sebastianelli L, ,et al. Neuropsychological and neurophysiological correlates of fatigue in post-acute patients with neurological manifestations of COVID-19: Insights into a challenging symptom. Journal of the neurological sciences. 2021;420:117271.
16. Korczyn AD. Dementia in the COVID-19 period. Journal of Alzheimer's Disease. 2020;75(4):1071.
17. Numbers K and Brodaty H. The effects of the COVID-19 pandemic on people with dementia. Nature Reviews Neurology. 2021;17(2):69-70. doi:10.1038/s41582-020-00450-z
18. Hariyanto TI, Putri C, Arisa J, et al. Dementia and outcomes from coronavirus disease 2019 (COVID-19) pneumonia: a systematic review and meta-analysis. Archives of Gerontology and Geriatrics. 2021;93:104299.
19. Rahman A, Tabassum T, Araf Y, et al. Silent hypoxia in COVID-19: pathomechanism and possible management strategy. Molecular biology reports. 2021;48(4):3863-3869.
20. Helms J, Kremer S, Merdji H, et al. Neurologic features in severe SARS-CoV-2 infection. New England Journal of Medicine. 2020;382(23): 2268-2270.
21. Iroegbu JD, Ifenatuoha CW, and Ijomone OM. Potential neurological impact of coronaviruses: implications for the novel SARS-CoV-2. Neurological Sciences. 2020;41:1329–1337. https://doi.org/10.1007/s10072-020-04469-4
22. Montalvan V, Lee J, Bueso T, et al. Neurological manifestations of COVID-19 and other coronavirus infections: a systematic review. Clinical neurology and neurosurgery, 2020;194:105921.
23. Amanzio M, Canessa N, Bartoli M, et al. Lockdown effects on healthy cognitive aging during the COVID-19 Pandemic: A Longitudinal Study. Frontiers in psychology. 2021;12.
24. Kira IA, Alpay EH, Ayna YE, et al. The effects of COVID-19 continuous traumatic stressors on mental health and cognitive functioning: A case example from Turkey. Current Psychology. 2021:1-12.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 166-172
https://doi.org/10.31067/acusaglik.1183203

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Physiotherapy and Rehabilitation / Fizyoterapi ve Rehabilitasyon

Comparison of Physiotherapy Education on Course Basis in terms of Student Satisfaction During the Covid-19 Pandemic Period: Online, Hybrid, and On-Campus Education

Çiğdem Yazıcı-Mutlu[1], Mehmet Alperen Pekdaş[1], Elif Tuğçe Çil[1], Deniz Aslan[1], Kristen Belcastro Ergen[1], Sahra Şirvan Can[1]

[1]Department of Physiotherapy and Rehabilitation, Faculty of Health Science, University of Yeditepe, Istanbul, Turkey

Çiğdem YAZICI MUTLU
Mehmet Alperen PEKDAŞ
Elif Tuğçe ÇİL
Deniz ASLAN
Kristen BELCASTRO ERGEN
Sahra Şirvan CAN

Correspondence: Çiğdem Yazıcı Mutlu
Department of Physiotherapy and Rehabilitation, Faculty of Health Science, University of Yeditepe, Istanbul, Turkey
Phone: +0902165780000
E-mail: cigdem.mutlu@yeditepe.edu.tr

Received: 05 October 2022
Accepted: 19 January 2023

ABSTRACT

In the study, aimed to compare three different education periods, On-Campus Education (2019), Hybrid Education (2020), and Online Education (2021), in terms of students' satisfaction within the scope of the courses offered in Physiotherapy and Rehabilitation program. The dataset of study collected as a retrospective study from the Physiotherapy and Rehabilitation Department in Health Sciences Faculty of Yeditepe University, Istanbul. The spring semester students of 2019, 2020, and 2021 (respectively, n=170; n=158; n=229) participated in the study. Student satisfaction was obtained by evaluating the courses with the learning outcome questionnaire. Answers to the questionnaire are allowed upon a 6-point Likert scale (0:Strongly Disagree - 5:Strongly Agree). According to the Analysis of Variance (ANOVA) test results, in the Introduction to Physiotherapy Occupation, Hydrotherapy, Manipulative Therapy-II Functional Anatomy and Kinesiology-II, Neurologic Rehabilitation, Orthosis and Prosthesis Rehabilitation and Physiotherapy in Sport courses, statistically significant difference was found (respectively, p=0.005, p=0.001 p=0.009, p=0.001, p=0.018, p=0.001, p=0.001). According to the satisfaction of the Physiotherapy students at three-grade levels, the courses with high theoretical content may be given online. Therefore, the online system can be integrated into the physiotherapy education system, but it cannot replace campus education in practical courses.

Keywords: COVID-19; education; online education; pandemic; physical therapists.

Covid-19 Pandemi Döneminde Fizyoterapi Eğitiminin Ders Bazında Öğrenci Memnuniyeti Açısından Karşılaştırılması: Çevrimiçi, Karma ve Kampüste Eğitim

ÖZET

Araştırmada, Fizyoterapi ve Rehabilitasyon alanında verilen dersler kapsamında Kampüste Eğitim (2019), Karma Eğitim (2020) ve Çevrimiçi Eğitim (2021) olmak üzere üç farklı eğitim döneminin öğrenci memnuniyeti açısından karşılaştırılması amaçlanmıştır. Çalışmanın veri seti, Yeditepe Üniversitesi Sağlık Bilimleri Fakültesi Fizyoterapi ve Rehabilitasyon Bölümü'nden retrospektif olarak toplanmıştır. Araştırmaya 2019, 2020 ve 2021 bahar dönemi öğrencileri (sırasıyla n=170; n=158; n=229) katılmıştır. Öğrenci memnuniyeti, derslerin öğrenme çıktı anketi ile değerlendirilerek elde edildi. Ankete yanıtlar 6'lı Likert ölçeğiyle (0: Kesinlikle Katılmıyorum - 5: Kesinlikle Katılıyorum) alındı. Varyans Analizi (ANOVA) test sonuçlarına göre; Fizyoterapi Mesleğe Giriş, Hidroterapi, Manipülatif Terapi-II Fonksiyonel Anatomi ve Kinesiyoloji-II, Nörolojik Rehabilitasyon, Ortez ve Protez Rehabilitasyon ve Sporda Fizyoterapi derslerinde istatistiksel olarak anlamlı fark bulunmuştur (sırasıyla, p=0,005, p=0,001 p=0,009, p=0,001, p=0,018, p=0,001, p=0,001). Fizyoterapi öğrencilerinin üç sınıf düzeyindeki memnuniyetlerine göre teorik içeriği yüksek dersler online olarak verilebilir. Bu nedenle online sistem fizyoterapi eğitim sistemine entegre edilebilir ancak uygulamalı derslerde kampüs eğitiminin yerini alamaz.

Anahtar Kelimeler: COVID-19; eğitim; çevrimiçi eğitim; pandemi; fizyoterapist.

The Coronavirus 2019 (COVID-19) pandemic has affected the whole world, with a primary focus on the education system. In the pandemic, governments around the globe decided to have educational institutions switch from face to face education to online education in order to control the spread of disease. Turkey suspended face-to-face education and switched to the online system on March 14, 2020. The transition to online education affected many educational areas, educators, and students, especially those in Physiotherapy and Rehabilitation Departments.

During the unplanned entire lockout period, the Physiotherapy departments, which had rich practical lessons, had to deal with many difficulties such as technological devices and the lack of face-to-face communication (1-3). Given the immediate transition to online learning, many institutions and educators were not prepared for this new style of education. As the online systems continued to stay in effect, educators continually tried to make the online lessons more efficient. This was not only an issue in Turkey but similar difficulties were observed in many other countries (4). Researchers generally used questionnaires via Google Forms to determine student satisfaction with online learning (5). The questionnaires used by the researchers were attempts to identify the problems and concerns of students and educators about online education (5,6), and students' opinions were taken to investigate their views on the health and social effects of online education (7). In addition, the students' satisfaction and performance with the Physiotherapy and Rehabilitation education were also investigated with questionnaires (4).

Before the pandemic period, many studies looked at the effectiveness of online education. A systematic review and meta-analysis (21 studies) put together evidence on the effectiveness of adaptive e-learning environments to increase learning outcomes success (8). Another systematic review assesssed the effectiveness of online learning compared to traditional learning techniques (59 studies) and indicated that online learning was similar to if not superior to traditional learning and should be encouraged (9). Lastly, another systematic review (19 studies) looked into whether an online or blended learning paradigm improved teaching of clinical skills in undergraduate nursing programs (10). The researchers explained that for teaching clinical skills, knowledge development, and user satisfaction, online learning was no less effective than traditional approaches (10). Even with the research showing the success with online education, there was no immediate need for change.

The pandemic conditions increased the need for change and the use of technology in our lives at great speeds, especially with the transition to online education. This impact will forever change the way the education system is structured. In the future, educators and policymakers will start to implement online education in health sciences departments, and the studies on this subject are important for us to better understand and determine the needs and thoughts of our students.

In our study, we wanted to understand how students' satisfaction with self-asessment in terms of achieving learning outcomes in different educational periods. For the study, aimed to compare three different education periods, On-Campus Education (2019), Hybrid Education (2020), and Online Education (2021), in terms of students' satisfaction within the scope of the courses offered in Physiotherapy and Rehabilitation program.

Materials and Method

Study Design

In this retrospective study, the primary focus of the study consisted of determining the achievement level of the learning outcomes for each course based on the students' assessment.

In this retrospective study, the primary focus of the study consisted of the students self-assessment on the learning outcomes specific to each course, which were previously prepared by the instructor of each course. The student satisfaction on the learning outcomes was obtained from a questionnaire (the course learning outcomes questionnaire; CLOQ) that involved the learning outcomes of that semester's curriculum.

- In the 2019 spring semester (on-campus education period): CLOQ was presented to the participants face-to-face and obtained as hard-copies.
- In the 2020 spring semester (hybrid education period): 6 weeks of campus learning and eight weeks synchronized online learning. CLOQ were presented to the participants through Google Forms and obtained electronically.
- In the 2021 spring semester (online education period): CLOQ were presented to the participants through Google Forms and obtained electronically.

Participants

A total of 664 students were registered in the Yeditepe University Physiotherapy and Rehabilitation Department in the spring semestres of 2019, 2020 and 2021 as 1st, 2nd, and 3rd grade students. From these students, a total of 557 students participated in our study.

The students of 2019 were characterized as the on-campus education (CE) group, the students of 2020 were characterized as the hybrid education (HE) group, and the students of 2021 were characterized as the online education (OE) group. The inclusion criteria were determined as actively enrolled students in the Yeditepe University Physiotherapy and Rehabilitation Department. None of the participants were under any pressure to answer questions about the learning outcomes.

Procedure

The learning outcomes were obtained from the Bologna Information Package utilized by our department. The questionnaires were delivered to the students at the end of each spring term, before the final exams, and the students were asked to complete the questionnaire. The students were asked to answer questions about the learning outcomes for each course and score the question for each outcome between 0 and 5 points (0: Strongly Disagree - 5: Strongly Agree). Each score expressed the satisfaction levels of the students. Each student, included in the study, completed CLOQ for that semester only once. In addition, each student scored the learning outcomes only for their semester courses.

The scores of the first, second, and third-grade students on CLOQ were collected as quantitative data. Fourth grade students were not included in this study because they spent most of their semester in different clinics.

The first grade students answered the learning outcome questionnaries for Introduction to Physiotherapy Profession (IPO), Anatomy-II (ANA-II), Hydrotherapy (HYD), and Psychosocial Rehabilitation (PR) courses. The second grade students answered the learning outcome questionnaries for Principles of Therapeutic Movements (PTM), Electrotherapy-II (ELE-II), Functional Anatomy and Kinesiology (FAK-II), Manual Therapy-II (MT-II) Exercise Physiology (EP), Pharmacology (PHARM), and Pathology (PAT). The third grade students answered the learning outcome questionnaries for Neurological Rehabilitation (NEUR), Orthotics and Prosthesis Rehabilitation (OPR), Physiotherapy in Sports (PS), and Neurophysiological Approaches (NPA-II). All questionnaires were administered online or face to face.

Statistical Analysis

The data obtained, after filling out the questionnaires, were analyzed using SPSS (Statistical Package for Social Sciences) v23 software. Mean, standart deviation (SD), median, minimum, and maximum values were used to present quantitative variables. The learning outcomes scored by the students during campus education (2019 spring semester), hybrid education (2020 spring semester), and synchronized online education (2021 spring semester) were compared with a one-way analysis of variance (ANOVA). A Bonferroni correction was applied for post-hoc testing. The significance level for all statistical analyzes was determined as $p<0.05$.

Results

According to the results, the learning outcomes of the 1st graders showed no significant difference between the CE, HE, and OE groups of the ANA-II and PR courses ($p=0.085$; $p=0.235$). However, there was a statistically significant difference in the IPO and HYD courses ($p=0.005$; $p=0.001$). In the HYD course, the mean of the HE group was significantly higher than the CE group and the OE group ($p=0.001$; $p=0.003$). On the other hand, in the IPO course, the mean of the CE group was significantly lower than the HE group and the OE group ($p=0.041$; $p=0.005$) (Table 1).

In the learning outcome scores of the 2nd graders, there was no significant difference between the CE, HE, and OE groups of the ELE-II, PTM, EP, PHAR, and PAT courses (respectively, $p=0.409$. $p=0.896$, $p=0.871$. $p=0.863$, $p=0.174$). A statistically significant difference was found between the CE, HE, and OE groups of the MT-II course ($p=0.009$). In the comparison between groups of the MT-II course, the HE group was significantly lower than the OE group ($p=0.007$). In the comparison of the groups for the FAK-II course, a significant difference was found between the CE, HE, and OE groups, and the HE group was significantly lower than the OE and CE groups (respectively, $p=0.001$; $p=0.001$).

According to results, the learning outcomes of the 3rd graders, there was no significant difference between the CE, HE, and OE groups of the NPA-II course ($p=0.118$). However, a statistically significant difference was found between the CE, HE, and OE groups of the NEUR, OPR, and PS courses (Respectively, $p=0.018$; $p<0.001$; $p<0.001$). In the comparison between the groups of the NEUR course, a significant difference was found only between the CE and HE groups ($p=0.017$). On the other hand, in the OPR course, the CE group was significantly higher than the HE and the OE groups ($p=0.002$; $p=0.001$). Moreover, in the PS course, the CE group was significantly higher than the HE and the OE groups ($p=0.001$; $p=0.015$).

Table 1: The course learning outcomes questionnaire (CLOQ) results of the groups

Graders	Courses	2019-CE (n=170) mean±sd	2020-HE (n=158) mean±sd	2021-SOE (n=229) mean±sd	F	p-value	Semesters comparisons	p-value
2nd grade	IPO	3.78±1.34	4.27±0.76	4.35±0.85	5.538	**0.005**	2019-2020	**0.041**
							2019-2021	**0.005**
							2020-2021	1.000
	ANA-II	3.42±1.48	3.50±1.27	3.85±1.12	2.498	0.085	2019-2020	1.000
							2019-2021	0.117
							2020-2021	0.306
	HYD	4.12±1.17	4.70±0.52	4.21±0.94	6.399	**0.001**	2019-2020	**0.001**
							2019-2021	1.000
							2020-2021	**0.003**
	PR	4.24±0.98	4.56±0.68	4.50±0.84	1.460	0.235	2019-2020	0.275
							2019-2021	0.497
							2020-2021	1.000
	MT-II	3.65±1.36	3.22±1.51	3.91±1.15	4.821	**0.009**	2019-2020	0.323
							2019-2021	0.934
							2020-2021	**0.007**
	ELE-II	4.25±1.25	3.96±1.26	4.02±0.93	0.899	0.409	2019-2020	0.605
							2019-2021	0.797
							2020-2021	1.000
	PTM	4.34±0.96	4.33±0.98	4.40±0.75	0.110	0.896	2019-2020	1.000
							2019-2021	1.000
							2020-2021	1.000
	FAK-II	3.64±1.22	2.66±1.60	3.72±1.13	12.601	**0.001**	2019-2020	**0.001**
							2019-2021	1.000
							2020-2021	**0.001**
	EP	4.34±1.02	4.41±1.06	4.33±0.84	0.138	0.871	2019-2020	1.000
							2019-2021	1.000
							2020-2021	1.000
	PHARM	4.02±1.27	4.03±1.13	3.93±1.11	0.147	0.863	2019-2020	1.000
							2019-2021	1.000
							2020-2021	1.000
	PAT	4.29±0.92	4.22±1.37	3.93±1.11	1.764	0.174	2019-2020	1.000
							2019-2021	0.331
							2020-2021	0.422
3rd grade	NEUR	4.34±0.98	3.68±1.33	4.04±1.14	4.120	**0.018**	2019-2020	**0.017**
							2019-2021	0.232
							2020-2021	0.703
	OPR	4.46±0.90	3.56±1.38	3.53±1.39	9.951	**0.001**	2019-2020	**0.002**
							2019-2021	**0.001**
							2020-2021	1.000
	NPA-II	4.77±0.65	4.45±1	4.57±0.67	2.171	0.118	2019-2020	0.140
							2019-2021	0.518
							2020-2021	1.000
	PS	4.38±1.06	3.24±1.11	3.78±1.17	12.111	**0.001**	2019-2020	**0.001**
							2019-2021	**0.015**
							2020-2021	0.073

Data expressed as mean ± standard deviation. CL: On-Campus Learning Group, HE: Hybrid Education Group, OE:Online Education Group. IPO: Introduction to Physiotherapy Occupation. ANA-II: Anatomy II. HYD: Hydrotherapy. PR: Psychosocial Rehabilitation. MT-II: Manipulative Therapy II. ELE-II: Electrotherapy II. PTM: Principles of Therapeutic Movement. FAK-II: Functional Anatomy and Kinesiology II. EP: Exercise Physiology. PHARM: Principles of Pharmacology. PAT: General Pathology. NEUR: Neurologic Rehabilitation. OPR: Orthosis and Prosthesis Rehabilitation. NPA-II: Neurophysiologic Approaches II. PS: Physiotherapy in Sport

Discussion

The educational environment, materials, and methods, which were reshaped with the Covid-19 pandemic, affected the satisfaction of students' education. For this reason, in our study, we looked at three different education methods for our physiotherapy students: On-Campus Education, Hybrid Education, and Online Education (respectively, 2019, 2020, and 2021 spring semesters). For each method, we compared the students' satisfaction with the courses based on the learning outcomes.

According to our results, it is observed that the adoption of online education for the 1st-grade students did not adversely affect student satisfaction in the IPO, ANA-II, HYD, and PR courses. In the IPO course, the hybrid and online methods were even higher than the on-campus education method. We think that the reason for these results is due to the excitement experienced by students at the entrance to the profession and the younger generation more adaptable to online learning being less affected by the transition. There was no difference between on-campus and online education in the ANA-II and PR courses. Although the ANA-II course is known to be challenging for the 1st-grade students, we may be able to say that the abundance of online visual materials is effective in achieving these results. There was no difference between face-to-face and online education in the HYD course, but hybrid education was found to have the highest average. The high average in hybrid education was questioned by interviewing the lecturer of this course. The lecturer stated that the study system was the same as the other semesters, but the examination system may have caused these results. Therefore, it can be stated, from the results obtained from the 1st-grade students, that students can adapt to the online environment quickly and be satisfied with the online learning method. However, the questionnaire did not specifically ask which learning method, online vs campus education, they prefer so we don't know their preferences.

Although it is observed that there is no difference between online education and on-campus education in terms of the satisfaction of the 2nd-grade courses (PTM, ELE-II, EP, PHARM, PAT, MT-II, FAK-II), it has been found that the satisfaction of the students increased in the online education time for MT course, which includes the practical course content in the online education. We think that the effort for better processing and understanding of practical lessons in the online period increased the students' satisfaction. In the FAK-II course, it was found that student satisfaction decreased in the hybrid education period, which was the first period of the pandemic but increased in the online period without any difference from the on-campus learning period. These results can conclude that adjusting the lessons according to the online education system increased the adherence and satisfaction of the students.

The most essential factor, in the evaluation of the satisfaction outcomes for the 3rd-grade students, was the students' attitudes towards the Rehabilitation courses. During this semester, four rehabilitation courses (NEUR, OPR, PS, and NPA-II) were conducted. In these courses, it was observed that there was a significant decrease in the satisfaction of all courses with hybrid education, which was at the beginning of the pandemic. We may say that this situation is due to inadequacies in the technological infrastructure with the transition to the online system and the adaptation and anxiety problems of the students during the Covid-19 pandemic. This also brings to mind the question: Why only the 3rd-grade students? It might be because they are more experienced/comfortable with the on-campus education system being in the 3rd-grade, future anxiety, or the fact that the 3rd-grade has more clinical based (laboratory) classes. According to the OPR course results, satisfaction decreased with the transition to the hybrid period, and it was continued in the online education. However, students are more satisfied with online education in the PS course. According to these findings, it may be said that better adaptation of the course to online education, with detailed arrangements, can achieve better results in terms of students' learning outcomes. Besides, we do not believe it is not sufficient to give the OPR course with online method.

In the literature, there are many studies looking at the results of education environments related to the transition to the Covid-19 period (11,12). More specifically, studies have been questioning student satisfaction with online education, it was stated, among medical and dentistry students, that 73.5% of students were satisfied with traditional education. However, they prefer hybrid education 56% to 62.5% and 53.5% prefered online education (11). The percentages are very close to each other, which makes a person wonder if students can be a valid reference in this regard. Moreover, Totlis et al. concluded that the remote learning methods have increased the active participation of students in the anatomy lessons but had a significantly negative affect on the students' performance with exams (11). They concluded that online learning could not replace the traditional anatomy teaching method, but online lectures could be incorporated into the anatomy curriculum (11,12).

Another retrospective case-control study, by Rossettini et al., looked at students' satisfaction and performances with online learning compared with students who underwent the same course delivered face-to-face over the previous five years (4). According to the results, there was no differences between online and face-to-face teaching, concerning students' satisfaction. In contrast, with the mean performance of the same course delivered face-to-face in the previous five years, they found a statistical significance in favor of online teaching. The research concluded that online teaching for first grader bachelors students in physiotherapy seems to be a feasible option with moving to e-Learning to facilitate access to higher education.

Similarly, a cross-sectional qualitative study was conducted to explore the perspectives and recommendations to improve students' learning experience of physiotherapy during the COVID-19 pandemic. It was introduced that the findings assist programs in delivering a complete e-Learning approach as the COVID-19 pandemic continues (13,14). Moreover, the study, designed by Yılmaz İnce et al., was conducted to determine the knowledge and opinions of students about distance education during the pandemic process in Turkey (6). It was concluded that although the students had a positive view of the online lessons and the recorded lectures, they preferred face-to-face lessons instead of online. In another study, students said they learned better in the physical classroom compared to online education. However, students noted that online education is currently beneficial as professors have improved their online teaching skills since the pandemic (7).

In light of the study's results and the information found with a review of the literature, this study is the only study that investigates student satisfaction based on the learning outcomes of the courses in physiotherapy education.

As a limitation of this study, it does not include student performance evaluations.

Conclusion

The study showed that 1st-grade physiotherapy students can quickly adapt to online courses and prefer to learn with the online method. Additionally, 2nd-grade students have an increased adherence and satisfaction adjusting to the lessons according to the online education system.

On the other hand, 3rd-grade students can adapt to online lessons but prefer to learn with the on-campus education method, especially for practical courses. As a result, the courses with high theoretical content may be given online. Therefore, the online system can be integrated into the physiotherapy education system, but it cannot replace on-campus education in practical courses.

Acknowledgements: We thank to assistants and students of Deparment of Physiotherapy of Health Science Faculty in Yeditepe University. We are grateful the chair of department Prof. Dr. Feryal Subaşı for her support.

Declarations

Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of University Marmara (Date 27.01.2022/No.10)

Consent to Participate

Informed consent was obtained from all individual participants included in the study.

Funding

No funding was received to assist with the preparation of this manuscript.

Conflict of Interest

The authors have no conflicts of interest to declare that are relevant to the content of this article.

REFERENCES

1. Rosen LD and Weil MM. Computer anxiety: A cross-cultural comparison of university students in ten countries. Computers in Human Behavior. 1995;11(1):45–64. https://doi.org/10.1016/0747-5632(94)00021-9
2. Salimi N, Gere B, and Irioogbe B. (2021). Online Learning in the Era of COVID-19: Computer Anxiety and Mental Health Among College Students. IAFOR Journal of Psychology & the Behavioral Sciences. 2021; 7: 35-50. https://doi.org/10.22492/ijpbs.7.1.03
3. Zeng, X, and Wang, T. College Student Satisfaction with Online Learning during COVID-19: A review and implications. International Journal of Multidisciplinary Perspectives in Higher Education. 2021; 6: 182–195. https://doi.org/10.32674/jimphe.v6i1.3502
4. Rossettini G, Geri T, Turolla A, et al. Online teaching in physiotherapy education during COVID-19 pandemic in Italy: a retrospective case-control study on students' satisfaction and performance. BMC Medical Education. 2021;21:456. https://doi.org/10.1186/s12909-021-02896-1
5. Rajab MH, Gazal AM, Alkattan K. Challenges to Online Medical Education During the COVID-19 Pandemic. Cureus. 2020;12: e8966. https://doi.org/10.7759/cureus.8966
6. Yılmaz İnce E, Kabul A, Diler İ. Distance Education in Higher Education in the COVID-19 Pandemic Process: A Case of Isparta Applied Sciences University. International Journal of Technology in Education and Science. 2020;4:345–351. https://doi.org/10.46328/ijtes.v4i4.112

7. Chakraborty P, Mittal P, Gupta MS, et al. Opinion of students on online education during the COVID -19 pandemic. Human Behavior and Emerging Technologies. 2020;3:357–365. https://doi.org/10.1002/hbe2.240
8. Fontaine G, Cossette S, Maheu-Cadotte MA, et al. Efficacy of adaptive e-learning for health professionals and students: a systematic review and meta-analysis. BMJ Open. 2019;9: e025252. https://doi.org/10.1136/bmjopen-2018-025252
9. George PP, Papachristou N, Belisario JM, et al. Online eLearning for undergraduates in health professions: A systematic review of the impact on knowledge, skills, attitudes and satisfaction. Journal of Global Health. 2014;4:010406 https://doi.org/10.7189/jogh.04.010406
10. McCutcheon K, Lohan M, Traynor M, Martin, D. A systematic review evaluating the impact of online or blended learning vs. face-to-face learning of clinical skills in undergraduate nurse education. Journal of Advanced Nursing 2014; 71(2): 255–270. https://doi.org/10.1111/jan.12509
11. Totlis T, Tishukov M, Piagkou M, et al. Online educational methods vs. traditional teaching of anatomy during the COVID-19 pandemic. Anatomy & Cell Biology, 2021;54:332–339. https://doi.org/10.5115/acb.21.006
12. Bączek M, Zagańczyk-Bączek M, Szpringer M, et al. Students' perception of online learning during the COVID-19 pandemic: A survey study of Polish medical students. Medicine (Baltimore). 2021; Feb 19;100:e24821. https://doi.org/10.1097/MD.0000000000024821.
13. Ng L, Seow KC, MacDonald L, et al. eLearning in Physical Therapy: Lessons Learned From Transitioning a Professional Education Program to Full eLearning During the COVID-19 Pandemic. Physical Therapy. 2021;101: pzabo82. https://doi.org/10.1093/ptj/pzab082
14. Kui A, Jiglau AL, Chisnoiu A, et al. A survey on dental students' perception regarding online learning during the COVID-19 pandemic. Med Pharm Rep. 2022; 95: 203-208. https://doi.org/10.15386/mpr-2051.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 173-182
https://doi.org/10.31067/acusaglik.1189581

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Psychology / Psikoloji

Stress Management: A Priority Developmental Need for University Students

Esra Atilla Bal[1]

[1]Acıbadem University, Psychology Department, İstanbul, Turkey

Esra ATİLLA BAL

Abstract

Purpose: The aim of this study is to determine the developmental needs of university students (N=103) supported by an NGO scholarship regarding employability related soft skills.

Methods: A question form was prepared by the researcher based on the literature review of studies examining the developmental needs of university students regarding employability related soft skills (5,10). The form included questions about demographic information, students' willingness level to join a training program to develop each of these skills and their reasons for their prioritized developmental need. The survey method was used in the study. Descriptive statistical analyses and the content analysis technique were used in data analysis.

Results: The results revealed that the students had a high developmental need ($\overline{X}$=4,07 out of 5) on all soft skills and stress management was their top developmental need ($\overline{X}$=4,25). Students' discourses revealed that their need to develop their stress management skills stemmed from the need to cope with the internal/external sources of stress as well as its behavioral, physiological, cognitive and emotional symptoms and the need to support their career development. Moreover, it was seen that students who were enrolled in Health Sciences related faculties had a lower willingness level to join a training program to develop these skills compared to those enrolled at Engineering/Architecture and Other faculties.

Conclusion: The results show that students have a high willingness level to develop all soft skills. Yet, the findings especially call attention to the elevated need of students to develop their stress management skills. It was also seen that students' willingness to develop their skills varied by faculty type.

Keywords: Stress management, soft skills, university students

Stres Yönetimi Yetkinliği: Üniversite Öğrencilerinin Öncelikli Gelişim İhtiyacı

ÖZET

Amaç: Bu çalışmada, Anadolu'dan İstanbul'a çeşitli devlet üniversitelerinde okumaya gelen ve bir sivil toplum kuruluşunun bursiyeri olan öğrencilerin (N=103) istihdam edilebilirlik ile ilgili davranışsal becerilere yönelik gelişim ihtiyaçlarının belirlenmesi amaçlanmıştır.

Yöntem: Çalışmanın amacı doğrultusunda, araştırmacı tarafından alanyazında üniversite öğrencilerinin istihdam edilebilirlik ile ilgili davranışsal becerilerine yönelik ihtiyaçlarıyla ilgili benzer çalışmalar taranarak öğrencilerinin geliştirmeye ihtiyaç duydukları becerilerden öne çıkanları kapsayan bir soru formu oluşturulmuştur (4,11). Bu formda öğrencilere kişisel bilgiler, becerilere yönelik verilecek eğitimlere katılmaya dair isteklilik düzeyleri ve en öncelikli gelişim ihtiyacı olduğunu düşündükleri beceriyle ilgili ihtiyaçlarının gerekçeleri sorulmuştur. Çalışmada, tarama modeli kullanılmış ve uygun örnekleme yöntemiyle elde edilen veriler betimsel istatistik analizler ve içerik analizi tekniği ile incelenmiştir.

Bulgular: Sonuçlar, öğrencilerin kendileriyle paylaşılan becerilerinin tümünde yüksek düzeyde gelişim ihtiyacı olduğunu ($\overline{X}$=4,07), en yüksek gelişim ihtiyacının ise stres yönetimi becerisine yönelik olduğunu ($\overline{X}$=4,25) ortaya koymuştur. Öğrencilerin stres yönetimi becerisiyle ilgili söylemleri, stresin en çok içsel/dışsal kaynakları ve davranışsal, fizyolojik, bilişsel ve duygusal sonuçları ile baş edebilme ve mesleki gelişimi destekleme ile ilgili gelişim ihtiyaçlarına dikkat çekmiştir. Ayrıca, Sağlık Bilimleri ile ilgili fakültelerde öğrenim gören öğrencilerin Mühendislik/Mimarlık ve Diğer fakültelerde okuyanlara kıyasla belirtilen becerilerle ilgili düzenlenecek eğitim programlarına katılım istekliliklerinin daha düşük olduğu bulunmuştur.

Sonuç: Sonuçlar öğrencilerin tüm becerilerle ilgili gelişim ihtiyaçlarının yüksek olduğuna, özellikle de stres yönetimi becerilerini geliştirme konusundaki ihtiyaçlarının en üst seviyede bulunduğuna dikkat çekmiştir. Bunun yanı sıra, öğrencilerin kendileriyle paylaşılan becerileri geliştirmeye dair istekliliklerinin bağlı bulundukları fakülteye göre farklılaştığı da görülmektedir.

Anahtar Kelimeler: Stres yönetimi, davranışsal beceriler, üniversite öğrencileri

Correspondence: Esra Atilla Bal
Acıbadem University, Psychology Department, İstanbul, Turkey
Phone: +02165004260
E-mail: esra.bal@acibadem.edu.tr

Received: 15 October 2022
Accepted: 31 December 2022

The shift to a knowledge economy, increasing globalization and a fast-changing work environment calls for highly-skilled employees who can meet various challenges and contribute to organizational success (1). Thus, employers expect graduates to have soft skills as well as technical skills which are related to education, knowledge and experience (2). Soft skills are those 'skills, abilities and traits that pertain to personality, attitude and behavior rather than to formal or technical knowledge" (3). Studies have mentioned various soft skills that employers seek in new graduates such as communication, planning, problem solving, teamwork, collaboration and stress management (4, 5). Such skills are crucial for the adaptation of new graduates to a continuously changing work environment. Recent studies point out that, during the recruitment process employers prioritize the new graduates who demonstrate these soft skills at a high level (4,5,6,7). However, employers also frequently point to the gap between the soft skills they require form new graduates and the soft skills young people actually display (4,7).

Studies regarding employability related soft skills have also been carried out in Turkey. In a study conducted among professionals working at different companies in Istanbul, the participants stated that they prioritize communication, decision making, planning and working as a team member skills when recruiting new graduates (8). In another study carried out with human resources professionals from 75 companies, the participants stated that they looked for adaptability, teamwork, communication and self-leadership skills in new recruits, yet they didn't believe that the new graduates were adequately equipped with these skills (9). Moreover, in a comprehensive study which involved 55.000 students from 55 universities in Turkey, the students stated that they needed to develop their time management, communication, teamwork and adaptability skills the most (10).

The current study aims to contribute to the literature by focusing on the developmental needs of university students regarding employability related soft skills which has yet received limited research attention in Turkey. In line with the stated goal of the study, the following research questions are posed:

1. How willing are the students to develop their employability related soft skills?

2. Which soft skill represents the top developmental need of the students?

3. Does the students' willingness to develop their soft skills differ due to their faculty type?

4. What reasons do the students share regarding their need to improve the soft skill that emerges as the top developmental need?

MATERIAL and METHODS

Research Design

As the study seeks to describe an existing condition, the survey method was used in line with the research objective.

Participants

103 university students who study at various public universities in Istanbul, Turkey participated in this study. The participants were all provided a scholarship by an NGO established in 1992, which supports socio-economically disadvantaged students who have moved from Anatolian countryside to the metropolitan city of Istanbul for higher education. Since the author is a member of the executive board of the NGO, the convenience sampling technique was used to reach the participants.

Due to the request from the NGO to preserve participant anonymity, limited demographic information was collected from the students which included faculty type and grade level. 35% of the participants were enrolled at Health Sciences faculties (18.5% Medicine, 7.8% Nursing, 3.9% Dentistry and 4.9% Pharmacy); 27.2% were studying at Architecture and Engineering faculties (20.4% Engineering and 6.8% Architecture) and 37.9% were enrolled at Other faculties (10,7% Education, 10,7% Administrative Sciences, 9,7% Law, 5,8% Science and Literature and 1% Communication). 5,8% of the participants were first-year, 16,5% second-year, 34% third year, 33% fourth year, 9,7% fifth year and 1% were sixth year students.

Data Collection

In order to find out about students' developmental needs regarding employability related soft skills, a question form was prepared by the researcher after screening through similar studies in the literature (4, 5, 11). In line with these studies; the most frequently cited communication and relationship management, stress management, time management, teamwork and decision making skills were included in the question form. Apart from the demographic questions, the form included two questions about

the developmental needs of students regarding these soft skills. In the first question, the students were asked to rate how willing they would be to join a training program that would be conducted to develop each of these skills (If you had a chance to join a traning program on the skills mentioned below, how willing would you be to join?) on a five-point Likert scale ('1=I would definitely not join this training', '5= I would definitely join this training'). In the second question, they were asked to state the soft skill that they were most willing to develop and share their reasons for their development need ('Please state the soft skill you prioritize as a developmental need and share the reasons why you want to develop this skill'). The question form was reviewed by an academician in terms of understandability and a pilot application was carried out with two university students. Their feedback showed that the questions were understood accurately. The question form was then shared online with the 296 university students on the NGO's scholarship. The students were given two weeks to fill out the question form during November 2021. 109 students completed the surveys on a voluntary basis; due to missing data the final participant group included 103 students.

Data Analysis

The quantitative data of the study was analysed by the SPSS 26 program. Descriptive statistics (mean values, standard deviations and minimum and maximum values) were used to analyse the first two research questions about the students' willingness to develop their soft skills and their top developmental need. Since the Shapiro-Wilk normality test showed that the group means were not normally distributed, for the third research question which inquired whether the soft skill developmental needs of students differed by their faculty type, non-parametric Kruskal Wallis and Mann Whitney U tests were used. The answers to the fourth research question which was open-ended and inquired about the reasons for the students' prioritized developmental need were analyzed by the content analysis technique (12). 25 students' answers were analysed at this stage since these students shared their reasons about the top developmental need of the group - stress management. After the students' answers were examined, they were coded by both the author and another academician. When a mutual decision was reached about the codes, the themes and sub-themes were determined to represent the codes. Regarding the reliability study of the qualitative data, the codes were compared and a similarity percentage was calculated between the coders, using the following formula: $\Delta=C\div(C+\partial)\times100$. In this formula, Δ represents the reliability coefficient; C represents the number of terms the coders agreed upon and ∂ represents the number of terms that the coders didn't agree upon. The similarity percentage is expected to be 80% and higher (13) and for this study, the comparisons made between the coders revealed a result of 84%. Students' responses were shared with a participant number in the discussion of the related themes and the participant numbers were abbreviated as P1 etc.

RESULTS

For the first question which asked how willing the students would be to join a training program that would be conducted on each of these skills, the means of the students' responses are reported on Table 1:

Table 1. Soft Skill Means Minimum Maximum Values (n=103)

Soft Skills	Mean ± SD	Min-Max
Stress Management	4.25 ± 0.85	2.00-5.00
Time Management	4.18 ± 0.93	1.00-5.00
Decision Making	4.07 ± 0.92	1.00-5.00
Communication and Relationship Management	4.04 ± 0.73	2.00-5.00
Teamwork	3.79 ± 0.96	1.00-5.00

The results show that students' willingness to join a training program to develop these skills was at a high level for all of the skills involved ($\bar{X}$=4,07 out of 5). Regarding the second research question which inquired about the top developmental need of the students, the mean values showed that stress management ($\bar{X}$=4,25) was the highest developmental need of the majority. Following this were the soft skills of time management ($\bar{X}$= 4,18), decision making ($\bar{X}$=4,07), communication and relationship management ($\bar{X}$=4,04) and teamwork ($\bar{X}$=3,79) respectively.

For the third research question which inquired whether the willingness of the students to develop their soft skills differed in terms of their faculty type, Kruskal Wallis test results showed that except for Teamwork, students' willingness to develop their soft skills differed according to their faculty type (Table 2).

Table 2. Krusgal Wallis Test Results for Faculty Type						
Soft Skills	**Faculty Type**	**N**	**Ranking Means**	**Chi-Square**	**df**	**p**
Communication and Relationship Management	Health Sciences	36	44,19			
	Engineering and Architecture	28	52,09	6,899	2	0,032
	Other Faculties	40	60,26			
Teamwork	Health Sciences	36	45,47			
	Engineering and Architecture	28	60	4,166	2	0,125
	Other Faculties	40	53,58			
Time Management	Health Sciences	36	43,18			
	Engineering and Architecture	28	63,29	8,217	2	0,016
	Other Faculties	40	53,34			
Decision Making	Health Sciences	36	41,53			
	Engineering and Architecture	28	59,38	8,373	2	0,015
	Other Faculties	40	57,56			
Stress Management	Health Sciences	36	42,28			
	Engineering and Architecture	28	59,25	7,545	2	0,023
	Other Faculties	40	56,98			

The Mann Whitney U tests conducted to examine which groups led to this difference showed that the difference stemmed from the first group which included Health Sciences faculty students. This group's means were lower than that of Engineering/Architecture and Other faculty groups. More specifically, regarding the willingness to develop Communication and Relationship Management, Decision Making and Stress Management skills, there were significant differences between Health Sciences and Other faculty students. Moreover, there was also a significant difference on the willingness to develop Time Management, Decision Making and Stress Management between Health Sciences and Engineering/Architecture faculty students (Table 3).

Table 3. Mann Whitney U Test Results for Faculty Type							
Soft Skills	**Faculty Type**	**N**	**Ranking Means**	**SD**	**U**	**Z**	**p**
Communication and Relationship Management	Health Sciences	36	32,21				
				0,68	493,5	-2,723	0,006
	Other Faculties	40	44,16				
Time Management	Health Sciences	36	26,83				
				0,906	300	-2,996	0,003
	Engineering and Architecture	28	39,79				
Decision Making	Health Sciences	36	32,21				
				0,864	493,5	-2,531	0,011
	Other Faculties	40	44,16				
	Health Sciences	36	27,82				
				0,975	335,5	-2,423	0,015
	Engineering and Architecture	28	38,52				
Stress Management	Health Sciences	36	32,81				
				0,817	515	-2,293	0,022
	Other Faculties	40	43,63				
	Health Sciences	36	27,97				
				0,865	341	-2,367	0,018
	Engineering and Architecture	28	38,32				

As mentioned previously, the majority of the students stated stress management as their highest developmental need. Thus, regarding the fourth question about the reasons of the majority of the students' top developmental need, the content analysis of the answers of those who shared stress management as a priority developmental need are shared on Table 4:

Table 4. Students' Responses Regarding Their Developmental Need on Stress Management

Themes	Sub-Themes	Codes	f
Sources of Stress	Internal Sources	Being prone to stress	10
		Tendency to think negatively	2
		Lack of self-confidence	2
		Being perfectionistic	1
	External Sources	Exam stress	3
		Stress caused by challenging conditions	6
		Stress due to time pressure	2
		Stress due to uncertainty	1
Results of Stress	Behavioral Results	Changes in sleeping and eating habits	1
		Decrease in performance	2
	Physiological Results	Health problems	2
	Cognitive Results	Faulty decision making	1
		Seeing oneself as inadequate	2
	Emotional Results	Feeling anxious	3
		Feeling angry	1
Career Development Motivation			
		Supporting career development	2

As can be seen from Table 4, the reasons as to why the students wanted to develop their stress management skills grouped under the themes of; sources of stress, results of stress and career development motivation.

The responses of the students regarding the sources of stress (f=27) gathered under the two sub-themes of internal and external sources. The internal sources sub-theme (f=15) included being prone to stress (f=10) 'I wish I could change my tendency to turn every condition I encounter into a stress factor' (P6); tendency to think negatively (f=2) 'I would like to have a more positive outlook when I face a problem' (P16), lack of self-confidence (f=2) 'I wish to manage my stress when I panic and be more self-confident' (P21) and being perfectionistic (f=1) 'Since I'm a perfectionist, I become stressed in case things don't turn out as I want them them to' (P15).

The external sources of stress sub-theme (f=12) included exam stress (f=3), stress caused by challenging conditions (f=6), stress due to time pressure (f=2) and stress due to uncertainty (f=1). Participant 5's 'I wish I could manage my stress before important exams' is an example for exam stress, Participant 18's 'Sometimes I put things off to the last minute and stress out' is an example for stress due to time pressure and Participant 10's, 'When there is too much uncertainty in my life, I feel under too much stress' exemplifies stress due to uncertainty.

The responses of the students regarding the results of stress (f=12) are gathered under the behavioral, physiological, cognitive and emotional sub-themes The behavioral results sub-theme (f=3) includes changes in sleeping and eating habits (f=1) 'When I'm stressed, I can't sleep or eat for days' (P20); and decrease in performance (f=2) 'Stress hinders my performance' (P7). The physiological results sub-theme (f=2) includes health problems 'I have health problems due to stress' (P19). The cognitive results subtheme (f=3), includes faulty decision making (f=1) 'When I'm stressed out I take hasty and faulty decisions' (P8) and seeing oneself as inadequate (f=2) 'I wish I could have more self-efficacy under stressful conditions' (P21). The emotional results sub-theme (f=4) includes feeling anxious (f=3) 'I can't stay calm under tough conditions, I can't quiet the anxious voice inside me' (P12) and feeling angry (f=1) 'I wish I could control my anger when I'm stressed out' (P4).

The final theme of career development motivation (f=2) includes supporting career development which can be exemplified by Participant 17's 'I wish to develop my stress management skills in order to reach my career goals' statement.

DISCUSSION

The findings that students have a high developmental need concerning all soft skills resonates with the research results in the literature (4, 10). In Turkey, it is especially difficult for students to develop their soft skills due to the teacher-led didactic teaching method used in education as well as the assessment methods used (9, 14). Since skill building is strengthened by experience, during the higher education years, using experiential learning methods during course delivery would be conductive to fostering students' soft skills (15). In Turkey, one such undergraduate course that aims to aid the transition of students from college to work life is ALIS 350 Academic and Life Skills: Transition to Professional Life course which is offered at Koç University in Istanbul. This course strives to equip students with employability related soft skills including relationship management, teamwork and time management (14). Yet ALIS 350 is a unique program offered in a private university and is a rare example in the Turkish higher education system. In Turkey, university career centers also have a limited capacity to address the developmental needs of students regarding career development and employability skills. The results of an investigation of 20 public university career centers in Turkey point out that 75% of these career centers conducted training programs geared to prepare students for work life including time management, teamwork and stress management. However, the study also reports that the personnel working in these centers are insufficient both in quantity and the qualifications required (16). Moreover, studies also point out that, developing students' skills is not only the higher education institution's responsibility, but that there's also a need for employers to partner with these institutions in supporting the development of soft skills (1,4,7).

The findings also showed that, among the skills shared with the students, stress management was the developmental need of the majority. Stress management is defined as a crucial soft skill since it is related to showing endurance in complicated and stressful situations (4,7). Thus it is a valuable skill which facilitates the adaptation to the rapidly changing and highly ambiguous world of work.

During the university years, dealing with increasing responsibilities, taking various decisions and managing one's time are all related with stress. Studies show that inefficient communication skills lead to higher stress levels for university students and also that time management is a serious source of stress (17, 18). Research findings also show that students who live away from their parents display poorer stress management (19). Other studies point out that, as socio-economic status level declines, healthy life style behaviours also decrease (20). It is plausible that these factors could be related with the elevated stress management need of the study participants who represent a group with socio-economical hardships living away from their families. Moreover, studies conducted in Turkey that focused on the Covid-19 pandemic from the perspective of university students showed that the pandemic had a major negative impact on students' psychological well-being (21). The results of a study carried out with 4818 students on scholarship by the Turkish Educational Foundation showed that during the pandemic there was a dramatic increase in the negative feelings experienced by the students (22). Hence, for the current study, the pandemic could also be one of the triggers that has led to students' elevated need to develop their stress management skills.

The results also show that the willingness of students to join a training program to develop these skills was lower for Health Sciences faculty students. As mentioned before, 35% of the study participants were enrolled at Health Sciences faculties and among these, more than half were enrolled at the Medicine Faculty. Moreover, a majority of these students were in their third year or higher grade levels indicating that they have an intensive workloads with internship duties and are working hard to prepare for further specialization examinations. Studies conducted with students enrolled in Health Sciences programs point out that these students are exposed to high levels of stress with stress levels especially higher for those at more senior levels (23, 24). Nacar et al. (20), examining the healthy lifestyle behaviors of students enrolled in seven Medicine faculties in Turkey, showed that stress management skills of students decreased as from the freshman to the senior year with those students from lower economic status demonstrating less healthy lifestyle behaviors. Thus, it seems plausible that the study participants from the Health Sciences faculties have elevated stress levels, yet don't have the necessary time to devote to a training program due to their intensive workloads.

The students' discourses about their developmental need concerning stress management included sources of stress, results of stress and career development motivation. The responses showed that being prone to stress, tendency to think negatively, lack of confidence and being perfectionistic were among the internal sources of stress. These results are in line with the studies in the literature which have reported that anxiety level, uncertainty tolerance

and excitement level are among personal stress factors (25). An increase in perfectionism is also shown to be related with negative psychological health (26).

The external sources of stress mentioned by the students due to exams, challenging conditions, time pressure and uncertainty are also cited in the literature. Studies have shown that academic challenges and negative life events are the basic stress factors of students and that they need support regarding academic and occupation-related anxieties as well as interpersonal problems (17). Time management and intolerance to uncertainty have also been shown to act as serious sources of stress for university students (18, 27).

The findings showed that students experience behavioral, physiological, cognitive and emotional symptoms of stress. Since university students are in a crucial developmental transition period, they are faced with increasing academic, personal and social pressures and these factors can lead to hightened levels of anxiety, depression, anger, headaches and sleep disturbances (28). Stress is also found to be realted with a decrease in performance and difficulty in decision making as well as loss of appetite and other changes in eating patterns (29). In addition, stress is also shown to be related with physiological symptoms such as pain and aches in various parts of the body (30).

Finally, the discourses of students also showed that their developmental needs regarding stress management stem from career development motivation. Indeed, career related issues and anxieties are reported as one of the key subjects on which students seek help from university counseling centers (17).

In Turkey, as courses with a focus on building employability related soft skills become more widespread and the quality and quantity of university career center services improve, the capacity of higher education institutions to develop employability related soft skills of students will be enhanced. However, since the current sample represents students enrolled in public universities, it seems most likely that the resources that are offered by their institutions to develop these soft skills are limited. Besides, it has also been shown that students from low socio-economical backgrounds are less likely to be seek help from university career services due to factors such as financial pressures (31), demands arising from work or responsibilities related to caregiving (32). Studies also put forth that in higher education, social disadvantage has a negative impact on students' experience and those students who have financial difficulties are also more inclined to experience stress along with other mental health problems (20,33). All of these factors could help to explain why stress management as a soft skill that is characterized by showing endurance in complicated and stressful situations has emerged as the most desired attribute for this niche sample of disadvantaged students.

CONCLUSION

This article highlights the elevated needs of university students to develop their employability related soft skills, especially stress management. Yet it's vital to note that not only higher education institutions but stakeholders including employers, NGO's and governments take collective action to support the development of young people's soft skills.

The findings also enhance the understanding of how disadvantaged groups could entail different developmental needs regarding soft skills and that the services to be provided would need to pay attention to the unique needs of these groups.

LIMITATIONS

The study's data have been gathered from a limited number of students and from a specific group of NGO scholars and caution must be taken when generalizing the results. In the future, similar studies can be conducted with larger participant groups including other NGO scholars as well as university students from both public and foundation universities. Also, future studies can be carried out with a more comprehensive list of employability related soft skills to understand the developmental need levels of students regarding a range of skills.

DECLARATIONS

Funding
Not Applicable.

Conflicts of Interest
Not Applicable.

Ethics Approval
The Ethical Committee Approval for the study was granted by the relevant University's Scientific Research Ethical Board on 04.11.2021 with decision number 21/32.

Data and Material
The Data and materials used in this research are available upon request.

Authors' Contributions
Since this is a single author study, the whole process has been carried out by the author.

REFERENCES

1. Clarke M. Rethinking graduate employability: The role of capital, individual attributes and context. Studies in Higher Education. 2017;43:1923–1937.
2. Cimatti B. Definition, development, assessment of soft skills and their role for the quality of organizations and enterprises. International Journal for Quality Research. 2016; 10: 97-130.
3. Moss P and Tilly C. Stories employers tell: Race, skill, and hiring in America.Russell Sage Foundation; 2001.
4. Succi C and Canovi, M. Soft skills to enhance graduate employability: comparing students and employers' perceptions. Studies in Higher Education. 2019;45:1834-1847.
5. Tsirkas K, Chytiri AP and Bouranta, N. The gap in soft skills perceptions: a dyadic analysis. Education+ Training. 2020; 62:357-377.
6. Wesley SC, Jackson VP and Lee M. The perceived importance of core soft skills between retailing and tourism management students, faculty and businesses. Employee Relations. 2017;39:79-99.
7. Succi, C and Wieandt, M. Walk the talk: soft skills' assessment of graduates. European Journal of Management and Business Economics.2019;114-125
8. Atilla Bal E. Recruiting new graduates: What success profile are organizations looking for? EAWOP InPractice Journal. 2020;1:75-96.
9. Ünal F.İstihdam edilebilirlik becerileri ve bu becerilerin kazandırılmasına yönelik stratejiler. Kurgu Dergisi. 2003;20:281-298.
10. Kuran E. Türkiye'nin gençlerinin iş yaşamına bakışı. Harvard Business Review Turkish Edition. 2020;9:38-57.
11. Yıldırım T. Öğrencilerin istihdam edilebilirlik ve bilgi okuryazarlığı becerileri: Hacettepe Üniversitesi örneği Hacettepe Üniversitesi Doktora Tezi. Ankara, 2019.
12. Yıldırım A and Şimşek H. (2011). Sosyal Bilimlerde Nitel Araştırma Yöntemleri. Seçkin Yayıncılık.
13. Miles M B and Huberman AM. Nitel veri analizi. (S. Akbaba Altun & A. Ersoy, Çev.). Pegem Akademi;2016.
14. Kılıç B, Işık R, Tuncer AE, et al. Transition to Professional Life through Experiential Learning: An Undergraduate Course. In Taras, V. & Gonzalez-Perez, M. A. (Eds.) Palgrave Handbook of Experiential Learning in International Business. Palgrave Macmillan; 2015.p.484-499.
15. Kolb DA.Experiential Learning: Experience as the source of learning and development. Pearson;2015.
16. Pişkin M and Ersoy Kart M. Üniversite Kariyer Merkezlerinin Örgüt Yapısı ve Personel Profilinin İncelenmesi: Kimler Yönetiyor? Kimler Yürütüyor? Sosyal Güvenlik Dergisi, 2019;9:275-298.
17. Durak-Batıgün A and Atay-Kayış A. (2014). Üniversite öğrencilerinde stres faktörleri: kişilerarası ilişki tarzları ve problem çözme becerileri açısından bir değerlendirme. Hacettepe Üniversitesi Eğitim Fakültesi Dergisi. 2014;29:69-80.
18. Van der Meer J, Jansen E and Torenbeek M. It's almost a mindset that teachers need to change: first-year students' need to be inducted into time management. Studies in Higher Education. 2010;35: 777-791.
19. Ünalan D, Şenol V, Öztürk A, et al. Meslek yüksekokullarının sağlık ve sosyal programlarında öğrenim gören öğrencilerin sağlıklı yaşam biçimi davranışları ve öz-bakım gücü düzeyleri arasındaki ilişkinin incelenmesi. İnönü Üniversitesi Tıp Fakültesi Dergisi. 2007;14:101-109.
20. Nacar M, Baykan Z, Cetinkaya F, et al. Health promoting lifestyle behaviour in medical students: a multicentre study from Turkey. Asian Pacific Journal of Cancer Prevention. 2014;15:8969-8974.
21. Öztürk B, Büyükerik B, Akarsu R, et al. Investigation of Cognitive, Psychological and Physical Factors Affecting Academic Performance of University Students by Principal Component Analysis During the Covid-19 Pandemic. Acıbadem Üniversitesi Sağlık Bilimleri Dergisi. 2022;13:385-393.
22. Türk Eğitim Vakfı. Pandemi Döneminde Bursiyer Öğrencilerin İhtiyaç Analizi Araştırması. Accessed on: 15.03.2022. https://www.tev.org.tr/haberler-ve-yenilikler/tr/6/Gumus-Baykus-Odulu-Kazandik
23. Özcan S. and Bozhüyük A. Çukurova Üniversitesi sağlık bilimleri öğrencilerinin sağlıklı yaşam davranışları. Çukurova Medical Journal. 2016;41:664-674.
24. Shaikh B, Kahloon, A, Kazmi, M, et al. Students, stress and coping strategies: a case of Pakistani medical school. Education for Health: Change in Learning & Practice. 2004;17:346-353.
25. Coşgun N. Çalışma hayatında stres ve iyimserliğin iş tatminine etkisi ve bir araştırma. İstanbul Üniversitesi Yüksek Lisans Tezi.İstanbul, 2006.
26. Adelson JL. A "perfect" case study: Perfectionism in academically talented fourth graders. Gifted Child Today.2007;30:14-20.
27. Buhr K and Dugas MJ. The intolerance of uncertainty scale: Psychometric properties of the English version. Behaviour Research and Therapy.2002;40:931-945.
28. O'Donovan A and Hughes BM. Access to social support in life and in the laboratory: Combined impact on cardiovascular reactivity to stress and state anxiety. Journal of Health Psychology. 2008;13:1147-1156.
29. İlgöz M. Stres Kaynakları, Sonuçları ve Stresle Mücadele. Beykent Üniversitesi Yüksek Lisans Tezi. İstanbul, 2014.
30. Tekin GO. Çalışma Yaşamında Stres Kaynakları ve Kamu Kurumlarında Çalışanlar Üzerine Etkileri: Edirne Örneği. Trakya Üniversitesi Yüksek Lisans Tezi. Edirne, 2010.
31. Okay-Somerville B, Allison I, Luchinskaya D and Scholarios D. Disentangling the impact of social disadvantage on 'becoming employable': Evidence from STEM student university-to-work transitions. Studies in Higher Education.2020:1-15.
32. Trottier M. Participation in career development communities of practice: Perspectives from low socio-economic background students. EAWOP InPractice Journal. 2021;15:135-155.
33. Richardson T, Elliott P, Roberts R and Jansen M. A Longitudinal Study of Financial Difficulties and Mental Health in a National Sample of British Undergraduate Students. Community Mental Health Journal.2017;53: 344–52.

Supplementary Table 1. Krusgal Wallis Test Results for Grade Level						
Soft Skills	**Grade Level**	**N**	**Ranking Mean**	**Chi-Square**	**df**	**p**
Communication and Relationship Management	1st and 2nd grade	23	62,41			
	3rd grade	36	47,13			
				13,356	3,000	0,004
	4th grade	34	58,4			
	5th and 6th grade	11	31,14			
Teamwork	1st and 2nd grade	23	61,91			
	3rd grade	36	52,97			
				7,269	3,000	0,064
	4th grade	34	51,68			
	5th and 6th grade	11	33,82			
Time Management	1st and 2nd grade	23	61,98			
	3rd grade	36	51,4			
				6,158	3,000	0,104
	4th grade	34	52,32			
	5th and 6th grade	11	36,82			
Decision Making	1st and 2nd grade	23	70,76			
	3rd grade	36	56,51			
				21,761	3,000	0,000
	4th grade	34	43,85			
	5th and 6th grade	11	27,91			
Stress Management	1st and 2nd grade	23	65,46			
	3rd grade	36	50,39			
				8,038	3,000	0,060
	4th grade	34	50,44			
	5th and 6th grade	11	38,68			

Supplementary Table 2. Mann Whitney U Test Results for Grade Level							
Soft Skills	**Faculty Type**	**N**	**Ranked Means**	**SD**	**U**	**Z**	**p**
Communication and Relationship Management	1st and 2nd grade	23	20,54	0,853	56,500	-2,770	0,006
	5th and 6th grade	11	11,14				
	4th grade	34	25,75	0,798	93,500	-2,691	0,007
	5th and 6th grade	11	14,5				
Decision Making	1st and 2nd grade	23	37,87	0,819	187,000	-3,547	0,000
	4th grade	34	23				
	1st and 2nd grade	23	21,78	1,019	28,000	-3,909	0,000
	5th and 6th grade	11	8,55				
	3rd grade	36	26,97	1,030	91,000	-2,872	0,004
	5th and 6th grade	11	14,27				

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 183-189
https://doi.org/10.31067/acusaglik.1240702

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI Public Environmental and Occupational Health / Halk ve Çevre Sağlığı

Knowledge Beliefs and Barriers of Healthcare Workers about Human Papilloma Virus (HPV) and HPV Vaccine

Neşe Yakşi[1] , Berkhan Topaktaş[1]

[1]Amasya University, School of Medicine, Department of Public Health, Amasya, Turkey

ABSTRACT

Background/Purpose: HPV vaccine is critical in the primary prevention of HPV infection and related diseases. HPV vaccination alone reduces HPV infection by 70% and cervical cancer by 48%. Healthcare workers are expected to have sufficient knowledge and positive attitudes and behaviours about the HPV vaccine. This study aimed to determine the knowledge level of healthcare workers about HPV and HPV vaccination and their beliefs and barriers towards HPV vaccination.

Methods: In this cross-sectional study, 339 healthcare workers were reached by snowball sampling. Sociodemographic form, 'Human Papilloma Virus Knowledge Scale (HPV-KS)', 'Health Belief Model Scale for Human Papilloma Virus (HPV) and Its Vaccination (HBMS-HPVV)' were applied online.

Results: 254 female (74.9%) and 85 male (25.1%) healthcare workers participated in this study, and 60.5% of the participants were physicians. 94.4% of participants have heard of the HPV vaccine. The most frequently consulted information sources are specialist physicians (57%), social media/TV/Websites (24.4%), and other health workers (23.7%). Twenty-six participants (7.7%) have had at least one dose of the HPV vaccine, and 58% completed three doses. 6.7% of the participants having daughters, and 0.7% of those having sons vaccinated their children against HPV. Women who have had HPV screening (p=0.016), HPV positive results (p=0.033) and pathological cervical cancer screening results (p=0.004), those having 1st-degree relatives or close friends who had HPV vaccine (p<0.001), those with fewer years in the job (p=0.025) and physicians (p=0.002) had HPV vaccine more. HPV-KS total score (p<0.001), HBMS-HPVV benefits score (p<0.001), and HBMS-HPVV susceptibility score (p<0.001) are higher, and barriers score (p=0.027) is lower in those who had the HPV vaccine.

Conclusion: Consequently, the knowledge about HPV and its vaccination was found to be sufficient in our study. It has been shown that the perception of benefit, severity and susceptibility is high, and the perception of barriers is moderate. Despite this, vaccine coverage is relatively low in this study group. The vaccine cost and the concerns about the effectiveness of the vaccine appear as important barriers.

Keywords: HPV vaccine, health belief model, healthcare worker, Turkey

Neşe YAKŞİ
Berkhan TOPAKTAŞ

Sağlık Çalışanlarında İnsan Papilloma Virüsü (HPV)'ye Yönelik Bilgi Düzeyi ve HPV Aşılamasına Yönelik İnanç ve Bariyerler

ÖZET

Amaç: HPV enfeksiyonu ve ilişkili hastalıkların primer korumasında HPV aşısı oldukça önemlidir. HPV aşısı yaptırmanın tek başına, HPV enfeksiyonunu %70; serviks kanserini ise %48 oranında azalttığı görülmüştür. Sağlık çalışanlarının HPV aşısı ile ilgili yeterli bilgi düzeyi ve olumlu tutum ve davranışlara sahip olması beklenir. Bu çalışmada HPV ve HPV aşılamaları konusunda sağlık çalışanlarının bilgi düzeyi ve HPV aşılamasına yönelik inanç ve bariyerlerinin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Kesitsel tipteki çalışmamızda kartopu örneklem metodu ile 339 sağlık çalışanına ulaşılmıştır. Sosyodemografik veri formu, 'Human Papilloma Virusu Bilgi Ölçeği (HPV-BÖ)', 'Human Papillomavirus (HPV) Enfeksiyonu ve Aşılanmasına İlişkin Sağlık İnanç Modeli Ölçeği (HPVA-SİMÖ)' online olarak uygulanmıştır.

Bulgular: Çalışmamıza 254 kadın (%74,9) ve 85 erkek (%25,1) sağlık çalışanı katılmıştır ve katılımcıların %60,5'i tabiptir. Çalışmamıza katılan sağlık çalışanlarının %94,4'ü HPV aşısını duymuştur. En sık başvurulan bilgi kaynakları ilgili alanların uzman tabipleri (%57), sosyal medya/TV/Web siteleri (%24,4) ve tabip dışı sağlık çalışanları (%23,7)'dır. 26 katılımcı (%7,7) en az bir doz HPV aşısı yaptırmıştır ve bunların %58'i aşıyı 3 doza tamamlamıştır. Kız çocuğu olan katılımcıların %6,7'si kızlarına ve erkek çocuğu olanların %0,7'si oğluna HPV aşısı yaptırmıştır. HPV aşısını, HPV taramasını yaptıran kadınlar (p=0,016), HPV tarama sonucu pozitif olanlar (p=0,033), serviks kanseri tarama sonucu patolojik olanlar (p=0,004), HPV aşısı yaptıran 1. derece akraba veya yakın arkadaşları olanlar (p<0,001), meslekte geçirilen yılları daha az olanlar (p=0,025) ve tabipler (p=0,002) daha fazla yaptırmıştır. HPV aşısı yaptıranlarda HPV-BÖ toplam puanı (p<0,001), HPVA-SİMÖ yarar alt ölçek puanı (p<0,001) ve duyarlılık alt ölçek puanı (p<0,001) daha yüksek bulunurken, engel alt ölçek puanı (p=0,027) daha düşük bulunmuştur.

Sonuç: Çalışmamızda HPV ve aşılamasına yönelik bilgi düzeyi yeterli bulunmuş olup; yarar, ciddiyet ve duyarlılık algısının yüksek olduğu, engel algısının ise orta seviyede olduğu gösterilmiştir. Buna rağmen aşı kapsayıcılığı çalışma grubumuzda oldukça düşüktür. Aşı maliyetinin devlet tarafından karşılanmaması ve aşının etkinliği konusundaki endişeler önemli bir bariyerler olarak karşımıza çıkmaktadır.

Anahtar kelimeler: HPV aşısı, sağlık inanç modeli, sağlık çalışanı, Türkiye

Correspondence: Neşe Yakşi
Amasya University, School of Medicine, Department of Public Health, Amasya, Turkey
Phone: +905548972393
E-mail: drnsyks@gmail.com

Received: 22 January 2023
Accepted: 28 February 2023

HPV (Human Papilloma Virus) has approximately 40 subtypes that cause many infections, especially anogenital infections (1). Most people will inevitably encounter HPV at some point in their lives. Low-risk HPV types result in condyloma, while high-risk types can cause cancers of the vagina, vulva, cervix, penis, anus, head, and neck. Cervical cancer caused by high-risk types is one of the most common cancers in women (2). According to the Turkey Cancer Statistics 2017 report, the frequency of cervical cancer in women is 4.3 per 100.000, and it is the 9th most common cancer type in women (3). The incidence of HPV-related cancers (mouth, pharynx, cervix, vulva, vagina, anus) is 5 per 100.000 in women; 1 in 100.000 in men (mouth, pharynx, penis, anus) (3). The HPV vaccine is crucial in the primary prevention of HPV infection and related diseases. The HPV vaccine was first approved by the United States Food and Drug Administration (FDA) in 2006. There are three types of vaccines (2-valent, 4-valent, 9-valent) with proven safety and efficacy against HPV. HPV vaccination alone reduces HPV infection by 70%; It has been found to reduce cervical cancer by 48% (4). There are three types of HPV vaccines in Turkey, but the vaccine cost is not covered by General Health Insurance (GHI) and is not included in the national vaccination programme.

To increase the quality of the health services regarding HPV, health professionals should have good knowledge about risk factors, prevention methods, early diagnosis, screening and treatment services and a positive attitude and behaviour on the subject due to being role models in the general population. Especially since the HPV vaccine is not included in the routine vaccination programme and its cost is not covered by GHI, providing information about the vaccine may be limited, which is often reflected in the practices. However, the attitude regarding that issue is crucial in changing health behaviours. Therefore, behaviour changes will be easier if the beliefs and attitudes about health behaviours are known. Therefore, this study aimed to determine the knowledge of healthcare professionals about HPV and HPV vaccination and their beliefs and barriers towards HPV vaccination.

MATERIALS and METHODS

The study data were collected between 20.07.2022 and 20.08.2022 following the ethics committee permission (Decision no: 75). The minimum sample size was 369, with 40% knowledge level about the HPV vaccine, with a 5% precision and 95% power. No sample selection was applied. Healthcare workers aged 18 and over were reached using the snowball method, and the forms prepared with the Google Forms application were applied online. Three hundred thirty-nine participants completed the online survey, including the sociodemographic data form, 'Human Papilloma Virus Knowledge Scale' and the 'Health Belief Model Scale for Human Papillomavirus (HPV) Infection and Its Vaccination'.

Human Papilloma Virus Knowledge Scale (HPV-KS) was developed by Waller et al. in 2013 (5). The original form of HPV-KS is composed of 35 questions, but two questions were excluded from the scale because they are incompatible with the Turkish national vaccination program. The Turkish validation study was conducted by Demir, and the Turkish form consists of 33 items. The questions are answered as "yes, no, I don't know". Each correct answer means 1 point, and each wrong answer is 0 points. It consists of 4 sub-dimensions; general HPV information, HPV screening test information, general HPV vaccine information and information about the current HPV vaccination program (6).

Kim developed the Health Belief Model Scale for Human Papilloma Virus and Its Vaccination (HBMS-HPVV) in 2012 (7). The Turkish validity and reliability study was performed by Güvenc et al. (8). The Turkish version of HBMS-HPVV consists of 14 items and four subscales. These are the perceived severity (items 6-9); perceived severity (items 6-9), perceived barriers (items 10-13 and 15), perceived benefits (items 1-3), and perceived susceptibility (items 4 and 5). In addition, it has four items Likert-type response system; 1 "not at all", 2 "somewhat", 3 "quite a lot", and 4 "a lot". A high perceived benefits score indicates that the HPV vaccine is beneficial, and a high perceived severity score suggests that HPV infection is a serious problem. A high perceived barriers score means that vaccination-related barriers are high. A high perceived susceptibility score indicates high susceptibility in this regard.

In statistical analysis, the compatibility of continuous variables with normal distribution was evaluated with the Kolmogorov-Smirnov test. Since the continuous variables were not normally distributed, they were shown as the median (minimum-maximum) value. Categorical data were shown as frequency (percentage). Chi-square test and Mann Whitney U test were used in comparative analyses. Binary logistic regression analysis was used for multivariate analyses. The statistical significance level was accepted as $p<0.05$.

RESULTS

This study included 254 women (74.9%) and 85 men (25.1%). 72% are married, and 64.3% have at least one child. The median age is 36 (23-64) years. 56.3% of them are graduates of master's degree or higher, 41.3% of university and 2.4% of high school. 60.5% of them are doctors. They are from 48 different provinces, and the highest number of participants are from Niğde (21.5%), Ankara (14.5%) and Istanbul (9.1%).

94.4% of the healthcare professionals participating in the present study have heard about the HPV vaccine. The most frequent sources of information about the HPV vaccine were the specialist physicians (57%), social media/TV/Web sites (24.4%) and non-medical health workers (23.7%). Twenty-six participants (7.7%) received at least one dose of the HPV vaccine (Figure 1), and 58% completed three doses. The rates of at least one dose of vaccination to the children of the participants who have girls (n=147) and boys (n=152) children are shown in Figure 1. The most common reasons for not having the HPV vaccine are; inadequate knowledge about the vaccine (45.3%), the high cost of the vaccine (33.9%), the thought of decreased effectiveness of the vaccine due to their age (9.6%) and no need for the vaccine (8.6%). Of the 81 participants (23.9%) 1st-degree relatives or close friends had the HPV vaccine. In case the vaccine cost is covered by the GHI, their thoughts on getting the HPV vaccine for themselves, their daughters and their sons are presented in Figure 2.

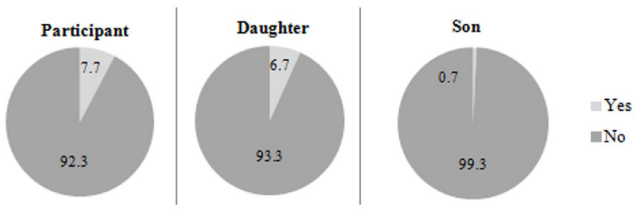

Figure 1. HPV vaccination status of the participants and their children

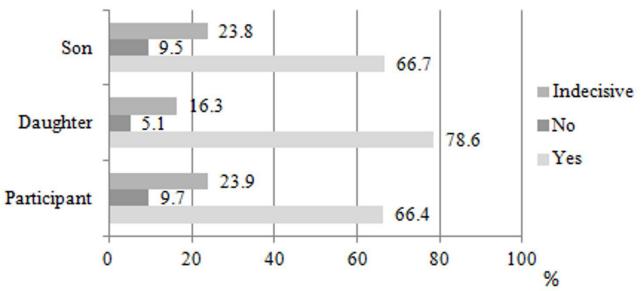

Figure 2. Thoughts of the participants about having HPV vaccine for themselves and their children in the case the cost of HPV vaccine is paid by General Health Insurance

Having HPV screening (p=0.016), positive HPV screening results (p=0.033), 1st-degree relatives or close friends who had HPV vaccination (p<0.001), and pathological cancer screening results (p=0.004) were found to increase the HPV vaccination rate. In addition, the rate of HPV vaccination was found to be higher in those with fewer years in the occupation (p=0.025) and physicians (p=0.002). The univariate analysis results of the affecting factors of the HPV vaccination are presented in Table 1, and the multivariate analysis results are shown in Table 2.

Participants scored the need for education regarding the HPV vaccine as 6 (1-10), and the median score of HPV-KS is 25 (0-32). There is a weak negative correlation between the need for education score and the HPV-KS score (r=-0.261, p<0.001). General HPV information (p=0.002), HPV screening test information (p=0.005), general HPV vaccine information (p=0.001) and information about the current HPV vaccination program (p<0.001) and HPV-KS total (p<0.001) scores were higher in those had HPV vaccine (Table 1).

The median score of the HBMS-HPVV severity, benefits and susceptibility subscales is 3(1-4), and the barriers subscale is 1.8 (1-4). While the HBMS-HPVV benefits subscale score (p<0.001) and susceptibility subscale score (p<0.001) are higher in those who had the HPV vaccine, the barriers subscale score (p=0.027) is lower. The HBMS-HPVV severity score was found as 3.5 (1.75-4) in those who had the vaccine and 3 (1-4) in those who did not (p=0.073) (Table 1). The educational need score is 5 (1-10) in those who had the HPV vaccine and 7(1-10) in those who did not (p=0.096). HPV vaccination status did not differ significantly according to sex, age, marital status, having children, perceived income status and education level (Table 1).

In the case of the HPV vaccine cost covered by GHI, the intention of getting the HPV vaccine was found to be higher in women (p=0.028), those who had cervical cancer screening (p=0.033) and HPV screening (p=0.028), those who thought that the state should cover the HPV vaccine cost (p=0.004)

Table 1. Factors affecting participants' HPV vaccination status

		HPV Vaccination		
		Yes n (%)*	No n (%)*	p-value
Age		35 (27-47)	37 (23-64)	0.177**
Sex	Female	21 (8.3)	233 (91.7)	0.474§
	Male	5 (5.9)	80 (94.1)	
Marital status	Single	6 (7.8)	71 (92.2)	0.915§
	Married	18 (7.4)	226 (92.6)	
	Divorced	2 (11.8)	15 (88.2)	
	Widow	0 (0.0)	1 (100.0)	
Having child	Yes	11 (5.0)	207 (95.0)	**0.015§**
	No	15 (12.4)	106 (87.6)	
Perceived income level	Income less than expenses	1 (2.2)	44 (97.8)	0.307§
	Income equal to expenses	14 (8.0)	162 (92.0)	
	Income more than expenses	11 (9.3)	107 (90.7)	
Educational level	High school graduate	0 (0.0)	8 (100.0)	0.080§
	University graduate	6 (4.3)	134 (95.7)	
	Master and above	20 (10.5)	171 (89.5)	
Occupation	Doctor	23 (11.2)	182 (88.8)	**0.002§**
	Allied health personnel	3 (2.2)	131 (97.8)	
Occupational duration (years)		10 (1-20)	12 (0-38)	**0.025****
Need for education regarding the HPV vaccine		5 (1-10)	7 (1-10)	0.096**
Cervical cancer screening (n=254)	Yes	14 (10.1)	125 (89.9)	0.251§
	No	7 (6.1)	108 (93.9)	
Pathological result of cervical screening (n=139)	Pathologic	2 (66.7)	1 (33.3)	**0.004§**
	Normal	12 (9.0)	121 (91.0)	
	I don't know	0 (0.0)	3 (100.0)	
HPV screening (n=254)	Yes	13 (13.8)	81 (86.2)	**0.017§**
	No	8 (5.2)	147 (94.8)	
HPV screening result (n=94)	HPV negative	10 (11.4)	78 (88.6)	**0.033¥**
	HPV positive	3 (50.0)	3 (50.0)	
HPV vaccination among 1st-degree relatives or close friends	Yes	17 (21.0)	64 (79.0)	**<0.001§**
	No	9 (3.5)	249 (96.5)	
Cervix cancer diagnosis among 1st-degree relatives or close friends	Yes	2 (7.4)	25 (92.6)	1.000¥
	No	24 (7.7)	288 (92.3)	
HPV-KS total score		28 (16-32)	25 (0-32)	**<0.001****
HBMS-HPVV-benefits score		4 (2-4)	3 (1-4)	**<0.001****
HBMS-HPVV-susceptibility score		4 (2-4)	3 (1-4)	**<0.001****
HBMS-HPVV-severity score		3.5 (1.75-4)	3 (1-4)	0.073**
HBMS-HPVV-barriers score		1.6 (1.4-3.2)	2 (1-4)	**0.027****

**Continuous variables are shown as median (min-max).*
***Mann Whitney U test. §Chi-square test. ¥Fisher Exact test*
HPV: Human Papilloma Virus.
HPV-KS: Human Papillo1ma Virus Knowledge Scale.
HBMS-HPVV: Health Belief Model Scale for Human Papilloma Virus and Its Vaccination

Table 2. Multivariate analysis of factors affecting participants' HPV vaccination status		
	OR (95% CI)	**p-value***
HPV test positivity	8.12 (0.85-77.39)	0.068
HPV vaccination among 1st-degree relatives or close friends	11.73 (2.03-67.53)	**0.006**
HBMS-HPVV-susceptibility score	4.51 (1.13-17.94)	**0.032**

**Backward LR method: variables of age, occupation group, occupational duration, HPV screening result, HPV vaccination among 1st-degree relatives or close friends, cervical cancer screening result, HPV-KS total score, HBMS-HPVV benefits, susceptibility, severity and barriers scores, perceived educational need for HPV vaccine were included. HPV: Human Papilloma Virus, HBMS-HPVV: Health Belief Model Scale for Human Papilloma Virus and Its Vaccination*

DISCUSSION

We found HPV vaccine coverage as 7.7%. In a systematic review evaluating population-based studies conducted in Turkey, HPV vaccination rates were shown to vary between 0.3-6% (9). Karasu et al. found the HPV vaccination rate to be 5.2% in their study with nurses, consistent with the present study (10). Considering that nearly half of the participants in the present study conducted with healthcare professionals were physicians, it can be said that the HPV vaccination rate is relatively low.

In the present study, the participants' HPV-KS total score is 25 (0-32). In a population-based study, the mean HPV-KS score was 8.9±2.5 (11). In the same survey, the rate of hearing about the HPV vaccine (55.4%) is far behind the rate in our study (94.4%). These results mean that the awareness and knowledge of the healthcare professionals involved in the present study about the HPV vaccine are reasonable.

Although the HPV vaccination rate is 7.7% in the present study, 66.4% of the participants stated that they intended to be vaccinated if the vaccine cost was covered by GHI, and 23.6% were undecisive on this issue. This result shows that most healthcare professionals who do not have the HPV vaccine are willing to be vaccinated. Thus, we can conclude that the HPV vaccine cost is an important barrier to HPV vaccination. Besides, in a study conducted with specialist physicians in Turkey, 91.6% of physicians think that if the vaccination cost decreases, the vaccination rate will increase (12). In a prospective study conducted by Yanıkkerem et al. with nurses having daughters between the ages of 9-26, it was observed that only 1.4% of the nurses had their daughters vaccinated following HPV vaccination education. The most important reason for not vaccinating was reported as the vaccination cost and concerns about the efficacy and safety of the vaccine, and one out of every 3 participants stated that they would like to have their daughter vaccinated later (13).

In many countries, the efficacy and safety of the vaccine, side effects, inconsistent and incomplete information about the vaccine, and vaccination costs have been reported as barriers to the administration of the HPV vaccine (14-16). In the review of Özdemir et al. in Turkey, the most common reasons for not having the HPV vaccine are lack of information (40.9-76.6%), concerns about side effects (0.9-64.5%), and vaccine cost (%0.2-49.5) (9). In the present study, the most frequent reasons were similarly insufficient knowledge about the HPV vaccine (45.3%), the high cost of the vaccine (33.9%), and the thought of decreased effectiveness of the vaccine due to age (9.6%). Since there was no upper age limit for including the study, it is seen that one out of every 10 participants did not have the vaccine because the vaccine would not be effective at their age. It has been reported that the vaccine's effectiveness decreases after the age of 26 in the recommendations of the Centers for Disease Control and Prevention (CDC) recommendations regarding the timing of the HPV vaccine (17). The fact that the HPV vaccine has a history of 16 years and low awareness until recently may make this a rational reason for older participants. Still, the low vaccination rate among the participants' children (girls: 6.7%, boys: 0.7%) shows that the relevant initiatives are still insufficient.

In the present study, HPV vaccination rates of participants and their children and the idea of having HPV vaccine for both themselves and their children if the vaccine is free, were higher for women and girls. In the study of Tolunay et al., it was shown that 86% of the physicians thought to have their daughters vaccinated with HPV, but this rate was 25.8% for sons, and the ineffectiveness of the vaccine was the most common reason for both (12). A study conducted with primary healthcare workers showed that 82% of physicians and 75% of nurses did not know that the HPV vaccine is suitable for both men and women (18). In the present study, one out of every 2 participants did not know that the vaccine was licensed for males ages 11-26. In addition, in the case of the vaccine being free, the intention to have the vaccine is higher in women. This shows that even healthcare professionals lack knowledge and sensitivity about the health problems of HPV in men and HPV vaccination is appropriate and necessary for men as well.

The health belief model is used in many assessment areas to help determine health behaviours. When the health belief model for HPV infection and vaccination was evaluated in the present study, it was seen that the perceived severity, benefits and susceptibility were high, and the perceived barriers were moderate. However, in a survey conducted with students of the faculty of health sciences, HBMS-HPVV severity, benefits and susceptibility scores were lower than in the present study while perceived barriers scores were higher (19). This means vocational education can positively affect attitudes towards HPV and its vaccine over time.

There are some limitations and strengths of the present study. First, the results cannot be generalized to the population due to the lack of probabilistic sample selection. The results should be interpreted with caution since the participation rate of health workers with more positive attitudes and behaviours about vaccination may be higher. Another limitation is that vaccination status is based on the declaration. In the present study, participants' knowledge levels, beliefs and attitudes towards HPV vaccination were evaluated with valid and reliable scales. In the literature review, few studies assess the acceptability of the HPV vaccine in society with the health belief model in Turkey. No study evaluates this issue, especially among healthcare professionals. In addition, the evaluation of different occupational groups and both sexes in the present study enriches the current findings.

CONCLUSION

In the present study group consisting of healthcare professionals, the knowledge about HPV and vaccination is sufficient. According to the health belief model, it was shown that the perceived benefit, seriousness and susceptibility towards HPV and its vaccine was high, and the perceived barriers towards the HPV vaccine were at a moderate level. Despite this, the study group's vaccine coverage (7.7%) is relatively low. Vaccination is associated with HPV knowledge level, benefit, susceptibility, and perceived barriers. Additionally, it was shown that the HPV vaccination rate is higher in those whose first-degree relatives or close friends had HPV vaccination. In this sense, the concepts of social interaction and role models are crucial. Even in this study group that the society accepts as a reference for health and consists of healthcare workers with regular income, one out of every three participants indicated vaccination costs as the reason for not having the vaccination. This should be evaluated, and if necessary, efforts should be increased to include the vaccination cost in the scope of GHI. In the present study, one out of every two participants stated that they did not have the vaccine due to insufficient information, and the need for education about the HPV vaccine is quite high. For this reason, the subjects of negative results of HPV in both sexes, the effectiveness of vaccines, side effects, etc., should be added to vocational education and in-service training.

Acknowledgement

This study has no financial source. There is no conflict of interest to be stated regarding the study. Ethics committee approval was obtained from Amasya University Non-Interventional Clinical Research Ethics Committee on July 07, 2022 (Decision No: 75). Since the study data was collected online, informed consent was obtained online before the application of the form. This research has not received any financial support from funding agencies in the public or commercial sectors. Data can be requested from the authors.

Author Contributions

NY: Planning the study; processing data; formal analysis; research; methodology; visualization; writing the article, editing.

BT: Planning the study; processing data; research; methodology; writing the article, editing.

REFERENCES

1. De Villiers E-M, Fauquet C, Broker TR, Bernard H-U, Zur Hausen H. Classification of papillomaviruses. Virology. 2004;324(1):17-27.
2. Bruni L, Barrionuevo-Rosas L, Albero G, Serrano B, Mena M. Gomez D., et al. ICO Information Centre on HPV and Cancer (HPV Information Centre) Human Papillomavirus and Related Diseases in the World Summary Report. 2016;15.
3. HSGM TCSB. Türkiye Kanser İstatistikleri 2017. 2021.
4. Garnett GP, Kim JJ, French K, Goldie SJ. Modelling the impact of HPV vaccines on cervical cancer and screening programmes. Vaccine. 2006;24:S178-S86.
5. Waller J, Ostini R, Marlow LA, McCaffery K, Zimet G. Validation of a measure of knowledge about human papillomavirus (HPV) using item response theory and classical test theory. Preventive medicine. 2013;56(1):35-40.
6. Demir F. Human Papilloma Virüsü (Hpv) Bilgi Ölçeği'nin Türkçe Geçerlik Ve Güvenirliği, Sağlık Bilimleri Üniversitesi, Gülhane Sağlık Bilimleri Enstitüsü, Halk Sağlığı Hemşireliği Anabilim Dalı. Yayınlanmamış Yüksek Lisans Tezi. 2019.
7. Kim HW. Knowledge about human papillomavirus (HPV), and health beliefs and intention to recommend HPV vaccination for girls and boys among Korean health teachers. Vaccine. 2012;30(36):5327-34.
8. Guvenc G, Seven M, Akyuz A. Health belief model scale for human papilloma virus and its vaccination: adaptation and psychometric testing. Journal of pediatric and adolescent gynecology. 2016;29(3):252-8.

9. Özdemir S, Akkaya R, Karaşahin KE. Analysis of community-based studies related with knowledge, awareness, attitude, and behaviors towards HPV and HPV vaccine published in Turkey: A systematic review. Journal of the Turkish German Gynecological Association. 2020;21(2):111.
10. Karasu AFG, Adanir I, Aydin S, Ilhan GK, Ofli T. Nurses' knowledge and opinions on HPV vaccination: a cross-sectional study from Istanbul. Journal of Cancer Education. 2019;34(1):98-104.
11. Agadayi E, Karademir D, Karahan S. Knowledge, Attitudes and Behaviors of Women who have or have not had human papillomavirus vaccine in Turkey about the Virus and the vaccine. Journal of Community Health. 2022:1-8.
12. Tolunay O, Celik U, Karaman SS, Celik T, Resitoglu S, Donmezer C, et al. Awareness and attitude relating to the human papilloma virus and its vaccines among pediatrics, obstetrics and gynecology specialists in Turkey. Asian Pacific Journal of Cancer Prevention. 2015;15(24):10723-8.
13. Yanikkerem E, Koker G. Knowledge, attitudes, practices and barriers towards HPV vaccination among nurses in Turkey: a longitudinal study. Asian Pacific Journal of Cancer Prevention. 2014;15(18):7693-702.
14. Ojeaga A, Alema-Mensah E, Rivers D, Azonobi I, Rivers B. Racial disparities in HPV-related knowledge, attitudes, and beliefs among African American and white women in the USA. Journal of Cancer Education. 2019;34(1):66-72.
15. Fernandes R, Potter BK, Little J. Attitudes of undergraduate university women towards HPV vaccination: a cross-sectional study in Ottawa, Canada. BMC women's health. 2018;18(1):1-9.
16. Walsh CD, Gera A, Shah M, Sharma A, Powell JE, Wilson S. Public knowledge and attitudes towards Human Papilloma Virus (HPV) vaccination. BMC public Health. 2008;8(1):1-9.
17. HPV Vaccination Recommendations. Centers for Disease Control and Prevention. 2021.
18. Özbakir NA, Özşahin A, Edirne T. Family doctors and nurses' knowledge levels and awareness of cervical cancer and Hpv Vaccine in an urban area in Turkey. Pamukkale Tıp Dergisi. 2019;12(3):457-66.
19. Altıntaş RY, Erciyas ŞK, Ertem G. Sağlık Bilimleri Fakültesi Öğrencilerinin Serviks Kanseri ile Human Papilloma Virüs Enfeksiyonu Aşılamasına İlişkin Sağlık İnanç Düzeylerinin Belirlenmesi. Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi. 2022;15(1):40-9.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 190-196
https://doi.org/10.31067/acusaglik.1233982

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI Public Environmental and Occupational Health / Halk ve Çevre Sağlığı

Mental Well-being as a Predictor of Quality of Life in Elderly Agricultural Workers

Ceren Varer Akpınar[1], Aliye Mandıracıoğlu[2], Safiye Özvurmaz[3], Filiz Adana[3], Fatma Kurt[3], Nazife Koç[4], Duygu Yeşilfidan[3]

[1]Faculty of Medicine, Department of Public Health, Giresun University, Giresun, Turkey

[2]Faculty of Medicine, Department of Public Health, Ege University, Izmir, Turkey

[3]Department of Public Health Nursing, Adnan Menderes University Faculty of Nursing, Aydın, Turkey

[4]Home Patient Care Services, Istanbul Rumeli University, İstanbul, Turkey

Ceren VARER AKPINAR
Aliye MANDIRACIOĞLU
Safiye ÖZVURMAZ
Filiz ADANA
FATMA KURT
Nazife KOÇ
Duygu YEŞİLFİDAN

Correspondence: Ceren Varer Akpınar
Faculty of Medicine, Department of Public Health, Giresun University, Giresun, Turkey
Phone: +905515992353
E-mail: varerceren@gmail.com

Received: 13 January 2023
Accepted: 21 February 2023

ABSTRACT

Purpose: In this study, it was aimed to evaluate the quality of life and perceived health status of agricultural workers over the age of 65 and to determine the relationship between quality of life and mental well-being.

Methods: This cross-sectional study was conducted on elderly agricultural workers (196 people) living in a rural area in Aydın. The European Quality of Life 5-Dimensions 3-Level Questionnaire was used to assess quality of life and the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) was used to assess mental well-being. T test and logistic regression analysis were used for statistical evaluation.

Results: The mean age of the participants was 70.92±6.22 and 50.5% of them were male. In study, three out of four people had experienced some problems in any dimensions of the quality of life. The participants' WEMWBS mean score was 47.12±7.79 and the mean perceived health status score was 50.64±22.03. There was a positive and moderate correlation between mental well-being and perceived health level (r=0.432, p<0.001). Having problems in at least one of the dimensions about quality of life had increased with age [OR 1.17 (95% CI 1.04-1.32)] and decreased with increasing mental well-being [OR 0.84 (95% CI 0.78-0.90)].

Conclusion: This study shows that more than half of the elderly agricultural workers experience problems about the quality of life, their mental well-being is moderate, and age and mental well-being are determinants of quality of life. The needs of the increasing number of elderly agricultural workers in our country should be evaluated in order to increase their mental well-being and quality of life, interventions should be planned for these needs.

Keywords: Elderly, quality of life, mental health, agricultural workers

Yaşlı Tarım İşçilerinde Yaşam Kalitesinin Yordayıcısı Olarak Mental İyilik Hali

ÖZET

Amaç: Bu çalışmada 65 yaş üzeri tarım işçilerinin yaşam kalitesini ve algılanan sağlık durumunu değerlendirmek, yaşam kalitesiyle mental iyilik hali arasındaki ilişkiyi belirlemek amaçlanmıştır.

Yöntemler: Bu kesitsel araştırma, Aydın ili kırsalında yaşayan yaşlı tarım işçileri (196 kişi) üzerinde yapılmıştır. Avrupa Yaşam Kalitesi Beş Boyutlu Üç Düzeyli Ölçeği, ruhsal iyilik halini değerlendirmede ise Warwick-Edinburgh Mental İyi Oluş Ölçeği (WEMİOÖ) kullanılmıştır. İstatistiksel değerlendirme için T test ve logistic regresyon analizi kullanılmıştır.

Bulgular: Katılımcıların yaş ortalaması 70,92±6,22 ve %50,5'i erkektir. Çalışmada, her dört kişiden üçü yaşam kalitesi boyutlarının herhangi birinde bazı problemler ya da ciddi sorunlar yaşamaktadır. Katılımcıların WEMİOÖ puan ortalaması 47,12±7,79, algılanan sağlık durumu puan ortalaması ise 50,64±22,03'dür. Ruhsal iyilik hali ve algılanan sağlık düzeyi arasında orta, yüksek derecede ilişki vardır (r=0,432, p<0.001). Yaşam kalitesi ile ilgili boyutlardan en az birinde sorun yaşama yaşla birlikte artmakta [OR 1,17 (%95 GA 1,04-1,32)], artan ruhsal iyilik düzeyiyle [OR 0,84 (%95 GA 0,78-0,90)] azalmaktadır.

Sonuç: Bu çalışma, yaşlı tarım işçilerinin yarısından fazlasının yaşam kalitesi ile ilgili sorunlar yaşadığını, mental iyilik hallerinin orta düzeyde olduğu ve yaş ve mental iyilik halinin yaşam kalitesi üzerinde belirleyici olduğunu göstermektedir. Ülkemizde giderek artan yaşlı tarım çalışanlarının mental iyilik düzeylerini ve yaşam kalitelerini arttırmak amaçlı gereksinimleri değerlendirilmeli ve bu gereksinimlere yönelik müdahaleler planlanmalıdır.

Anahtar Kelimeler: Yaşlı, yaşam kalitesi, ruh sağlığı, tarım işçileri

Socio-demographic changes in the world show that the elderly population is increasing. In the world population trend report, it is stated that with the increase in life expectancy, the population over the age of 65 will exceed 1.5 billion in 2050 and elderly individuals will constitute 16% of the total population (1). The population over the age of 65 has increased by 24% in the last five years according to 2020 data in Turkey (2).

The increasing elderly population also brings about changes in the labor market (3). More elderly population is included in working life with the decreasing young workforce and working life is also stated as a socialization tool for the elderly to provide social participation. On the other hand, elderly individuals become economically vulnerable and impoverished in the capitalist system where every service or product requires money (4). In particular, the elderly population living in rural areas and having a poor education level struggles with povert and a significant part of them have to work informally in daily jobs and in agriculture (5). 65.5% of the working elderly population works in agriculture according to the data of the Turkish Statistical Institute (6). As a fragile group, elderly agricultural workers are more exposed to physical, chemical, ergonomic and psychological risk factors and their quality of life may be adversely affected (7).

Quality of life is a multidimensional scale proposed as a health indicator of population and is used to evaluate health promotion actions (8). Quality of life is defined by the World Health Organization (WHO) as *"the perception of their position in life in relation to their goals, expectations, standards and concerns; in the context of the culture and value system in which individuals live."*(9). Health-related quality of life is a useful indicator for determining the general health status as it evaluates both the physical and mental health status of the individual and the effect of health status on the quality of life (8). Health-related quality of life for the elderly can be defined as being able to do daily activities, independence and functional status (10,11).

Deterioration in mental health status and depressive symptoms may cause emotional and physical pain, a decrease in quality of life and an increased risk of death in the elderly population (12,13). Decreased quality of life may bring along psychological health problems and may affect mental well-being (14,15). Mental well-being can play an important role in the quality of life of elderly agricultural workers who are both biologically and socially vulnerable.

Determining the quality of life and mental well-being of elderly agricultural workers will be very important in preventing possible health risks and planning health promotion actions. Although there are studies evaluating the quality of life in the elderly (10,16,17), on the national level, the most of them include elderly people who are in nursing homes (18–20) or who apply to health institutions (21). As far as is known, data on the quality of life and mental well-being of elderly agricultural workers on the national level are limited in the literature.

The aim of this population-based study is evaluating the quality of life and perceived health status of agricultural workers over the age of 65 and determining the relationship between quality of life and mental well-being

Material and Methods

The population of this cross-sectional study were agricultural workers over the age of 65 living in the Tepecik neighborhood of Aydın province. It takes immigration from the country and includes different socio-cultural structures due to the widespread agricultural lands in the region, The size of the research population is not known due to the high rate of unregistered work among agricultural workers. G*Power 3.1 software was used to calculate the sample size. The sample size to be included in the study was calculated as 150 people with an effect size of 0.2, a type 1 error level of 5% and a power of 80%. The improbable sampling technique was used and people over the age of 65 were included in the study who have worked in agriculture for at least five years and volunteered to participate. As a result, 196 elderly agricultural workers were included in the study.

The dependent variable of the study is the level of quality of life. The independent variables are the level of mental well-being and the characteristics of socio-demographic and working conditions.

The data collection form consists of 19 questions created by the researchers as a result of the literature review, a section containing the European Quality of Life Five Dimensions Three Level Questionnaire used to question the quality of life and the Warwick-Edinburgh Mental Well-Being Scale used to determine mental well-being. The data were collected using a face-to-face interview technique using a questionnaire between June-November 2022. One of the researchers works in the primary health care institution in the region and has sufficient knowledge about the region. The data were collected in the

field by obtaining address information from the local government.

European Quality of Life Five Dimensions Three Level Questionnaire (EQ-5D-3L)

The EQ-5D-3L scale was used to evaluate the quality of life of elderly agricultural workers which was developed by the EuroQol group in 1990 and adapted by Eser et al. in 2007 (22,23). EQ-5D-3L is a general health scale used to measure quality of life. The first part of the scale consists of five dimensions as mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Each dimension consists of a single question. For the situation specified in each dimension, it is evaluated with 1 point if there is no problem, 2 points if there are some problems and 3 points if there are serious problems. The fact that the answers given to all dimensions in the evaluation are '1 point' indicates the state of full health. The second part of the EQ-5D-3L evaluates the perceived health level with the VAS. The person is asked to mark the state of health he felt that day on a line from 0 to 100. A score of 0 indicates the worst state of health and a score of 100 indicates the best state of health (8,24).

Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)

The WEMWBS scale developed by Tennant et al. in 2007 (25), measures the mental well-being of individuals. The Turkish validity and reliability study of the scale was performed by Keldal et al. in 2015 (26). The scale consists of 14 questions and is answered in a 5-point Likert type (strongly disagree-1, … strongly agree-5) and there is no reverse scored item. A minimum of 14 and a maximum of 70 points are obtained from the scale and high scores indicate high mental well-being. The Cronbach's alpha value of the scale was calculated as 0.89 for this study.

Ethics committee approval (21.12.2022-E-53938333-050-14831) was obtained for the study. Informed consent was obtained from the participants and necessary information about the study was given.

The data were evaluated in SPSS version 25.0 statistical program. In descriptive analysis, numerical variables are shown as mean and standard deviation, categorical variables are shown as numbers and percentages. The normal distribution of the data was evaluated with the Kolmogorov-Smirnov tests. The correlation between WEMWBS and EQ-5D-3L VAS was calculated using the Spearman's Rank Correlation Coefficient. When analyzing the factors related to quality of life, the participants were evaluated in two groups as those who had some or serious problems in any dimension of the EQ-5D-3L and those who had no problems at all. After the data were analyzed with the chi-square test and Student's T test, all significant variables were included in the multivariate binary logistic regression model using the "enter" approach. %95 confidence interval and $p<0.05$ value were used to evaluate statistical significance.

Results

The descriptive characteristics of the participants are shown in Table 1. The mean age of the study group was 70.92±6.22 (minimum 65, maximum 90). 50.5% of them were male, 66.8% were married, 45.9% were graduated from primary school, 49.5% had middle-income, 95.4% had social security and 67.3% of them lived alone. 51.5% of the participants had a working period of 20-49 years in agriculture, 59.7% of them had a work accident in the last year, 70.9% of them had a chronic disease (Table 1).

While the rate of those who stated that they had some problems or serious problems in any dimension of the EQ-5D-3L was 75%, the highest problem was the pain/discomfort dimension with 63.3% and the anxiety/depression dimension with 53.5% in the second rank (Table 2).

The participants' WEMWBS mean score was 47.12±7.79 and the mean perceived health status score according to VAS was 50.64±22.03. Positive and moderately significant correlation was found between WEMWBS and VAS scores ($r=0.432$, $p<0.001$) (Table 3).

In univariate analyzes, it was found that problems related to quality of life were significantly lower in young age, males, higher education level, living in nuclear family, working in agriculture sector for a short time, those without chronic diseases and those with high mental well being ($p<0.05$).

In Table 4, the odds ratios (OR) of having problems in at least one of the five dimensions were evaluated for all variables that were significant in univariate analyzes with the multivariate logistic regression model. The results revealed that the most important determinants were age and mental well-being. Problems with at least one of the five dimensions of EQ-5D-3L increased with age [OR 1.17 (95% CI 1.04–1.32)]. Having problems in at least one of the five dimensions of EQ-5D-3L decreased with increasing mental well-being [OR 0.84 (95% CI 0.78-0.90)] (Table 4).

Table 1. Descriptive characteristics of the study group, N=196

Descriptive characteristics	n	%
Age (Mean±SD=70.92±6.22)		
65-69	104	53.1
70-74	44	22.4
75-89	48	24.5
Gender		
Female	97	49.5
Male	99	50.5
Marital status		
Married	131	66.8
Single/Divorced/Widowed	65	33.2
Education level		
Illiterate	12	6.1
Literate	45	23.0
Primary	90	45.9
Secondary	29	14.8
High School	20	10.2
Perception of income		
Bad	94	47.9
Average	97	49.5
Good	5	2.6
Social security		
No	9	4.6
Yes	187	95.4
Family type		
Alone	132	67.3
Nuclear family	36	18.4
Extended family	28	14.3
Years of work in agriculture (Mean±SD=38.63±16.11)		
5-19	22	11.2
20-49	101	51.5
≥50	73	37.3
Work accident (last year)		
No	81	41.3
Yes	115	59.7
Type of work accident (last year)		
Musculoskeletal injuries	92	46.9
İnsect bites	64	32.7
Sharps injuries	26	13.3
Sunstroke	2	1.0
Chronic disease		
No	57	29.1
Yes	139	70.9

Table 2. Distribution of the scores in dimensions of the EQ-5D-3L, N=196

Dimensions	n (%)
Mobility	
1 No problems	129 (65.8)
2 Some problems	67 (34.2)
3 Serious problems	0
Self Care	
1 No problems	146 (74.5)
2 Some problems	50 (25.5)
3 Serious problems	0
Usual activities	
1 No problems	129 (65.8)
2 Some problems	67 (34.2)
3 Serious problems	0
Pain/discomfort	
1 No problems	72 (36.7)
2 Some problems	116 (59.2)
3 Serious problems	8 (4.1)
Anxiety/depression	
1 No problems	91 (46.4)
2 Some problems	101 (51.5)
3 Serious problems	4 (2.0)
Some problems or serious problems in any dimension	147 (75.0)

Table 3. Scale scores and correlations of mental well-being and perceived health status

	Mean± Standard deviation	Minimum	Maximum	r*
Warwick-Edinburgh Mental Well-Being Scale	47.12±7.79	24	65	**0.432****
Visual Analogue Scale	50.64±22.03	10	100	

** Spearman correlation coefficient **p<0.001*

Table 4. Risk factors for some or serious problems with any dimension of the EQ-5D-3L

Variables[a]	Quality of life (Some problems or serious problems)[b]		
	n (%)	B (S.E.)	OR (95% Confidence interval)
Age		**0.16 (0.06)**	**1.17 (1.04-1.32)***
Gender			
Male(R)	65 (65.7)	1.00	
Female	82 (84.5)	0.33 (0.52)	1.39 (0.50-3.88)
Education level			
High school (R)	12 (60.0)	1.00	
Primary-secondary	83 (69.7)	0.19 (0.71)	1.21 (0.29-3.94)
Literate	41 (91.1)	0.74 (0.97)	1.11 (0.31-1.42)
Illiterate	11 (91.7)	0.20 (1.38)	1.22 (0.08-1.84)
Family type			
Nuclear (R)	91 (68.9)	1.00	
Extended	30 (83.3)	0.29 (0.68)	1.34 (0.35-1.52)
Alone	26 (92.9)	0.93 (0.88)	2.53 (0.44-3.36)
Years of work in agriculture		-0.06 (0.24)	0.94 (0.58-1.52)
Work accident (last year)			
No (R)	49 (60.5)	1.00	
Yes	98 (85.2)	0.43 (0.51)	1.54 (0.55-2.46)
Chronic disease			
No (R)	30 (52.6)	1.00	
Yes	117 (84.2)	0.77 (0.49)	2.16 (0.82-2.66)
Mental well-being[c]		-0.17 (0.03)	0.84 (0.78-0.90)**

*R^2=0.34 (Cox&Snell), 0.51 (Nagelkerke), $x^2(8)$=9.48, p>0.05 (Hosmer&Lemeshow. [a] R= Reference category. [b]Dependent variable; "No problems with any dimension of the EQ-5D-3L" = 0, "Experiencing some issues and serious issues with any dimension of the EQ-5D-3L" = 1. [c] Warwick-Edinburgh Mental Well-Being Scale. *p < 0.01, **p < 0.001*

Discussion

In this study, the relationship between the quality of life of elderly agricultural workers and mental well-being and other factors was investigated. Unlike the studies in the literature that evaluate the quality of life of elderly individuals living in nursing homes or applying to health institutions, the results of this community-based study are important which includes elderly individuals working in agriculture.

When the quality of life of the individuals included in the study is evaluated, three out of every four people experience some problems or serious problems in any dimensions of the quality of life. The rate of those who reported problems especially in the dimensions of pain/discomfort and depression/anxiety is higher. There are many studies evaluating quality of life in elderly individuals in Turkey using different quality of life scales such as SF-36, WHOQoL–BREF (10,16,18–20), but few studies were found evaluating quality of life with EQ-5D (8,17,21). In a national study that evaluated the level of quality of life with the EQ-5D scale in Turkey, two out of three men and nine out of ten women over the age of 65 had problems in at least one of the quality of life dimensions and it was found that problems in the dimensions of mobility, pain/discomfort and anxiety/depression were seen with a higher frequency (8). Although the quality of life levels were similar, the fact that those who reported problems in the dimension of mobility were less frequent in this study may be due to the fact that it was done in the elderly working actively in agriculture. In international studies evaluating the quality of life of the elderly, it is stated that the quality of life levels are lower in the elderly living in rural areas (4,27,28). Similar to the results of this study, in a study conducted in rural areas in Thailand, the quality of life was found to be good in only 13.8% of the elderly. In addition, while there was no difference between working status and quality of life, the quality of life of those who reported their occupation as a farmer was found to be lower (4).

In the study, the perceived health status scores of the elderly as assessed by VAS were found to be moderate. In another national study, the mean score of perceived health was higher in individuals over the age of 65 than the results of the current study (8). In another study, which included the results of further analysis of a national study, it was revealed that the perceived health status was lower in older workers (29). It was stated that the perceived health status is lower especially in elderly workers (5). In a study comparing the quality of life of the elderly in rural and urban areas, general health perception was significantly lower in rural areas (27). The lower perceived health status in this study may be due to the fact that it was done in the elderly working in a rural area and in a relatively low socioeconomic status working in agriculture.

In this study, it was shown that the mental well-being levels of the elderly individuals were moderate. The elderly are one of the most vulnerable groups in society and mental health problems are common. In addition, it is stated that employment of the elderly in working life may have different effects on mental health in a review on the mental health problems of elderly workers (3).

The participation of the elderly in employment for non-economic reasons such as finding meaning in life and social contact can make a positive contribution to the protection of the mental health. However, working in agriculture with economic concerns and dangerous work accidents in rural areas may explain the poor mental well-being of them (7).

In this study, it was shown that having problems in at least one of the dimensions related to quality of life decreases with increasing mental well-being. This result is similar to the results of a study conducted on elderly individuals in a semi-urban area in Manisa. In the study, the quality of life of elderly individuals with positive mood was found to be better than those with depressive mood (30). There are studies showing a negative relationship between mental well-being and quality of life in both national (10,17,30–32) and international studies (33,34) in elderly individuals. In a study evaluating the depression levels and quality of life of the elderly, a significant decrease was found in the quality of life for each increase in geriatric depression scores (10).

In this study, it was shown that another factor affecting the quality of life in the elderly is age. It was found that having problems in at least one of the dimensions related to quality of life increased with age. This finding is consistent with the results of other studies showing that the quality of life in the elderly decreases with increasing age (8,10,16,20,35). Studies show that there is an increase in the prevalence of health problems with age, a decrease in contribution to society and these conditions negatively affect quality of life and perceived health status (36). WHO introduced the concept of active aging in the 1990s and defined it as the process of maximizing health, safety and participation in society in order to increase the quality of life in the aging process (37). Health and social service practices specific to elderly agricultural workers, which will contribute to the active aging process, can prevent the decrease in the quality of life with advancing age.

One of the most important limitations of this study is that a probabilistic sample selection could not be made because the size of the study population was not known. In addition, the study only includes individuals working in agriculture in a region and therefore may not be representative of all older agricultural workers. However, it is the first study in the national literature to determine the quality of life and mental well-being of elderly agricultural workers.

Conclusion

In this study which was conducted with elderly individuals working in agriculture in a certain region, it was determined that three out of every four people had problems in terms of quality of life and their perceived health and mental well-being were at moderate level. In addition, this study reveals that low mental well-being and advanced age negatively affect quality of life. In addition, this study reveals that low mental well-being and advanced age negatively affect the quality of life. With a holistic approach, the needs of the increasing number of elderly agricultural workers in Turkey should be evaluated in order to increase their mental well-being and quality of life, interventions should be planned for these needs, and the effects of these interventions on the quality of life should be evaluated.

Declarations

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethics Approval

The study was conducted according to the Helsinki Declaration for Ethical Principles of Research. Approval was obtained from the Ethics Committee (21.12.2022-E-53938333-050-14831).

Availability of Data and Material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors' Contributions

All authors discussed their research goals, objectives, and questions and participated in the phases of this study, recruitment and data collection (N.K, F.K, D.F.), data analysis, interpretation (C.V.A, A.M.), writing the article and reviewing the article critically (C.V.A, A.M, S.Ö, F.A). All authors have read and approved the final article.

References

1. United Nations, Department of Economic and Social Affairs, Population Division (2019). World Population Prospects 2019: Highlights (ST/ESA/SER.A/423), 2019. [cited 2022 Dec 23]. Available from: https://population.un.org/wpp/publications/files/wpp2019_highlights.pdf
2. Türkiye İstatistik Kurumu (TUİK). Adrese Dayalı Nüfus Kayıt Sistemi Sonuçları, 2020 [cited 2022 Nov 29]. Available from: https://data.tuik.gov.tr/Bulten/Index?p=Adrese-Dayali-Nufus-Kayit-Sistemi-Sonuclari-2020-37210

3. Gao G, Li W, Lee J, et al. Employment, work, and depressive symptoms among older workers. J Gerontol Geriatr Med. 2020;6(5):1–4. DOI: 10.24966/GGM-8662/100071
4. Yodmai K, Somrongthong R, Kumar R. Determinants of quality of life among rural elderly population in Khon Kean province of Thailand. J Liaquat Uni Med Health Sc. 2018;17(3):180–4. DOI: 10.22442/jlumhs.181730574
5. Halk Sağlığı Uzmanları Derneği (HASUDER). Çalışma yaşamında yaşlılar ve kronik Hastalığı Olanlar. In: Türkiye Sağlık Raporu-2020. 2020. p. 447–51.
6. Türkiye İstatistik Kurumu (TUİK). Elderly Statistics, 2020. [cited 2022 Dec 23]. Available from: https://www.tuik.gov.tr/media/announcements/istatistiklerle_yaslilar_2020.pdf
7. Okyay RA, Tanir F, Ağaoğlu PM. Occupational health and safety characteristics of agricultural workers in Adana, Turkey: a cross-sectional study. PeerJ. 2018;6(6). DOI: 10.7717/peerj.4952
8. Dinç Horasan G, Tarı Selçuk K, Sakarya S, et al. Health-related quality of life and perceived health status of Turkish population. Qual Life Res. 2019;28(8):2099–109. DOI: 10.1007/s11136-019-02167-z
9. The WHOQOL Group. World Health Organization Quality of Life Assessment (WHOQOL): Development and general psychometric properties. Social Science and Medicine. 1998;46(12):1569–85.
10. Unalan D, Gocer S, Basturk M, et al. Coincidence of low social support and high depressive score on quality of life in elderly. Eur Geriatr Med. 2015;6(4):319–24. DOI: 10.1016/j.eurger.2015.02.009
11. Cleary KK, Howell DM. Using the SF-36 to determine perceived health-related quality of life in rural Idaho seniors. J Allied Health. 2006;35(3):156–61. PMID: 17036671.
12. Blazer DG. Depression in late life: Review and commentary. J Gerontol A Biol Sci Med Sci. 2003;58(3):249–65. DOI: 10.1093/gerona/58.3.m249
13. Blazer DG, Hybels CF, Pieper CF. The association of depression and mortality in elderly persons: A case for multiple, independent pathways. J Gerontol A Biol Sci Med Sci. 2001;56(8):505–9. DOI: 10.1093/gerona/56.8.m505
14. Havlioğlu S, Koruk İ. The quality of life and problematic behaviors among adolescent migrant seasonal farm workers. Turk J Public Health. 2013;11(1):11–22. DOI: 10.20518/tjph.173073
15. Örüm MH, Mart G, Mart M. Investigation of the factors associated with anxiety ın seasonal agricultural workers with generalized anxiety disorder. Journal of Development and Psychology. 2020;1(2):87–97.
16. Özerdoğan Ö, Yüksel B, Çelik M, et. al. Associated factors affecting the quality of life of the elderly. Turk J Public Health. 2018;16(2):90–105. DOI: 10.20518/tjph.458209
17. Unsar S, Dindar I, Kurt S. Activities of daily living, quality of life, social support and depression levels of elderly individuals in Turkish society. J Pak Med Assoc. 2015;65(6):642–6. PMID: 26060163
18. Bozkurt Ü, Yılmaz MR, Yilmaz M. The determination of functional independence and quality of life of older adults in a nursing home. International Journal of Caring Sciences. 2016;9(1):198–210.
19. Ilhan N, Arpaci S, Havaoglu D, et al. Quality of life and factors affecting the quality of life of elderly nursing home residents. Clinical and Experimental Health Sciences. 2016;6(2):56–65.
20. Ercan Şahin N, Emiroğlu ON. Quality of Life and Related Factors of Older People in Nursing Home. Journal of Hacettepe University Faculty of Nursing. 2014;1(1):57–66.
21. Unsar S, Erol O, Sut N. Social support and qualıty of life among older adults. International Journal of Caring Sciences. 2016;9(1):249–57.
22. The EuroQOL Group. Measuring self-reported population health: an international perspective based on EQ-5D, 2004. [cited 2022 May 20]; Available from: https://euroqol.org/wp-content/uploads/2016/10/Measuring_Self-Reported_Population_Health_-_An_International_Perspective_based_on_EQ-5D.pdf
23. Eser E, Dinç G, Cambaz S, et al. EUROQoL (EQ-5D) Community standards and psychometric properties. 2. Sağlıkta Yaşam Kalitesi Kongresi. 2007;139–40.
24. EuroQOL Group. EuroQol--a new facility for the measurement of health-related quality of life. Health policy. 1990;16(3):199–208.
25. Tennant R, Hiller L, Fishwick R, et al. The Warwick-Edinburgh mental well-being scale (WEMWBS): Development and UK validation. Health and Quality of Life Outcomes. 2007;5(1):50–63. DOI: 10.1186/1477-7525-5-63
26. Keldal G. Turkish version of the Warwick-Edinburgh Mental Well-Being Scale: A validity and reliability study. The Journal of Happiness & Well-Being. 2015;3(1):103–15.
27. Usha V, Lalitha K. Quality of life of senior citizens: A Rural-urban comparison. Indian J Soc Psychiatry. 2016;32(2):158. DOI: 10.4103/0971-9962.181104
28. Dongre AR, Deshmukh PR. Social Determinants of Quality of Elderly Life in a Rural Setting of India. Indian J Palliat Care. 2012;18(3):181. DOI: 10.4103/0973-1075.105688
29. Çağlayan Ç, Etiler N. Health of older workers in Turkey: A further analysis of a national sample. Turk J Geriatrics. 2015;18(4):285–92.
30. E.Şen N, Gündoğan Ş, Eser E. Evaluation of the effects of physical dependence, mental well-being and social ınteraction on quality of life in ındividuals over 65 living in a peri-urban area in Manisa. Sağlık ve Toplum. 2022;32(2):106–16.
31. Eyigör S, Karapolat H, Durmaz B. Evaluation of the relationship between quality of life and depression the elderly women who attended to a clinic of a university hospital. Turk J Geriatrics. 2006;9(3):130–5.
32. Şenol V, Soyuer F, Argün M. Quality of life of elderly nursing home residents and its correlates in Kayseri. A descriptive-analytical design: A cross-sectional study. Health. 2013;05(02):212–21. DOI: 10.4236/health.2013.52029
33. Chan SWC, Shoumei JIA, Thompson DR, et al. A cross-sectional study on the health related quality of life of depressed Chinese older people in Shanghai. Int J Geriatr Psychiatry. 2006;21(9):883–9. DOI: 10.1002/gps.1578.
34. Chan SWC, Chien WT, Thompson DR, et. al. Quality of life measures for depressed and non-depressed Chinese older people. Int J Geriatr Psychiatry. 2006;21(11):1086–92. DOI: 10.1002/gps.1611
35. Sucaklı MH, Çelik M, Bakan B. Evaluation of the quality of life and affecting factors in the elderly living in nursing homes. Turk J Family Practice. 2013;17(3):96–100.
36. Telatar TG, Özcebe H. Increasing quality of life of elderly. 2004;7(3):162–5.
37. Uyanık Y, Başyiğit R. View of the elderly population in demographic structure and policy examples in perspective of active aging approach. İş ve Hayat. 2018;4(3):273–310.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 197-207
https://doi.org/10.31067/acusaglik.1176800

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI Public Environmental and Occupational Health / Halk ve Çevre Sağlığı

Consanguineous Marriage, Health Literacy and Fatalism Levels of Different Generations: A Descriptive-Correlational Study in A Sample from Turkey

Metin Yıldız[1], Mehmet Salih Yıldırım[2], Ayşe Elkoca[3], Yakup Sarpdağı[4], Muhammet Ali Aydın[5], Tuğçe Kabak Solak[6], Gökhan Dege[7]

[1]Department of Nursing, Sakarya University, Sakarya, Turkey
[2]Vocational School of Health Services, Agri Ibrahim Cecen University School of Health, Agri, Turkey
[3]Gaziantep İslam Bilim ve Teknoloji University, Departmant of Midwife, Gaziantep, Turkey
[4]Department of Nursing Van Yuzuncu Yil University, Van, Turkey
[5]Department of Nursing, Ataturk University, Erzurum, Turkey
[6]Department of Nursing Agri Ibrahim Cecen University, Agri, Turkey
[7]Department of Nutrition and Dietetics Agri Ibrahim Cecen University, Agri, Turkey

Metin YILDIZ
Mehmet Salih YILDIRIM
Ayşe ELKOCA
Yakup SARPDAĞI
Muhammet Ali AYDIN
Tuğçe KABAK SOLAK
Gökhan DEGE

Correspondence: Metin Yıldız
Department of Nursing, Sakarya University, Sakarya/ Turkey
Phone: +902642953853
E-mail: yildizz.metin@gmail.com

Received: 19 September 2022
Accepted: 19 February 2023

ABSTRACT

Objective: This research was conducted to determine consanguineous marriage, health literacy, and fatalism levels of different generations and examine their relationship.

Materials and Methods: This descriptive-correlational study was conducted with 463 individuals living in Ağrı between October 2021-March 2022.

Results: Significant differences were found between the individuals' Consanguineous Marriage Attitude Scale, Health Literacy Scale, and Fatalism Tendency Scale total score means and their generation ($p<0.05$). A significant negative correlation was found between the total score mean of the Individual's Consanguineous Marriage Attitude Scale and the total and all sub-dimensions of the Health Literacy Scale ($p<0.05$). A significant positive correlation was found between the total score mean of the Consanguineous Marriage Attitude Scale and the total score mean of the Fatalism Tendency Scale ($p<0.05$).

Conclusion: In our study, it was found that the attitude of the baby boom generation towards consanguineous marriage was higher, the health literacy level of the Z generation was higher, and the fatalism tendency of the X generation was found to be higher.

Keywords: Consanguineous marriage, Fatalism, Generations, Health literacy, Turkey.

Farklı Kuşakların Akraba Evliliği, Sağlık Okuryazarlığı ve Kadercilik Düzeyleri: Tanımlayıcı-Korelasyonel Çalışma Türkiye Örneği

ÖZET

Amaç: Bu araştırma, farklı kuşakların akraba evliliği, sağlık okuryazarlığı ve kadercilik düzeylerinin belirlenmesi ve aralarındaki ilişkisinin incelenmesi amacıyla yapılmıştır.

Materyal ve Yöntem: Tanımlayıcı ve ilişki arayıcı tipte yürütülen bu araştırma, Ekim 2021-Mart 2022 tarihleri arasında, Ağrı ilinde yaşayan 463 bireyle yürütülmüştür.

Bulgular: Bireylerin Akraba Evliliği Tutum Ölçeği, Sağlık okuryazarlığı Ölçeği ve Kadercilik Ölçeği toplam puan ortalaması ile bulunduğu kuşak arasında anlamlı farklılık saptanmıştır ($p<0.05$). Bireylerin Akraba Evliliği Tutum Ölçeği toplam puan ortalaması ile Sağlık okuryazarlığı ölçeği toplam ve tüm alt boyutları arasında negatif yönde anlamlı bir ilişki bulunmuştur ($p<0.05$). Akraba Evliliği Tutum Ölçeği toplam puan ortalaması ile Kadercilik eğilimi ölçeği toplam puan ortalaması arasında pozitif yönde anlamlı bir ilişki bulunmuştur ($p<0.05$).

Sonuç: Çalışmamızda kuşaklardan bebek patlaması kuşağının akraba evliliğine yönelik tutumunun daha yüksek, Z kuşağının sağlık okuryazarlık düzeyinin daha yüksek ve X kuşağının kadercilik eğilimlerinin daha yüksek olduğu saptanmıştır.

Anahtar Sözcükler: Akraba evliliği, Kadercilik, Kuşaklar, Sağlık okuryazarlık,Türkiye.

Consanguineous marriage has been done since the day human beings existed and is practiced in most places in the world. It has been observed that more than 1.2 billion of the world's population are in consanguineous marriages (1). "Relative" is defined as having a common ancestor, and the marriage of two individuals with a common ancestor is defined as "consanguineous marriage." It is expressed as a form of marriage between children of cousins or cousins who come from the same ancestry and have a blood relationship (2).

Traditions, social values, religious beliefs, and factors such as strengthening consanguinity ties are among the reasons for consanguineous marriages. For this reason, their rates vary from society to society. The rate of consanguineous marriages is expressed as higher in developing countries and less in developed countries. Although this rate varies according to the regions in Turkey, it is generally seen as 20-40% (3). Consanguineous marriage constitutes the basis of sociocultural life as the most common type of marriage today and is an important area of public health (4). The prevalence of genetic disorders is high in children born as a result of consanguineous marriage. Therefore, the prevention of consanguineous marriage is of medical importance. In the relevant field research, effective genetic counseling opportunities and determination of families at high risk, learning of risks by families, and having health literacy skills can effectively prevent such marriages (3, 5).

Health literacy is important in seeking, understanding, using, and making decisions about health information. Information about health issues, self-care, and disease prevention can increase understanding of personal risk factors, thereby helping individuals improve their health (6,7). Health literacy is "reaching a level of knowledge, personal skills and confidence to act to improve personal and public health by changing personal lifestyles and living conditions. It improves people's access to health information and their capacity to use it effectively" (8). The individual's demographic characteristics, abilities, illness and illness experiences, religious, social values, and cultural environment directly or indirectly affect the individual's level of improving and using their health positively or negatively (9-11). Diseases, injuries, and deaths preventable in the understanding of fatalism are met as "normal" in individuals and expressed as "destiny." The perception of health problems as fate negatively affects the development, improvement, and use of the health of the society, that is, health literacy (12).

When the literature is examined, consanguineous marriage, health literacy, and fatalism are indirectly linked to each other and affect each other positively or negatively (13). However, the relationship between the three concepts was not encountered in the literature. Therefore, this research, it is aimed to compare the effects of these concepts on individuals and their connections with each other. It is anticipated that the results of this research will contribute to the literature.

Research Questions

1. Is there a relationship between the level of Consanguineous Marriage, Health Literacy and Fatalism?

2. Do the levels of Consanguineous Marriage, Health Literacy and Fatalism differ significantly by generation?

METHODS

Study Design

This descriptive-correlational study was conducted with individuals living in Ağrı between October 2021-March 2022. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline (Vandenbroucke et al., 2007) was used for the report of this study paper. The population of the study consisted of individuals in the province of Ağrı located in the east of Turkey. In the study, it was determined that 384 individuals should be reached in the calculation made with the sampling method whose population is known. No sampling method was used in the study, and all individuals who agreed to participate in the study were included. At the end of the study, the data of 463 participants were analyzed. As a result of the study, in the post hoc power analysis conducted in line with the results obtained from 463 participants, the power of our study was calculated to be 99% at a 95% confidence level at medium effect size.

Data Collection Tools

Introductory Information Form, Consanguineous Marriage Attitude Scale, Health Literacy Scale, and Fatalism Tendency Scale were used to collect research data.

Introductory Information Form

It consists of questions created by researchers and including the introductory characteristics of individuals.

Consanguineous Marriage Attitude Scale

As a result of the validity and reliability analysis of the scale, the draft scale consisting of 33 items was reduced to 30 items, and the final scale was created. Six sub-dimensions of the scale were determined as a result of the factor analysis. These sub-dimensions; "Acceptive Attitude (1-2-3-4-5-6-7)", "Social Values (8-9-10-11-12-14-15)", "Social Pressure (13-16-17) -18) "," Perception of Risk (19-20-21) "," Perception of Health (22-23-24) "," Legitimating Myths (25-26-27-28-29-30) ". Items 2-16-19-20-21-27-29 in the scale are reverse coded. The lowest score obtained from the scale is 30, and the highest score is 150. Getting a higher score on the scale indicates a positive attitude towards consanguineous marriage (14). In our study, the Cronbach Alpha value was found 0.87.

Health Literacy Scale

The 47-item Health Literacy Survey in Europe (HLS-E.U) scale, developed by Sorensen, was simplified by Toc, Bruzar, and Sorenson. The validity and reliability of its Turkish form were carried out by Aras and Bayik Temel. The Cronbach's alpha value of the scale is 0.92 and consists of 25 items and four sub-dimensions. "Access to Information" contains five items (items 1-5). The minimum score to be obtained from this subscale is 5, the maximum score is 25. "Understanding Information" contains seven items (items 6-12), the minimum score to be obtained from this subscale is 7, and the maximum score is 35. The "Appraisal / Assessment" subscale includes eight items (13th-20th items). The minimum score to be obtained from this subscale is eight, and the maximum score is 40. The "Application / Use" subscale also includes five items (items 21.-25). The minimum score to be obtained from this subscale is five, and the maximum score is 25. The minimum score for the whole scale is 25, and the maximum score is 125. The items in the 5-choice Likert-type scale are answered as "5: I have no difficulty, 4: I have little difficulty, 3: I have some difficulty, 2: I have very difficulty, 1: I am unable to do it / I have no skills / impossible." All items on the scale are positive. Low scores indicate insufficient health literacy, and high scores indicate sufficient. As the score increases, the health literacy level of the individual increases (15). In our study, the Cronbach Alpha value was found to be 0.94.

Fatalism Tendency Scale (FTS)

The scale was developed by Kaya and Bozkur (2015) (16). The scale consists of four sub-dimensions, Predetermined, Personal-Control, Superstition, and Chance, and a total of 24 items. The scale is Likert type with five options. It consists of 1: Strongly Disagree, 2: Disagree, 3: Undecided, 4: Agree, 5: Strongly Agree. Predetermination Sub-Dimension: This dimension (1st, 4th, 12th, 15th, 18th, 19th, 22nd, and 24th items) is eight items, the items are scored directly the highest score that can be obtained is 40, and the lowest score is 8. The higher the score from this dimension, the higher the perception that everything is predetermined.

Personal Control Sub-Dimension: This dimension (2nd, 6th, 8th, 11th, 14th, and 21st items) consists of 6 items, and the highest score that can be obtained from this dimension is 30, and the lowest score is 6; items are scored in reverse. High scores in this dimension indicate that there is a poor sense of personal control.

Superstition Sub-Dimension: This dimension (3rd, 5th, 10th, 17th, 20th, and 23rd items) consists of 6 items, the items are scored directly, and the highest score that can be obtained is 30, and the lowest score is 6. The higher the score on the superstition dimension, the higher the tendency towards superstitions.

Chance Sub-Dimension: This dimension (items 7, 9, 13, and 16) consists of 4 items. The items are scored directly, and the highest score that can be obtained is 20, and the lowest score is 4. As the score obtained from this sub-dimension increases, the tendency to believe in the chance factor increases.

Predetermination: The Cronbach's alpha coefficient of the sub-dimension of the scale was 0.86, the Personal Control sub-dimension was 0.78, the Superstition sub-dimension was 0.81, and the Chance sub-dimension was 0.71. The Cronbach Alpha coefficient of the scale is 0.86, and the test-retest reliability coefficient is 0.72. A maximum of 120 and a minimum of 24 points can be obtained on the scale. The total fatalism tendency score is formed by the sum of the scores obtained from all sub-dimensions. As the score increases, the fatalism tendency also increases (16). In our study, the Cronbach Alpha value was found 0.83.

Data Analysis

IBM SPSS V-25 program was used in the statistical analysis of the study. Analyzed is made with SPSS-25 program installed in a university in Turkey. In the research, descriptive features are presented with the number (n) and percentage (%). Continuous variables are specified with their mean, standard deviation, minimum and maximum values. Necessary normality tests were performed to analyze the data, and it was understood that the data showed normal distribution (kurtosis and skewness -1.5 to +1.5) (17).

Independent Samples t-test was used for binary groups in normally distributed data. The One Way Variance (ANOVA) test was also used for data with more than two continuous variables and normally distributed. In paired comparisons of multiple groups, one of the post-hoc tests, the Bonferroni test, was used for homogeneous distribution and Games-Howell for non-homogeneous data. Pearson correlation test was used to determine the linear relationship between variables and severity of the relationship. A p-value of <0.05 was considered statistically significant.

Ethical Principles

Ethical approval was obtained from University Scientific Research Ethics Committee. Necessary explanations were made to the individuals included in the study, and written permission was obtained from those who wanted to participate in the study.

Limitations

The conduct of the study in a single city was the major limitation. The results are largely limited to the individuals who participated in the study and their responses to the scales.

RESULTS

It has been determined that 53.3% of the individuals participating in the study are Generation Z, 54.8% are women, 66.3% are single, 66.7% are graduates of higher education, 73.0% of them are equal to the expenses of their income, and 54.0% of them have lived the longest time in the province, 72.4% of them belong to nuclear family type, 63.0% of them are not related to their parents, 92.4% of them have a relative who is a consanguineous marriage, 69.8% of them stated that consanguineous marriage is religiously appropriate, and 50.3% of them stated that their devotion to religion is at a moderate level. The mean age was found to be 28.49 ± 12.61 (years) (Table 1).

Table 1. Descriptive characteristics of individuals (n = 463)

Demographic features		n	%
Generation	Baby Boom	13	2.8
	Generation X	82	17.7
	Generation Y	121	26.1
	Generation Z	247	53.3
Gender	Female	323	54.8
	Male	140	45.2
Marital status	Single	307	66.3
	Married	156	33.7
Education status	Primary education	76	16.4
	Secondary education	62	13.4
	Higher education	309	66.7
	Master / Doctorate	16	3.5
Monthly income	My income is less than my expenses	101	21.8
	My income is equal to my expense	338	73.0
	My income is more than my expenses	24	5.2
Longest lived place	Province	250	54.0
	District	112	24.2
	Village	101	21.8
Family Type	Nuclear family	335	72.4
	Extended family	117	25.3
	Broken family	11	2.4
Are the parents consanguineous marriage?	Yes	125	27.0
	No	338	73.0
Any acquaintances who are consanguineous?	Yes	428	92.4
	No	35	7.6
Do you think consanguineous marriage is religiously appropriate?	Yes	323	69.8
	No	140	30.2
What is your level of devotion to religion?	Low	25	5.4
	Middle	233	50.3
	High	463	44.3
	Ẋ ±SD (Min-Max)		
Age	28.49±12.61 (18-72)		

In our study, it was found that individuals' Consanguineous Marriage Attitude Scale Total Score Mean 68.07 ± 14.03, Accepting Attitude Sub-dimension 15.49 ± 6.20, Social Values Sub-Dimension 11.66 ± 4.66, Social Pressure Sub-Dimension 11.15 ± 2.42, Risk Perception Sub-Dimension 8.22 ± 2.15, Health Perception Sub-Dimension 5.12 ± 2.35, Legitimizing Myths Sub-Dimension was 16.41 ± 2.69. The Health Literacy Scale Total Score Mean was 103.58 ± 17.42, the Access to Information Sub-dimension was 20.94 ± 4.18, the Understanding Information Sub-dimension was 28.90 ± 5.74, the Appraisal / Assessment Sub-dimension was 33.09 ± 6.02, the Application / Use Sub-dimension was 20.66 ± 3.70. Fatalism Tendency Scale Total Score Mean 77.84 ± 13.90 sub-dimensions Predetermination Sub-dimension 27.63 ± 7.53, Personal Control Sub-Dimension 24.90 ± 4.09, Superstition Sub-Dimension 13.79 ± 5.94, Chance Sub-dimension 11.50 ± 4.19 (Table 2).

Table 2. Total and sub-dimension mean scores of individuals in consanguineous marriage attitude scale, health literacy scale and fatalism tendency scale (n = 463)

Scales	±SD	Min	Max
Consanguineous Marriage Attitude Scale Total Score Mean	68.07 ± 14.03	44.0	116.0
Accepting Attitude Sub-Dimension Mean Score	15.49 ± 6.20	8.0	29.0
Social Values Sub-Dimension Mean Score	11.66 ± 4.66	7.0	28.0
Social Pressure Sub-Dimension Mean Score	11.15 ± 2.42	5.0	17.0
Risk Perception Sub-Dimension Mean Score	8.22 ± 2.15	6.0	15.0
Perception of Health Sub-Dimension Mean Score	5.12 ± 2.35	3.0	12.0
Legitimating Myths Sub-Dimension Mean Score	16.41 ± 2.69	8.0	26.0
Health Literacy Scale Total Score Mean	103.58 ± 17.42	32.0	125.0
Access to Information Sub-dimension Mean Score	20.94 ± 4.18	5.0	25.0
Understanding Information Sub-Dimension Mean Score	28.90 ± 5.74	8.0	35.0
Appraisal / Evaluation Sub-Dimension Mean Score	33.09 ± 6.02	8.0	40.0
Application / Use Sub-Dimension Mean Score	20.66 ± 3.70	7.0	25.0
Fatalism Tendency Scale Total Score Mean	77.84 ± 13.90	39.0	120.0
Predetermination Sub-dimension	27.63 ± 7.53	8.0	40.0
Personal Control Sub-Dimension	24.90 ± 4.09	12.0	30.0
Superstition Sub-Dimension	13.79 ± 5.94	6.0	30.0
Chance Sub-dimension	11.50 ± 4.19	4.0	20.0

A significant difference was found between the total mean score of the Consanguineous Marriage Attitude Scale and the generation, gender, marital status, educational status, the place where they lived for the longest time, and consanguineous marriage status of the parents, statements regarding the status of the acquaintance of individuals who are consanguineous marriages, their views on the state of conformity to the consanguineous marriage and their level of devotion to religion ($p < 0.05$) (Table 3).

In the post-hoc (Games Howell) analysis conducted to determine the origin of the difference between the Consanguineous Marriage Attitude Scale total score mean and the generation they belong to, it was determined that the mean score of generation X was higher than the average score of Generation Z.

In the post-hoc (Games Howell) analysis conducted to determine the group originating from the difference between the total score mean of the Consanguineous Marriage Attitude Scale and the educational level, it was found that the mean score of individuals with primary education is higher than the mean score of individuals with higher education.

In the post-hoc (Bonferroni) analysis, which was conducted to determine the group that caused the difference between the total score mean of the Consanguineous Marriage Attitude Scale and the place where they lived the longest, it was found that the mean score of the individuals who lived in the village for the longest time was higher than the mean score of all groups.

In the post-hoc (Bonferroni) analysis conducted to determine the origin of the difference between the total score mean of the Consanguineous Marriage Attitude Scale and their expressions regarding the level of devotion to religion, it was found that the mean score of the individuals who stated that they were high was higher than the mean score of the individuals who stated that they were low.

A significant negative correlation was found between the total mean score of the Consanguineous Marriage Attitude Scale and the total and all sub-dimensions of the Health Literacy Scale ($p < 0.05$). A significant positive relationship was found between the total score mean of the Consanguineous Marriage Attitude Scale, and the total score mean of the Fatalism Tendency Scale and age ($p < 0.05$). A significant negative correlation was found between the Health Literacy Scale Total Score Mean and age ($p < 0.05$) (Table 4).

Table 3. Comparison of demographic characteristics of individuals' total score of consanguineous marriage attitude scale, health literacy scale and fatalism tendency scale (n = 463)

Demographic features			Consanguineous Marriage Attitude Scale		Health Literacy Scale		Fatalism Tendency Scale	
		n	Ẋ ±SD	Test and Significance	Ẋ ±SD	Test and Significance	Ẋ ±SD	Test and Significance
Generation	Baby Boom	13	81.46± 20.61	F=6.759 **p=0.001**	82.15±23.36	F=14.453 **p=0.001**	77.01±15.85	F=3.159 **p=0.025**
	Generation X	82	71.50± 15.45		97.09±19.75		81.98±15.54	
	Generation Y	121	66.72±13.89		103.57±18.91		76.23±13.87	
	Generation Z	247	66.89±12.68		106.87±13.83		77.29±15.85	
Gender	Female	323	66.18±13.13	t=-4.503 **p=0.001**	103.72±17.96	t=0.258 p=0.797	78.84±14.09	t=2.375 p=0.018
	Male	140	72.45±15.08		103.27±16.16		75.52±13.21	
Marital status	Single	307	66.39±12.81	t=-3.661 **p=0.001**	107.09±14.04	t=6.340 **p=0.001**	76.94 ±13.10	t=-1.943 p=0.053
	Married	156	71.38±15.69		96.64±21.06		79.59±15.24	
Education status	Primary education	76	74.88±16.99	F=8.528 **p=0.001**	91.15±21.29	F=21.671 **p=0.001**	82.76±15.14	F=4.007 **p=0.008**
	Secondary education	62	69.35±13.45		100.17±20.01		77.51±15.30	
	Higher education	309	66.36±12.73		106.79±14.23		76.66±12.89	
	Master / Doctorate	16	63.87±15.55		114.06±11.15		8.37±16.92	
Monthly income	My income is less than my expenses	101	68.49±13.88	F=2.259 p=0.106	101.73±17.30	F=1.554 p=0.212	79.01±15.14	F=0.577 p=0.562
	My income is equal to my expense	338	68.37±13.99		103.79±17.53		77.61±13.58	
	My income is more than my expenses	24	62.16±14.63		108.50±15.85		76.12±13.08	
Longest lived place	Province	250	67.08±13.69	F=5.548 **p=0.004**	104.85±17.12	F=3.748 **p=0.024**	78.44±13.60	F=0.609 p=0.544
	District	112	66.64±13.80		104.52±15.17		76.72±13.86	
	Village	101	72.13±14.50		99.42±19.83		77.59±14.71	
Family Type	Nuclear family	335	67.55±13.84	F=1.191 p=0.305	104.70±16.99	F=3.771 **p=0.024**	77.61±13.37	F=2.290 p=0.102
	Extended family	117	69.76±14.01		99.92±18.26		79.20±15.31	
	Broken family	11	66.01±19.69		108.54±16.83		70.18±12.15	
Are the parents consanguineous marriage?	Yes	125	73.24±14.07	t=4.939 **p=0.001**	103.16±18.06	t=-0.322 p=0.748	78.43±15.01	t=0.557 p=0.578
	No	338	66.16±13.55		103.74±17.20		77.62±13.48	
Any acquaintances who are consanguineous?	Yes	428	68.59±14.05	t=2.784 **p=0.006**	103.33±17.54	t=-1.094 p=0.274	77.92±13.93	t=0.485 p=0.628
	No	35	61.77±12.31		106.68±15.73		76.74±13.58	
Do you think consanguineous marriage is religiously appropriate?	Yes	323	72.36±13.65	t=11.268 **p=0.001**	102.96±18.17	t=-1.160 p=0.247	78.34±13.65	t=1.191 p=0.234
	No	140	58.17±9.04		105.01±15.50		76.67±14.43	
What is your level of devotion to religion?	Low	25	63.24±13.05	F=3.115 **p=0.045**	104.80±17.81	F=0.503 p=0.605	69.60±16.47	F=11.764 **p=0.001**
	Middle	233	67.25±14.01		102.78±16.49		76.04±13.70	
	High	463	69.60±14.03		104.35±18.41		80.88±13.06	

** Independent Samples t test, † One Way ANOVA*

Table 4. The relationship between individuals' age, consanguineous marriage attitude scale, health literacy scale, and fatalism tendency scale total and sub-dimension mean scores (n = 463)

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
(1) Consanguineous Marriage Attitude Scale Total Score Mean	r	-																	
	p	-																	
(2) Accepting Attitude Sub-Dimension	r	.879																	
	p	.001																	
(3) Social Values Sub-Dimension	r	.798	.577																
	p	**.001**	**.001**																
(4) Social Pressure Sub-Dimension	r	.106	-.137	.160															
	p	**.022**	**.003**	**.001**															
(5) Risk Perception Sub-Dimension	r	.556	.476	.233	-.166														
	p	**.001**	**.001**	**.001**	**.001**														
(6) Perception of Health Sub-Dimension	r	.626	.486	.331	-.071	.441													
	p	**.001**	**.001**	**.001**	.128	**.001**													
(7) Legitimating Myths Sub-Dimension	r	.718	.595	.479	-.113	.365	.406												
	p	**.001**	**.001**	**.001**	**.015**	**.001**	**.001**												
(8) Health Literacy Scale Total Score Mean	r	-.233	-.185	-.222	.010	-.273	-.132	-.078											
	p	**.001**	**.001**	**.001**	.833	**.001**	**.005**	.094											
(9) Access to Information Sub-Dimension	r	-.192	-.183	-.143	.064	-.266	-.102	-.086	.866										
	p	**.001**	**.001**	**.002**	.171	**.001**	**.028**	.063	**.001**										
(10) Understanding Information Sub-Dimension	r	-.241	-.186	-.240	.018	-.243	-.167	-.091	.912	.769									
	p	**.001**	**.001**	**.001**	.695	**.001**	**.001**	.051	**.001**	**.001**									
(11) Appraisal / Evaluation Sub-Dimension	r	-.221	-.160	-.239	-.026	-.235	-.100	-.068	.929	.716	.783								
	p	**.001**	**.001**	**.001**	.580	**.001**	**.031**	.145	**.001**	**.001**	**.001**								
(12) Application / Use Sub-Dimension	r	-.149	-.114	-.124	.001	-.229	-.091	-.034	.799	.589	.596	.721							
	p	**.001**	**.014**	**.007**	.984	**.001**	.050	.461	**.001**	**.001**	**.001**	**.001**							
(13) Fatalism Tendency Scale Total Score Mean	r	.182	.134	.265	.115	-.060	.036	.096	-.013	-.016	-.050	.009	.016						
	p	**.001**	**.004**	**.001**	**.014**	.194	.442	**.039**	.773	.738	.283	.855	.725						
(14) Predetermination Sub-dimension	r	.244	.206	.241	.071	.106	.139	.106	-.133	-.135	-.170	-.092	-.060	.753					
	p	**.001**	**.001**	**.001**	.125	**.022**	**.003**	**.023**	**.004**	**.004**	**.001**	**.049**	**.196**	**.001**					
(15) Personal Control Sub-Dimension	r	-.104	-.080	-.075	.061	-.173	-.134	-.030	.429	.380	.358	.386	.404	.214	-.058				
	p	**.025**	.087	.108	.187	**.001**	**.004**	.524	**.001**	**.001**	**.001**	**.001**	**.001**	**.001**	.216				
(16) Superstition Sub-Dimension	r	.149	.109	.227	.070	-.041	.036	.073	-.103	-.068	-.107	-.077	-.117	.752	.333	-.093			
	p	**.001**	**.019**	**.001**	.135	.382	.439	.118	**.027**	.143	**.022**	**.099**	**.012**	**.001**	**.001**	**.047**			
(17) Chance Sub-Dimension	r	.055	-.005	.194	.093	-.164	-.051	.055	-.079	-.084	-.059	-.076	-.066	.687	.282	-.033	.566		
	p	.235	.921	**.001**	**.046**	**.001**	.277	.242	.091	.070	.204	.103	.154	**.001**	**.001**	.477	**.001**		
Age	r	.168	.138	.173	-.024	.137	.144	.045	-.301	-.294	-.384	-.227	-.119	.097	.217	-.129	.047	-.008	
	p	**.001**	**.003**	**.001**	.599	**.003**	**.002**	.338	**.001**	**.001**	**.001**	**.001**	**.010**	**.036**	**.001**	**.005**	.308	.866	

DISCUSSION

In this section, the findings are discussed in the light of the literature.

This study aims to determine the consanguineous attitude, health literacy, and fatalism tendencies of individuals of different generations, "Baby boom, X, Y, and Z," living in Ağrı province in the east of Turkey the factors affecting them. Findings obtained in the study are discussed in line with the literature.

In our study, individuals' total mean score of the Consanguineous Marriage Attitude Scale was found to be 68.07 ± 14.03. The lowest possible score on the scale is 30, and the highest score is 150. The higher the score to be obtained in the scale, the higher the attitude towards consanguineous marriage. However, according to the score obtained in our study, it can be said that there is a low level of consanguinity attitude. In these studies in the literature, it was found that attitudes towards consanguineous marriage were positive (18-20). The low attitude towards consanguineous marriage in our study can be associated with the fact that more than half of the individuals in our study were in the Z generation. The higher education levels and health literacy levels of the individuals in generation Z compared to the individuals in the other generation lead to a low attitude towards consanguineous marriage.

Our study determined that individuals in the X generation have a higher consanguineous marriage attitude than the individuals in the Z generation. According to Middle, the general prevalence of consanguinity in Saudi Arabia is 56%, and 33.6% of these are first cousin consanguineous marriages (21). In addition to a high rate of consanguinity, the Saudi Arabian population is also characterized by extended families and people of advanced maternal or paternal age (21, 22). According to Anvar et al., most of those who were positive towards consanguineous marriages were older age groups, men, those married to their relatives, and had a family history of consanguineous marriage (23). These results are consistent with the results of our study.

In our study, consanguineous marriage was found to be higher in males than females. In any male-dominated Muslim culture, most marriage decisions are patriarchal, and a strong patriarchal marriage pattern is usually present (24, 25). Anvar et al. stated that most of those who approach consanguineous marriage positively are men (23). These results are consistent with the results of our study.

Our study found that married individuals had a higher consanguineous marriage attitude than single individuals. According to Anvar et al., Most of those who are positive about consanguineous marriage are older age groups, men, married to their relatives, and those with a family history of consanguineous marriage (23). These results are consistent with the results of our study.

In our study, significance was found between education level and consanguineous marriage attitude. As a result of advanced analysis, it was determined that individuals with primary education graduates have a higher consanguineous marriage attitude than higher education graduates. In a study conducted in the province of Aydin, it was found that the rate of consanguineous marriage decreased as the education level of women and men increased (26). In a study conducted in the province of Afyonkarahisar, it was determined that individuals preferring consanguineous marriages decreased because the increase in the education level of individuals caused them to become more conscious about consanguineous marriages and medical consequences (27). At the same time, the study of Anvar et al. Is compatible with our study (23). It can be explained by the awareness of the health problems that may occur in the children born due to the consanguineous marriage of individuals with a high level of education. Our study is compatible with the studies in the literature.

Our study found that individuals living in villages had more consanguineous marriage attitudes than individuals living in provinces and districts. Studies in countries where consanguineous marriages are common have been observed that consanguineous marriages are more common among first-degree relatives in rural areas (28). While the rate of consanguineous marriage is 50% in Pakistan, this rate has reached 62% in rural areas (24). These results are consistent with the results of our study.

It was found that individuals whose parents are relatives and those who have a consanguineous marriage acquaintance have a more consanguineous marriage attitude. According to Anvar et al., Most of those who are positive about consanguineous marriage are older age groups, men, married to their relatives, and those with a family history of consanguineous marriage (23). People with consanguineous marriages were more likely to have a positive attitude than unrelated marriages (29). This finding

has been reported similarly in Western society, which shows the important relationship between positive attitude and consanguineous marriage. A positive attitude may be reflected in the decision to marry a relative (30). These results are consistent with the results of our study.

It has been determined that individuals who find consanguineous marriage religiously appropriate have more attitudes towards consanguineous marriage. This study in the literature is compatible with our study (31).

It has been found that individuals with a high level of devotion to religion have a higher consanguineous marriage attitude. Anvar et al.'s study point to a strong religious prejudice of consanguineous marriage, as 3693 of 3694 consanguineous marriage cases are followers of Islam. This result is consistent with the results of our study (23).

When we look at the health literacy levels of different generations in our study, it was found that the total score average of the Health Literacy Scale was 103.58 ± 17.42. The lowest possible score on the scale is 25, and the highest score is 125. A high score on the scale indicates a high level of health literacy. If we look at the score obtained in our study, it can be said that the health literacy levels of the individuals in our study are high. Cho et al. Concluded in their study that those with high health literacy attach importance to the use of preventive health services (32). In their study, Altsitsiadis et al. Observed that as literacy increased, their behavior of taking sun-protective measures against skin cancer also increased (33). Our study is compatible with the literature.

In our study, it was found that individuals in generation Z have higher levels of health literacy compared to other generations. At the same time, we see that health literacy increases as we move from the baby boom to the Z generation. These studies in the literature support our study (32, 34). Developments in technology can be associated with the ease of access to information and the prevalence of health services.

In our study, it was found that single individuals have higher health literacy levels. The study of Bicer et al. Is parallel to our study (35).

In our study, it was found that individuals with a high level of education have high levels of health literacy. These studies in the literature also found that individuals with low education levels have low levels of health literacy (6, 34). This result supports our study.

In our study, it was determined that individuals living in villages have lower health literacy levels than individuals living in provinces and districts. In the study conducted by Temel et al., It was determined that individuals living in villages had lower health literacy levels than those living in urban and big cities (36). This result is in parallel with our study.

In our study, it was found that individuals living in broken families have higher health literacy levels than individuals living in extended families. This study in the literature is in parallel with our study (37).

When we look at the Fatalism Tendency of different generations in our study, the Fatalism Tendency scale's total score mean was 77.84 ± 13.90. The lowest possible score on the scale is 24, and the highest score is 120. The higher the score to be obtained on the scale, the higher the level of Fatalism Tendency. If we look at the score obtained in our study, it can be said that the levels of Fatalism Tendency of the individuals in our study are at the above middle level. Similar mean scores were found in Selvi's study on women with acquaintances with breast cancer (38). In a study conducted by Carkoglu and Kalaycioglu (2009) in Turkey, 50% of the participants in the study agreed that they could do little to change the course of their life, while 18% were undecided on this issue and only 28% believed that it could change (39). The findings of our study are compatible with the literature. Individuals in the province of Ağrı, where our study was conducted, are members of the Islamic religion. One of the conditions of Islam is "to believe in accident and destiny." This situation can be associated with a moderate level of fatalism in individuals.

In our study, it was found that individuals in the X generation have a higher fatalism tendency compared to other generations. In the validity and reliability study of Orhan's Fatalism Tendency Scale in 2017, it was determined that the fatalism tendency increased as the age increased (40). This result supports our study. It can be said that the reason for this situation is the increase in the education level due to the increase in the number of literate individuals, the increase in transportation facilities, and the developments in the field of technology.

It has been determined that the higher the education level, the lower the fatalism tendency. This study in the literature is equivalent to our study (40). As education increases, people can be associated with questioning, researching, analyzing, and learning the truth.

It has been found that individuals with a high level of devotion to religion have a higher fatalism tendency. Charkazi and others have shown that Iranian Turkmen women have a firm belief in fatalism. They stated that fatalism is an important belief that can be considered as an obstacle to breast cancer screening behaviors in that society (41). This result is consistent with the result of our study.

In our study, we found that the fatalism score of the individuals increased due to the increase in the consanguineous marriage attitude score, but their health literacy scores decreased. Society's attitude towards consanguineous marriages and awareness of the health consequences of consanguineous marriages are largely ignored (23). This result supports the relationship between consanguineous marriage attitude and health literacy of our study. It can be explained by the fact that individuals with a high level of health literacy are aware that children born as a result of consanguineous marriage will have more congenital anomalies, unwanted abortions, and stillbirths. Cultural norms and religious beliefs were an obstacle to early diagnosis and treatment (42, 43). Individuals with a high level of health literacy can be explained by the high level of awareness of health and disease, benefiting from early diagnosis and treatment programs, being aware of the way to follow in case of any disease, taking responsibility for their health, and not perceiving existing problems as fatalism.

In our study, we found that as the age increased, consanguineous marriage attitude and tendency to fatalism increased, but the level of health literacy decreased. Powe et al., In a study comparing cancer fatalism and cancer knowledge level of African American women by age groups, determined that older women had higher cancer fatalism and lower cancer knowledge (44). This situation shows that as the age of individuals increases, their perception levels decrease, and they see any problems they may have as a symptom of aging. In the study conducted by Kirac et al., They found that as age increases, the level of health literacy decreases (45). Anvar et al. Stated that individuals in the older age group had more positive attitudes towards consanguineous marriage (23). The reason for this situation can be explained as adherence to traditions and customs and cultural norms. These results are consistent with the results obtained in our study.

CONCLUSION

In our study, we found that individuals in different generations have low attitudes towards consanguineous marriage, have a moderate fatalism tendency, and have high levels of health literacy. In our study, we found a positive relationship between consanguineous marriage and fatalism. In addition, we found a significant negative relationship between health literacy and consanguineous marriage and fatalism. Based on these results, one should be aware of the negative effects of consanguineous marriage and fatalism on the health of individuals in their future lives, and consultancy services should be provided to society on these issues.

DECLARATIONS

Statement of Contribution

M.Y., MSY, AE, YS, MAA, TKS, GD (writing and preparing original draft); M.Y., MSY, AE, (review, visualization); M.Y., YS, MAA, TKS (resources supervision, review and editing); MAA, TKS, GD (data collection, validation, project administration); M.Y., MSY, AE, (conceptualization, methodology); M.Y., AE, MAA (review and editing, data curation); M.Y., MSY, AE, YS, (writing, visualization, formating).

Aknowledgement

We would like to express our sincere thanks to those who contributed to the relevant literature.

We have established our work, the institutions where the work is carried out and all person who chose to participate in the study voluntarily.

Disclosure Statement

No potential conflict of interest was reported by the authors.

Funding

The authors reported no funding associated with the work featured in this article.

REFERENCES

1 Fareed M and Afzal M. Genetics of consanguinity and inbreeding in health and disease. Annals of human biology. 2017;44:99-107.

2 Binbay T, Arik Bİnbay D, Ulaş H, et al. Şizofrenide anne-baba akraba evliliğinin klinik özelliklere etkisi. Anatolian Journal of Psychiatry/ Anadolu Psikiyatri Dergisi. 2017;18.

3 Durduran Y, Bodur S, Çakıl E, et al. Konya il merkezinde sağlıkta dönüşüm öncesi ve sonrası gebe ve bebek izlemleri. Dicle Medical Journal/Dicle Tip Dergisi. 2012;39.

4 Nar MŞ. Tıbbi Antropoloji: Akraba Evliliklerinin Patolojik Etkileri. Ankara Üniversitesi Dil ve Tarih-Coğrafya Fakültesi Dergisi. 2012;52:223-41.

5 Şahİn İA and Selma Ş. AKRABA EVLİLİĞİ TUTUM ÖLÇEĞİ: BİR METODOLOJİK ÇALIŞMA. International Anatolia Academic Online Journal Health Sciences. 2020;6:168-91.

6 Chen X, Hay JL, Waters EA, et al. Health literacy and use and trust in health information. Journal of health communication. 2018;23:724-34.

7 Kutlu G and Akbulut Y. Türkiye'de sağlık okuryazarlığı politikalarının hastaneler açısından değerlendirilmesi. Konuralp Medical Journal. 2019;11:132-43.

8 Bakanlığı TS and Müdürlüğü TSHG. Sağlığın teşviki ve geliştirilmesi sözlüğü. Bakanlık yayın. 2011;814.

9 Yilmazel G. 8c Çetinkaya, F.(2016). Sağlık okuryazarlığının toplum sağlığı açısından önemi [The importance of health literacy for community health]. TAF Preventive Medicine Bulletin.15:69-74.

10 Squiers L, Peinado S, Berkman N, et al. The health literacy skills framework. Journal of health communication. 2012;17:30-54.

11 Bobov G and Capik C. The reliability and validity of the religious health fatalism scale in Turkish language. Journal of religion and health. 2020;59:1080-95.

12 Ersin F, Capik C, Kissal A, et al. Breast cancer fatalism scale: A validity and reliability study in Turkey. International Journal of Caring Sciences. 2018;11:783.

13 Dayapoglu N, Ayyıldız Nİ and Şeker D. Determination of health fatalism and the factors affecting health fatalism in patients with epilepsy in the North of Turkey. Epilepsy & Behavior. 2021;115:107641.

14 Alp Şahin İ. Akraba evliliği tutum ölçeği: Metodolojik bir çalışma. Sağlık Bilimleri Enstitüsü; 2019.

15 Temel AB and Zühal A. Evaluation of validity and reliability of the Turkish version of Health Literacy Scale. Florence Nightingale Journal of Nursing. 2017;25:85-94.

16 Kaya A and Bozkur B. Kadercilik Eğilimi Ölçeğinin Geliştirilmesi: Geçerlik Ve Güvenirlik Çalışması. Mersin University Journal of the Faculty of Education. 2015;11.

17 Tabachnick BG and Fidell LS. Using multivariate statistics, 6th edn Boston. Ma: Pearson. 2013.

18 Jaber L, Romano O, Halpern GJ, et al. Awareness about problems associated with consanguineous marriages: survey among Israeli Arab adolescents. Journal of Adolescent Health. 2005;36:530.

19 Sandridge AL, Takeddin J, Al-Kaabi E, et al. Consanguinity in Qatar: knowledge, attitude and practice in a population born between 1946 and 1991. Journal of biosocial science. 2010;42:59-82.

20 Sedehi M, Keshtkar A and Golalipour MJ. The knowledge and the attitude of youth couples on/towards consanguineous marriages in the North of Iran. Journal of clinical and diagnostic Research. 2012;6:1233-6.

21 Middle I, Al-Salloum A, Al-Herbish A, et al. Regional variations in the prevalence of consanguinity in Saudi Arabia. Saudi Med J. 2007;28:1881-4.

22 Al Salloum A, El Mouzan MI, Al Herbish A, et al. Prevalence of selected congenital anomalies in Saudi children: a community-based study. Annals of Saudi medicine. 2015;35:107-10.

23 Anwar S, Taslem Mourosi J, Arafat Y, et al. Genetic and reproductive consequences of consanguineous marriage in Bangladesh. PloS one. 2020;15:e0241610.

24 Hussain R and Bittles AH. The prevalence and demographic characteristics of consanguineous marriages in Pakistan. Journal of biosocial science. 1998;30:261-75.

25 Hussain R. Community perceptions of reasons for preference for consanguineous marriages in Pakistan. Journal of biosocial science. 1999;31:449-61.

26 Şen ŞR. Aydın il merkezinde akraba evliliği sıklığı ve gebelik sonuçları ile ilişkisi. Sağlık Bilimleri Enstitüsü; 2010.

27 Samli H, Toprak D and Solak M. Afyonkarahisar ilinde Akraba Evlilikleri ve I Bunun Dogumsal Anomaliler ile Iliskisi. Kocatepe Tıp Dergisi. 2006;7.

28 Al-Gazali L, Bener A, Abdulrazzaq Y, et al. consanguineous marriages in the United Arab Emirates. Journal of biosocial science. 1997;29:491-7.

29 Alharbi OA, Al-Shaia WA, Al-Hamam AA, et al. Attitude of Saudi Arabian adults towards consanguineous marriage. Qatar Medical Journal. 2015;2015:12.

30 Teeuw ME, Loukili G, Bartels EA, et al. Consanguineous marriage and reproductive risk: attitudes and understanding of ethnic groups practising consanguinity in Western society. European Journal of Human Genetics. 2014;22:452-7.

31 Bener A and Mohammad RR. Global distribution of consanguinity and their impact on complex diseases: Genetic disorders from an endogamous population. Egyptian Journal of Medical Human Genetics. 2017;18:315–20-–20.

32 Cho YI, Lee S-YD, Arozullah AM, et al. Effects of health literacy on health status and health service utilization amongst the elderly. Social science & medicine. 2008;66:1809-16.

33 Altsitsiadis E, Undheim T, De Vries E, et al. Health literacy, sunscreen and sunbed use: an uneasy association. British Journal of Dermatology. 2012;167:14-21.

34 Morris NS, Maclean CD and Littenberg B. Change in health literacy over 2 years in older adults with diabetes. The Diabetes Educator. 2013;39:638-46.

35 Biçer EB and Malatyali İ. Sağlık okuryazarlık düzeyinin belirlenmesi: Sivas Cumhuriyet Üniversitesi örneği. Ankara Sağlık Hizmetleri Dergisi. 2018;17:1-15.

36 Temel AB and Çİmen Z. KRONİK HASTALIĞI OLAN YAŞLI BİREYLERDE SAĞLIK OKURYAZARLIĞI, SAĞLIK ALGISI VE İLİŞKİLİ FAKTÖRLER. Ege Üniversitesi Hemşirelik Fakültesi Dergisi. 2017;33:105-25.

37 Acar GA, Baltaci K, Acimiş NM, et al. Bir Tekstil Fabrikasında Çalışanlarda Sağlık Okuryazarlığı Düzeyi ve İlişkili Etmenler. 3. International 21. National Public Health Congress; 2019.

38 Selvi A. Yakınında meme kanseri olan kadınların öğrenim gereksinimleri ile kadercilik eğilimi arasındaki ilişki. İstanbul Üniversitesi-Cerrahpaşa; 2019.

39 Serİn M, Taştan A and Ayten A. Trafikte Sürücü Davranışı ve Dindarlık İlişkisi: Kayseri Örneği. Erciyes Akademi.36:186-212.

40 Orhan K. Validity and Reliability Study of Fatality Tendency Scale. Uluslararası Medeniyet Çalışmaları Dergisi. 2017;2:83-102.

41 Charkazi A, Samimi A, Razzaghi K, et al. Adherence to recommended breast cancer screening in Iranian Turkmen women: the role of knowledge and beliefs. International Scholarly Research Notices. 2013;2013.

42 Denewer A, Farouk O, Mostafa WA, et al. Social support and hope among Egyptian women with breast cancer after mastectomy. Breast cancer: basic and clinical research. 2011;5:BCBCR. S6655.

43 Hwang JJ, Donnelly TT, Ewashen C, et al. Sociocultural influences on Arab women's participation in breast cancer screening in Qatar. Qualitative health research. 2017;27:714-26.

44 Powe BD, Hamilton J and Brooks P. Perceptions of cancer fatalism and cancer knowledge: a comparison of older and younger African American women. Journal of Psychosocial Oncology. 2006;24:1-13.

45 Kiraç R and Öztürk YE. HALKIN SAĞLIK OKURYAZARLIK DÜZEYİ İLE SAĞLIK KAYGISI ARASINDAKİ İLİŞKİSİ. Sosyoloji Araştırmaları Dergisi. 2020;23:214-43.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 208-214
https://doi.org/10.31067/acusaglik.1138301

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI Public Environmental and Occupational Health / Halk ve Çevre Sağlığı

Evaluation of Vaccination Level and Vaccine Literacy in Vocational Health School Students

Egemen Ünal[1] , **Mehmet Enes Gökler**[1]

[1]Ankara Yıldırım Beyazıt University, Department of Public Health, Ankara, Turkey

ABSTRACT

Purpose: As of 2022, the pandemic COVID-19 has entered a phase of decline thanks to vaccination efforts. In this sense, it is important to determine the vaccination status of young people studying in departments involved in providing health services to the community and to know their thoughts about vaccination. In this study, we aimed to investigate the COVID-19 immunization status and immunization literacy of students at Ankara Yıldırım Beyazıt University-Vocational Health School (AYBU-VHS).

Methods: The sample size of the study was calculated with a confidence interval of 95%, α=0.05, d=5%, and an unknown frequency of 50%, and the sample size was set as a minimum of 384. A questionnaire consisting of 4 parts [sociodemographic variables, information about COVID-19 (vaccination status, presence of chronic diseases, etc), COVID-19 knowledge level with 10 questions, and COVID-19 vaccine literacy scale] was used as the data source for the study. Study groups were determined by the dependent variable of having at least one vaccination or being fully vaccinated.

Results: 77.8% of the students (N:450) were female (n:350), the mean age was 20.37±3.64 years, 3.1% (n:14) were not vaccinated, and 14.0% (n:63) were not fully vaccinated. When analyzing the group's information about the vaccine COVID-19, unvaccinated individuals agreed at a higher rate that the vaccine COVID-19 could not be effective ($p < 0.001$), but agreed at a lower rate that the vaccine COVID-19 could also protect against other diseases such as influenza (p=0.002). It was found that individuals with at least one vaccination and fully vaccinated had higher vaccination literacy than unvaccinated and fully unvaccinated individuals (p=0.011; p=0.004).

Conclusion: Nearly 20% of students are still not fully vaccinated and there are deficits in attitudes toward vaccination. In addition, the vaccination competency of the fully vaccinated is higher. These findings are crucial to determine the knowledge, attitudes and behaviors of young people regarding vaccination and to take the necessary precautions.

Keywords: Vaccination level, Vaccine Hesitancy, Vocational Health School

Egemen ÜNAL
Mehmet Enes GÖKLER

Correspondence: Egemen Ünal
Ankara Yıldırım Beyazıt University, Department of Public Health, Ankara, Turkey
Phone: +905434227898
E-mail: egemenunal28@hotmail.com

Received: 30 June 2022
Accepted: 02 January 2023

Sağlık Meslek Yüksekokulu Öğrencilerinde Covıd-19 Aşısı Olma Ve Aşı Okuryazarlığının Değerlendirilmesi

ÖZET

Amaç: COVID-19 pandemisi 2022 itibarı ile aşılama çalışmaları sayesinde gerileme dönemine girmiştir. Bu anlamda özellikle topluma sağlık hizmeti sunumunda görev alacak bölümlerde okuyan gençlerin aşılanma durumlarının belirlenmesi ve aşı hakkındaki düşüncelerinin ortaya konması önemlidir. Bu çalışmada Ankara Yıldırım Beyazıt Üniversitesi-Sağlık Hizmetleri Meslek Yüksekokulu (AYBÜ-SMYO) öğrencilerinde COVID-19 aşı durumu ve aşı okuryazarlığının değerlendirilmesi amaçlandı.

Yöntem: Çalışmanın örneklem sayısı %95 güven aralığında, α=0.05, d=%5 ve %50 bilinmeyen sıklığı ile hesaplanan örneklem sayısı minimum 384 olarak belirlendi. Araştırmada veri kaynağı olarak 4 bölümden oluşan anket kullanılacaktır [sosyodemografik değişkenler, COVID-19 ile ilgili bilgileri (aşı olma durumu, kronik hastalık varlığı vb.), 10 soruluk COVID-19 bilgi düzeyi ve COVID-19 aşı okuryazarlığı ölçeği]. Çalışmanın bağımlı değişkeni en az bir aşı olan ve tam aşılı olan grup olarak belirlendi.

Bulgular: Öğrencilerin (N:450) %77,8'i kadın(n:350) olup yaş ortalaması 20,37±3,64 yılken, %3,1'i (n:14) aşısız, %14,0'ı (n:63) tam aşılı değildi. Grubun COVID-19 aşına yönelik bilgileri incelendiğinde, aşılı olmayan bireyler COVID-19 aşısının etkili olmayabileceğine (p<0,001), daha yüksek oranda katılıyorken; COVID-19 aşısının grip gibi diğer hastalıklardan da koruyabildiğine (p=0,002) daha düşük oranda katılmaktaydılar. En az bir aşılı ve tam aşılı bireylerin aşısız ve tam aşısız bireylere göre daha yüksek aşı okuryazarlığına sahip oldukları saptandı (p=0,011;p=0,004).

Sonuç: Öğrencilerin halen %20'ye yakını tam aşılı değildir ve aşıyla ilgili tutum-bilgi düzeyinde eksiklikler göze çarpmaktadır. İleveten tam aşılı bireylerin aşı okuryazarlıkları daha yüksektir. Bu sonuçlar aşılama konusunda sağlık alanındaki gençlerin bilgi tutum ve davranışlarını belirlemek ve gerekli önlemleri almak için kritiktir.

Anahtar kelimeler : Aşılanma Düzeyi, Aşı Tereddüdü, Meslek Yüksekokulu

The coronavirus epidemic (COVID-19), classified as a pandemic by the World Health Organization (WHO) in March 2011, is one of the most important public health problems of the 21st century (1). The high risk of infection and the lack of specific treatment have further increased the importance of vaccine development. Societal immunity that ends the pandemic is only possible with high vaccination rates. As of 2021, there is conflicting information about the pros and cons of vaccines, which is one of the most debated topics in the world and in Turkey.

Vaccine literacy is defined as the extent to which individuals are able to obtain, process, and understand basic health information and services to make appropriate health decisions about vaccines (2). Moreover, vaccine literacy is expressed not only as knowledge about vaccines but also as the development of a less complex system for explaining and presenting vaccines as a sine qua non for a functioning health care system.

The COVID-19 epidemic facing the entire health community is now one of the biggest public health problems in the world and began to decline in 2022, mainly due to increased vaccination activities. At that time, in addition to reducing the lethality of the disease, personal protection measures and especially vaccination will be of great importance.

Although there is a great demand for vaccination studies in society, it is clear that some untrue discourses and some thoughts expressed both in social media and in society cause hesitation in vaccination (3). In this sense, it is important to identify the vaccination status of young people studying in departments involved in providing health services to the community and their thoughts about vaccination through descriptive scientific studies (4). One of the groups that will provide this service is students in health vocational schools.

The aim of this study was to evaluate the COVID-19 vaccine literacy and effective variables in Ankara Yıldırım Beyazıt University-Vocational Health School students.

MATERIAL AND METHOD

The study was a cross-sectional study conducted by the academicians of AYBU Faculty of Medicine, Department of Public Health during the academic year 2021-2022. The required ethics committee approvals for the study were obtained from the AYBU Health Sciences Ethics Committee (Date 07/04/2022; No: 06). AYBU VHS Students constitute the population of the study (approximately 2000 students). The sample size of the study was calculated with a confidence interval of 95%, α=0.05, d=5%, and an unknown frequency of 50%, and the sample size was set as a minimum of 384.

A questionnaire consisting of 4 parts was used as a data source for the study. In the first part of the questionnaire, sociodemographic variables were requested for the subjects (gender, age, department of education, marital status, income status, etc.). In the second part, some clinical and COVID-19 related information of the person is questioned (vaccination status, presence of chronic disease, living with a person with COVID-19, etc.), while the third part contains 10 COVID-19 information questions and the last part is a COVID-19 vaccine literacy scale. Study groups were determined by the dependent variable of having at least one vaccination (vaccinated) or having at least two vaccinations (fully vaccinated). The validity and reliability study of the COVID-19 vaccine literacy scale was conducted in 2021 by Durmuş et al (2). The statements on the scale were assessed using a 4-point Likert scale. The statements on the scale are: (1) Never, (2) Rarely, (3) Sometimes, (4) Often. The fact that the average of the scores obtained on the scale is close to 4 indicates that the level of vaccination literacy is high. Questionnaires were completed both in person and online after informed consent was obtained verbally from participants. Participants were told that they were completely independent in their decision to participate in the study, and work was done only with the group that wished to respond voluntarily. The necessary permissions for the study were obtained from the relevant institution.

The IBM-SPSS 20.0 statistical package was used for statistical analysis of the research data. In the statistical analysis, categorical variables were presented as numbers and percentages in the descriptive results section, whereas continuous variables were presented as mean±standard deviation for normally distributed data and median (IQR; 25-75) for distributed data. For categorical variables, appropriate chi-square tests were used to compare whether there was a difference in frequency between groups. The accepted statistical significance level was $p<0.05$.

RESULTS

77.8% of the study group were women (N: 350) and the mean age was 20.37±3.64 (range 18-53) years. While 3.1% (N: 14) of the study group were unvaccinated, 14.0% (N: 63) were not fully vaccinated. While the proportion of

living with individuals at risk for COVID-19, such as those over 65 years of age, health care workers, and immunosuppressants, was higher among the unvaccinated (p:0.026), no association was found between gender, age group, marital status, employment status, presence of chronic disease, and COVID-19 history ($p > 0.05$ for each). The status of not being fully vaccinated was higher among men, married persons, and those who had COVID-19 ($p < 0.001$; p: 0.014; p: 0.017, respectively). No association was found between not being fully vaccinated and age group, employment status, presence of chronic disease, COVID-19 family history, or living with an at-risk person. The distribution of some sociodemographic data by vaccination status and complete vaccination status of the study group is shown in Table 1.

protect against other diseases such as influenza (p: 0.002). Individuals who were not fully vaccinated were more likely to report that the COVID-19 vaccine may not be effective ($p < 0.001$), that the vaccine does not protect against infections ($p < 0.001$), that fever, mild swelling and redness at the injection site are among the side effects of the vaccine (p: 0.001). The distribution of the study group's information about the vaccine COVID-19 according to their vaccination status is shown in Table 2.

Examining the attitudes of the study group toward the vaccine COVID-19, there is higher agreement with the statements that unvaccinated individuals can transmit the virus to others (p: 0.003), can lead a normal lifestyle after vaccination (p: 0.002), and are concerned about the negative effects of the vaccine ($p < 0.001$).

Table 1. The distribution of some sociodemographic data by vaccination status and complete vaccination status of the study group

		Vaccinated				p	Fully vaccinated				p
		Yes		No			Yes		No		
		N	%	N	%		N	%	N	%	
Gender	**Female**	342	78,4	8	57,1	0,059	312	80,6	38	60,3	**<0,001**
	Male	94	21,6	6	42,9		75	19,4	25	39,7	
Age group	**18-19**	225	51,6	5	35,7	0,389	203	52,5	27	42,9	0,123
	20-21	143	32,8	7	50,0		129	33,3	21	33,3	
	>22	68	15,6	2	14,3		55	14,2	15	23,8	
Marital status	**Single**	415	95,2	13	92,9	0,691	372	96,1	56	88,9	**0,014**
	Married	21	4,8	1	7,1		15	3,9	7	11,1	
Working status	**Working**	40	9,2	3	21,4	0,125	33	8,5	10	15,9	0,066
	Not working	396	90,8	11	78,6		354	91,5	53	84,1	
Presence of chronic disease	**No**	29	6,7	2	14,3	0,267	28	7,2	3	4,8	0,472
	Yes	407	93,3	12	85,7		359	92,8	60	95,2	
COVID-19 status	**No**	341	78,2	11	78,6	0,974	310	80,1	42	66,7	**0,017**
	Yes	95	21,8	3	21,4		77	19,9	21	33,3	
COVID-19 status in family	**No**	268	61,5	9	64,3	0,831	242	62,5	35	55,6	0,291
	Yes	168	38,5	5	35,7		145	37,5	28	44,4	
Living with an individual at risk of COVID-19, such as over 65, healthcare worker, immunosuppressive person	**No**	374	85,8	9	64,3	**0,026**	332	85,8	51	81,0	0,317
	Yes	62	14,2	5	35,7		55	14,2	12	19,0	

When examining the study group's statements about the vaccine COVID-19, it appears that the unvaccinated individuals agree to a greater extent that the vaccine COVID-19 may not be effective ($p < 0.001$) and that the vaccine does not protect against infections ($p < 0.001$), while they agree to a lesser extent that the vaccine COVID-19 may also

Individuals who were not fully vaccinated were more likely to agree with the statements that they were more concerned about the negative effects of the vaccine (p: 0.001) and that they could not lead a normal lifestyle after vaccination (p: 0.013). The distribution of the study group's attitudes toward the vaccine COVID-19 according to their vaccination status is shown in Table 3.

Table 2. Distribution of the study group's information about the COVID-19 vaccine according to their vaccination status.

		Vaccinated				p	Fully vaccinated				p
		Yes		No			Yes		No		
		N	%	N	%		N	%	N	%	
The COVID-19 vaccine can cause infection.	I strongly disagree	38	8,7	0	0,0	0,611	35	9,0	3	4,8	0,618
	Disagree	16	3,7	1	7,1		16	4,1	1	1,6	
	Undecided	202	46,3	7	50,0		179	46,3	30	47,6	
	Agree	124	28,4	3	21,4		108	27,9	19	30,2	
	I strongly agree	56	12,8	3	21,4		49	12,7	10	15,9	
COVID-19 may not be effective	I strongly disagree	49	11,2	0	0,0	**<0,001**	47	12,1	2	3,2	**<0,001**
	Disagree	130	29,8	0	0,0		122	31,5	8	12,7	
	Undecided	174	39,9	3	21,4		145	37,5	32	50,8	
	Agree	65	14,9	6	42,9		58	15,0	13	20,6	
	I strongly agree	18	4,1	5	35,7		15	3,9	8	12,7	
The vaccine protects me from infection	I strongly disagree	14	3,2	3	21,4	**<0,001**	10	2,6	7	11,1	**<0,001**
	Disagree	39	8,9	5	35,7		34	8,8	10	15,9	
	Undecided	186	42,7	6	42,9		154	39,8	38	60,3	
	Agree	155	35,6	0	0,0		148	38,2	7	11,1	
	I strongly agree	42	9,6	0	0,0		41	10,6	1	1,6	
Fever, mild swelling and redness at the injection site are among the side effects of the vaccine	I strongly disagree	9	2,1	1	7,1	0,072	7	1,8	3	4,8	**0,001**
	Disagree	40	9,2	1	7,1		38	9,8	3	4,8	
	Undecided	117	26,8	8	57,1		95	24,5	30	47,6	
	Agree	199	45,6	3	21,4		182	47,0	20	31,7	
	I strongly agree	71	16,3	1	7,1		65	16,8	7	11,1	
COVID-19 may also protect against other diseases such as influenza	I strongly disagree	62	14,2	7	50,0	**0,002**	54	14,0	15	23,8	0,079
	Disagree	126	28,9	1	7,1		112	28,9	15	23,8	
	Undecided	163	37,4	6	42,9		142	36,7	27	42,9	
	Agree	69	15,8	0	0,0		65	16,8	4	6,3	
	I strongly agree	16	3,7	0	0,0		14	3,6	2	3,2	

Table 2. Distribution of the study group's information about the COVID-19 vaccine according to their vaccination status.

		Vaccinated				p	Fully vaccinated				p
		Yes		No			Yes		No		
		N	%	N	%		N	%	N	%	
I can transmit the virus to other people	I strongly disagree	34	7,8	2	14,3	**0,003**	30	7,8	6	9,5	0,133
	Disagree	26	6,0	3	21,4		23	5,9	6	9,5	
	Undecided	89	20,4	1	7,1		73	18,9	17	27,0	
	Agree	125	28,7	8	57,1		113	29,2	20	31,7	
	I strongly agree	162	37,2	0	0,0		148	38,2	14	22,2	
I have a serious risk of contracting a COVID-19 infection	I strongly disagree	31	7,1	1	7,1	0,405	28	7,2	4	6,3	0,186
	Disagree	94	21,6	4	28,6		81	20,9	17	27,0	
	Undecided	174	39,9	8	57,1		153	39,5	29	46,0	
	Agree	97	22,2	1	7,1		86	22,2	12	19,0	
	I strongly agree	40	9,2	0	0,0		39	10,1	1	1,6	

The vaccine also protects other unvaccinated people	**I strongly disagree**	76	17,4	5	35,7	0,186	68	17,6	13	20,6	0,090
	Disagree	116	26,6	4	28,6		105	27,1	15	23,8	
	Undecided	134	30,7	5	35,7		112	28,9	27	42,9	
	Agree	81	18,6	0	0,0		75	19,4	6	9,5	
	I strongly agree	29	6,7	0	0,0		27	7,0	2	3,2	
I am concerned about the negative effects of the vaccine	**I strongly disagree**	20	4,6	0	0,0	**<0,001**	19	4,9	1	1,6	**0,001**
	Disagree	73	16,7	0	0,0		67	17,3	6	9,5	
	Undecided	132	30,3	1	7,1		122	31,5	11	17,5	
	Agree	145	33,3	3	21,4		123	31,8	25	39,7	
	I strongly agree	66	15,1	10	71,4		56	14,5	20	31,7	
I can lead a normal lifestyle after vaccination	**I strongly disagree**	19	4,4	3	21,4	**0,002**	16	4,1	6	9,5	**0,013**
	Disagree	47	10,8	3	21,4		41	10,6	9	14,3	
	Undecided	128	29,4	7	50,0		110	28,4	25	39,7	
	Agree	170	39,0	1	7,1		151	39,0	20	31,7	
	I strongly agree	72	16,5	0	0,0		69	17,8	3	4,8	

The mean score of the study group on the vaccine literacy scale was 2.75±0.41 (range, 1.58-3.92). It was found that vaccinated females and fully vaccinated males had higher vaccine literacy scores according to gender (p: 0.008 and p: 0.003, respectively). Although there was no relationship between being vaccinated and vaccination literacy according to age group, it was found that vaccination literacy was higher in the 20-21 age group among those who were fully vaccinated (p: 0.005). It was also found that both vaccinated and fully vaccinated individuals had higher vaccination literacy than unvaccinated and fully vaccinated individuals (p: 0.011 and p: 0.004, respectively). The distribution of scores obtained with the vaccine literacy scale according to the vaccination status of the study group is shown in Table 4.

DISCUSSION

While 3.1% of the study group were unvaccinated, 14.0% were not fully vaccinated. Considering all vaccine acceptance studies, the highest acceptance for the vaccine COVID-19 was found in Indonesia (93%), China (91%), the United Kingdom (86%), and the lowest in the United Arab Emirates (22%) (5). In low- and moderately low-development countries, vaccine acceptance rates ranged from 76.7% to 42.6% (6). According to April 2022 data, 59% of the world's population has completed the COVID-19 vaccination protocol (7). While the rate of living with persons at risk for COVID-19, such as persons older than 65 years, health care workers, and immunosuppressives, was higher among unvaccinated persons, the rate of not being fully vaccinated was found to be higher among men, married persons, and persons with COVID-19.

Table 4. Distribution of scores obtained with the vaccine literacy scale according to the vaccination status of the study group.

		Vaccinated		**p**	**Fully vaccinated**		**p**
		Yes	**No**		**Yes**	**No**	
		Median (IQR 25-75)	**Median (IQR 25-75)**		**Median (IQR 25-75)**	**Median (IQR 25-75)**	
Gender	**Female**	2,75 (2,5 -3)	2,42 (2,38 -2,54)	**0,008**	2,75 (2,5 -3)	2,67 (2,42 -2,92)	0,127
	Male	2,67 (2,58 -3)	2,67 (2,58 -2,67)	0,484	2,75 (2,58 -3)	2,58 (2,42 -2,67)	**0,003**
Age group	**18-19**	2,75 (2,5 -3)	2,5 (2,42 -2,58)	0,117	2,75 (2,5 -3)	2,67 (2,42 -2,83)	0,081
	20-21	2,75 (2,5 -3)	2,58 (2,33 -2,67)	0,059	2,75 (2,5 -3)	2,58 (2,33 -2,67)	**0,005**
	>22	2,83 (2,67 -3,08)	2,71 (2,25 -3,17)	0,745	2,83 (2,67 -3,08)	2,75 (2,58 -3,08)	0,518
Total		2,75 (2,50-3,00)	2,54 (2,42-2,67)	**0,011**	2,75 (2,50-3,00)	2,67 (2,42-2,83)	**0,004**

No difference was found between work status, presence of chronic disease, family history of COVID-19 and the vaccination. The studies showed that COVID-19 vaccine hesitancy varied greatly by age, race/ethnicity, income, and education. Young people, women, and participants with lower income and education were more likely to be hesitant about getting vaccinated (5,8,9). In addition, some studies have shown that populations with a history of COVID-19 infection, similar to our study, were more likely to accept the COVID-19 vaccine (5,10-12). Vaccine acceptance was higher in healthcare workers and vulnerable groups than in the general population (5,13,14).

Sonmezer et al. reported in their study conducted in our country that 62.7% of the subjects believed that the vaccine COVID-19 would induce an immune response against COVID-19 (12). In our study, when we examined individuals' information about the vaccine COVID-19, it was found that individuals who were not vaccinated or did not complete the protocol believed that the vaccine COVID-19 may not be effective and may not protect against infection. The literature reports that the most common reason for not getting vaccinated against COVID-19 is the belief that the vaccines are not effective (15). Although reliance on advice from health care professionals increases vaccination coverage, sources of misinformation and content creation without surveillance have become evident today (16). Misinformation often relates to the evaluation of vaccine safety, efficacy, and suitability, which are major concerns with COVID-19 vaccination (17). Despite numerous studies demonstrating both the high efficacy and safety profile of COVID-19 vaccines, these concerns are considered high both globally and in our country (18,19). Evidence suggests that this may be due to a lack of adequate information dissemination (19). It is well known that willingness to vaccinate increases with accurate information (17). It was thought that conducting research and informing the community about the content and efficacy of the vaccine would have a positive impact on vaccination coverage.

Vaccination reduces the risk of COVID-19 infection. However, fully vaccinated individuals with the infection have a similar viral load to unvaccinated cases and can effectively transmit the infection in their home environment, including fully vaccinated contacts (20). In our study, the unvaccinated individuals believe that they will not transmit the virus to others. This shows that unvaccinated individuals who are vulnerable to infection still pose serious risks in society because of their beliefs. This belief of unvaccinated individuals may also reduce compliance with mask, distance, and hygiene recommendations established to prevent infection. In our study, individuals who were unvaccinated reported that they were more worried about the negative effects of the vaccine and that they could not maintain a normal lifestyle after vaccination. Studies show that the side effects of the vaccines are mild. A quarter of people reported having no symptoms after the first vaccination, but mild symptoms after the second vaccination. At the second dose, 14% of participants reported no symptoms, while the majority had mild and predictable side effects (15). The fact that side effects are mild and predictable and that there are no cases of hospitalization may help to reduce vaccination hesitancy (15). On the other hand, knowing the possible findings after vaccination will help dispel myths and reduce public concerns.

Despite global efforts to contain the pandemic COVID-19, inadequate vaccination literacy among the population may hinder these efforts (21). In our study, both vaccinated and fully vaccinated individuals were found to have higher vaccination literacy than unvaccinated and fully unvaccinated individuals. In the study by Biasio et al, vaccination literacy increased with increasing age and educational status (22). In the study by Gusar et al., the vaccine literacy level increased with educational level and decreased with age.

Vaccination literacy was lower among participants who were employed, had a chronic disease, used drugs, or consumed alcohol daily (21). In our study, vaccination literacy was found to be lower in unvaccinated women and unvaccinated men. Considering that a person's vaccination literacy also provides information about health literacy, low health literacy is considered a serious barrier to vaccination coverage in our country (23,24). Determining the vaccination literacy of the population is important for planning intervention studies aimed at increasing COVID-19 vaccine coverage.

Our study adds some important information to the literature about the vaccination status of various health care professionals, especially those who will be working in the health care field, but there are also some limitations of our study. The HVS students selected for the study are a select and specific group. It would be more comprehensive to assess the oppositional thoughts against the COVID-19 vaccine among students from different faculties and schools.

Public health authorities should take steps to increase vaccine acceptance and promote positive attitudes toward vaccines. An optimal approach would be to develop an educational program that provides the general population with accurate, reliable information about vaccines. In addition, public health authorities should be more vigilant about misinformation disseminated via the Internet, especially via social media.

REFERENCES

1. Cruz MP, Santos E, Cervantes MAV, et al. COVID-19, a worldwide public health emergency. Rev Clínica Española (English Ed. 2021;221(1):55–61.
2. Durmuş A, Akbolat M, Amarat M. COVID-19 Aşı Okuryazarlığı Ölçeği'nin Türkçe geçerlilik ve güvenirliliği. Cukurova Med J. 2021;46(2):732–41.
3. Facciolà A, Visalli G, Orlando A, et al. Vaccine hesitancy: An overview on parents' opinions about vaccination and possible reasons of vaccine refusal. J Public health Res. 2019;8(1):jphr-2019.
4. Mose A, Haile K, Timerga A. COVID-19 vaccine hesitancy among medical and health science students attending Wolkite University in Ethiopia. PLoS One. 2022;17(1):e0263081.
5. Joshi A, Kaur M, Kaur R, et al. Predictors of COVID-19 Vaccine Acceptance, Intention, and Hesitancy: A Scoping Review. Front Public Heal. 2021 Aug;9.
6. Patwary MM, Alam MA, Bardhan M, et al. COVID-19 Vaccine Acceptance among Low- and Lower-Middle-Income Countries: A Rapid Systematic Review and Meta-Analysis. Vaccines. 2022 Mar;10(3):427.
7. Hannah Ritchie, Edouard Mathieu, Lucas Rodés-Guirao, et al. Coronavirus Pandemic (COVID-19). Our World Data. 2020;
8. Willis DE, Andersen JA, Bryant-Moore K, et al. COVID-19 vaccine hesitancy: Race/ethnicity, trust, and fear. Clin Transl Sci. 2021 Nov;14(6):2200–7.
9. McElfish PA, Willis DE, Shah SK, et al. Sociodemographic Determinants of COVID-19 Vaccine Hesitancy, Fear of Infection, and Protection Self-Efficacy. J Prim Care Community Health. 2021 Jan;12:215013272110407.
10. Bell S, Clarke R, Mounier-Jack S, et al. Parents' and guardians' views on the acceptability of a future COVID-19 vaccine: A multi-methods study in England. Vaccine. 2020 Nov;38(49):7789–98.
11. Wang K, Wong ELY, Ho KF, et al. Intention of nurses to accept coronavirus disease 2019 vaccination and change of intention to accept seasonal influenza vaccination during the coronavirus disease 2019 pandemic: A cross-sectional survey. Vaccine. 2020 Oct;38(45):7049–56.
12. Sonmezer MC, Sahin TK, Erul E, et al. Knowledge, Attitudes, and Perception towards COVID-19 Vaccination among the Adult Population: A Cross-Sectional Study in Turkey. Vaccines. 2022 Feb;10(2):278.
13. Lazarus J V., Ratzan SC, Palayew A, et al. A global survey of potential acceptance of a COVID-19 vaccine. Nat Med. 2021 Feb;27(2):225–8.
14. Cobos Muñoz D, Monzón Llamas L, Bosch-Capblanch X. Exposing concerns about vaccination in low- and middle-income countries: a systematic review. Int J Public Health. 2015 Nov;60(7):767–80.
15. Saeed BQ, Al-Shahrabi R, Alhaj SS, et al. Side effects and perceptions following Sinopharm COVID-19 vaccination. Int J Infect Dis. 2021 Oct;111:219–26.
16. Ortiz RR, Smith A, Coyne-Beasley T. A systematic literature review to examine the potential for social media to impact HPV vaccine uptake and awareness, knowledge, and attitudes about HPV and HPV vaccination. Hum Vaccin Immunother. 2019 Aug;15(7–8):1465–75.
17. Smith LE, Amlôt R, Weinman J, et al. A systematic review of factors affecting vaccine uptake in young children. Vaccine. 2017 Oct;35(45):6059–69.
18. Paul E, Steptoe A, Fancourt D. Attitudes towards vaccines and intention to vaccinate against COVID-19: Implications for public health communications. Lancet Reg Heal - Eur. 2021 Feb;1:100012.
19. Babicki M, Malchrzak W, Mastalerz-Migas A. Assessment of Attitudes, Main Concerns and Sources of Knowledge Regarding COVID-19 Vaccination in Poland in the Unvaccinated Individuals—A Nationwide Survey. Vaccines. 2022 Mar;10(3):381.
20. Singanayagam A, Hakki S, Dunning J, et al. Community transmission and viral load kinetics of the SARS-CoV-2 delta (B.1.617.2) variant in vaccinated and unvaccinated individuals in the UK: a prospective, longitudinal, cohort study. Lancet Infect Dis. 2022 Feb;22(2):183–95.
21. Gusar I, Konjevoda S, Babić G, et al. Pre-Vaccination COVID-19 Vaccine Literacy in a Croatian Adult Population: A Cross-Sectional Study. Int J Environ Res Public Health. 2021 Jul;18(13):7073.
22. Biasio LR, Bonaccorsi G, Lorini C, et al. Assessing COVID-19 vaccine literacy: a preliminary online survey. Hum Vaccin Immunother. 2021 May;17(5):1304–12.
23. Costantini H. COVID-19 Vaccine Literacy of Family Carers for Their Older Parents in Japan. Healthcare. 2021 Aug;9(8):1038.
24. Ayaz AS, Ozturk FO. Health Literacy Levels of Women and Related Factors in Turkey. J Nurs Res. 2021 Dec;29(6):e180.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 215-220
https://doi.org/10.31067/acusaglik.1109356

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI Public Environmental and Occupational Health / Halk ve Çevre Sağlığı

Determination of Early Side Effects After Covid-19 Vaccinations

Neriman Şimşek Yükseltürk[1], Semra Açıksöz[2], Nurdan Yalçın Atar[2]

[1]Gülhane Training and Research Hospital, Ankara, Turkey
[2]Health Sciences University Hamidiye Faculty of Nursing, İstanbul, Turkey

Abstract

Objectives: The first phase of the COVID-19 vaccine was launched in Turkey in January 2021 and was intended primarily for healthcare workers. Vaccine side effects play significant role in building public confidence in vaccination. This study aims to determine the early-stage vaccine side effects in healthcare workers who have been given the COVID-19 vaccine.

Methods: The research has a descriptive cross-sectional type of design. The data were collected face-to-face with the questionnaire form created by the researchers, which investigated the sociodemographic characteristics and vaccine complications of the participants.

Results: The sample of the study consisted of 321 medical personnel (%55.6 female, %79.8 under 40 years, %67.1 nurses, %15.2 physicians, and %17.4 laboratory workers) who received the Covid-19 vaccine in Turkey and voluntarily agreed to participate in the study. The most common side effects associated with vaccination were as follows: pain (%46.3 Sinovac, %55.5 Pfizer- biotech), heat increase (%32.8 Sinovac, %30.7 Pfizer- biotech), whole-body aches (%55.2 Sinovac, %58.7 Pfizer- biotech) and injection site redness (%28.4 Sinovac, %26.0 Pfizer- biotech).

Conclusions: The benefits of the Covid-19 vaccine preponderate its identified side effects of it. Most of the side effects reported in this study were consistent with Pfizer-Biotech.

Keywords: Covid-19, Vaccination, Side effect, Healthcare Professional

Neriman ŞİMŞEK YÜKSELTÜRK
Semra AÇIKSÖZ
Nurdan YALÇIN ATAR

Covid-19 Aşı Sonrası Erken Dönem Gelişen Yan Etkilerin Belirlenmesi

ÖZET

Amaç: Türkiye'de COVID-19 aşısı Ocak 2021'de öncelikli olarak sağlık çalışanlarına uygulandı. Aşı yan etkileri, insanların aşıya olan güvenini oluşturmada önemli bir rol oynamaktadır. Bu çalışma, COVID-19 aşısı yapılan sağlık çalışanlarında erken evre aşı yan etkilerini belirlemeyi amaçlamaktadır.

Yöntem: Bu araştırma tanımlayıcı-kesitsel bir çalışmadır. Veriler, araştırmacılar tarafından oluşturulan, sağlık personelinin sosyodemografik özellikleri ve aşı komplikasyonları hakkındaki bilgilerini sorgulayan anket formu ile yüz yüze toplanmıştır.

Bulgular: Araştırmanın örneklemini Türkiye'de Covid-19 aşısı olan ve çalışmaya gönüllü olarak katılmayı kabul eden 321 sağlık personeli (%55.6 kadın, %79.8 40 yaş altı, %67.1 hemşire, %15.2 hekim ve %17.4 laboratuvar çalışanı) oluşturmuştur. Aşılama ile ilişkili en sık görülen yan etkiler; ağrı (%46.3 sinovac, %55,5 pfizer-biotech), ısı artışı (%32.8 sinovac, %30.7 pfizer-biotech), tüm vücut ağrıları (%55.2 sinovac, %58.7 pfizer-biotech) ve enjeksiyon bölgesinde kızarıklık (%28.4 sinovac, %26.0 pfizer-biotech)'dır.

Sonuç: Covid-19 aşısının yararları, tanımlanmış yan etkilerinden daha ağır basmaktadır. Bu çalışmada bildirilen yan etkilerin çoğu Pfizer-Biotech ile uyumluydu.

Anahtar Kelimeler: COVID-19, Aşı, Yan etki, Sağlık Çalışanı

Correspondence: Neriman Şimşek Yükseltürkı
Gülhane Training and Research Hospital,
Ankara, Turkey
Phone: +905363226541
E-mail: nyukselturk007@hotmail.com

Received: 26 April 2022
Accepted: 07 January 2023

Covid-19 is the most important health problem of the 21st century. Covid-19 is transmitted from person to person through the air, causing a respiratory infection that can progress to fatal complications (1). Studies have documented a large number of cases of COVID-19 among medical personnel working in hospitals, nursing homes and nursing homes (2). The high and rapid contagiousness of the virus, the lack of treatments that can improve the prognosis of the disease, and the negative impact on the health systems of countries show the importance of developing an effective and reliable vaccine against the disease. The vaccine is aimed to reduce the severity of the disease, the transmission of the virus, and the burden of the disease. In addition, World Health Organization experts pointed out that 60-70% immunity is required to end the pandemic with vaccines. The death of thousands of people a day and the social and economic stagnation of life from time to time have accelerated vaccination studies (1-3).

Although COVID-19 vaccines have been approved as emergency vaccines within a short period of time, concerns about the safety and effectiveness of vaccines in the general population remain. There have been several studies attributing vaccine hesitancy among young adults to trust in vaccine, perceived side effects and lower risk perception of the disease (4, 5).

Covid-19 vaccine trials are progressing rapidly around the world, but large disparities between countries are observed. According to Our World in Data, which compiles vaccine statistics daily, approximately 50 percent of the world's population has received at least one dose of vaccine. While in Europe and North America every second person has the opportunity to be vaccinated, this number is quite low in Africa. Worldwide, the number of doses made so far, including the second dose of vaccine, has exceeded 7 billion. For example, vaccine application in Turkey started on January 14th and the amount of first, second, and third doses of vaccine administered as part of the fight against Covid-19 exceeded 114 million as of October 2021 (6).

Although vaccination increases rapidly around the world, it has been reported that mild side effects such as pain at the injection site, redness, swelling, headache, fatigue, muscle/joint pain, fever, chills, vomiting, diarrhea, and rarely allergic side effects may occur after vaccination (7). Local and systemic side effects that can be seen after vaccination may occur immediately after vaccination or a few days later. While the side effects may depend on the content of the vaccine and environmental factors, the cause cannot be determined exactly. The allergic side effects of vaccines are rare but can be fatal. Although the risk of anaphylaxis is low with vaccines, nurses and patients should be prepared for appropriate interventions by monitoring possible side effects (8). Studies have reported that healthcare professionals have hesitations regarding vaccinations (9). For this, it is important to determine the side effects that develop in individuals who are administered the Covid-19 vaccine and the factors that are effective in this process. This study aims to determine the early period vaccine side effects in individuals who have been vaccinated against Covid-19.

METHODS AND MATERIALS

Study Design

This research is a descriptive study. The aim is to examine early side effects after Covid-19 vaccinations administered in a hospital in Turkey. In Turkey, the vaccination program started with the vaccination of health workers first in February 2021. There are two types of vaccinations, Sinovac and Pfizer-Biotech, and which vaccine will be given is based on the choice of people.

Participants

Study participants were selected from hospital staff who received the Covid-19 vaccine between February and March 2021 the Gülhane Training and Research Hospital in Ankara, Turkey. They were 321 participants, nearly 25 percent of all hospital staff. 80% of participants chose Pfizer- Biotech vaccine and 20% of participants chose the Sinovac vaccine. Questionnaires were administered to healthcare workers after the first dose of vaccine was administered.

Data Collections

The data were collected face-to-face with the questionnaire form created by the researchers. In the study, data were collected with the socio-demographic characteristics form and vaccine-related reactions form. In the Socio-demographic characteristics form, there are a total of 7 questions evaluating the age, gender, educational status, profession, and health status of individuals. Age

(categorized to 20-29, 30–39, and <40 years), gender, profession (nurse, doctor or laboratory worker) and participant department. In the form of vaccine-related reactions, there are 17 questions in which local and systemic side effects that may develop due to the vaccine are questioned. Reaction development time after vaccination and Covid-19 vaccine side effects; whether possible side effects (yes–no).

Analyses

The data of the study were analyzed in the IBM SPSS Statistics 23.0 package program. The categorical variables were given as numbers and percentages. For comparison, a t-test was run to examine the results of the two groups (Sinovac and Pfizer- Biotech) in this study.

Ethical Approval

The written permission of the ethics committee of Health Sciences University Hamidiye Scientific Research (numbered 16.03.2021-1112) and the Gülhane Training and Research Hospital Medical Specialization Education Board with the decision number E-50687469-799 allowed the study to be carried out. Written informed consent was obtained from the healthcare professionals participating in the study after the required information about the study was provided.

RESULTS

A total of 321 healthcare professionals filled out the questionnaire. The characteristics of the participants are given in Table 1. Out of 321 respondents, 179 (55.6%) were females and 142 (44.4%) were males. The majority of them (216, 67.1%) were nurses followed by laboratory workers 56 (17.4%), and physicians 49 (15.2%). Table 2 shows the side effect development time after two types of vaccinations. According to the results, most of the participants stated no serious adverse events. Comparing the side effects reported by the manufacturer with those reported by the participants of this study, similar results were noted. The results showed that there are some local and systematic side effects. The most common side effects are injection site pain, heat increase, whole body aches, and redness. Less common side effects are ınjection site swelling, itching, nettle rash, fever, headache. Rare side effects included injection site abscess, dysfunction, dizziness, lack of appetite, vomit, and anaphylaxis (Table 3).

Table 1. Characteristics of the Participants

Age	N	%
20-29	101	32.4
30-39	152	47.4
40 and above	68	21.2
Gender		
Female	179	55.6
Male	142	44.4
Job		
Nurse	216	67.1
Physician	49	15.2
Lab Worker	56	17.4
Department		
Internal Diseases Clinics	87	27
Surgical Clinics	73	22.7
Emergency Service	61	18.9
Intensive Care Units	74	23
Others	26	8.4

Table 2. Reaction Development Time after Vaccination

Type of vaccine	In the first 15 min.	In the first 30 min.	Within 24 hours	Within 48 hours	Within 72 hours	Other	p
Sinovac	2	2	4	-	-	59	0.69
Pfizer-Biotech	12	11	23	-	-	208	

DISCUSSION

In this study, we aimed to examine the side effects of the first dose of the Covid vaccine. In our study, participants mentioned some side effects, especially within 24 hours. After vaccination, anaphylaxis developed in the first 24 hours in 25 people who had Pfizer- Biotech and 3 people who had Sinovac. Severe side effects were observed in a nurse who received the Pfizer- Biotech vaccine was immediately intervened. The symptoms observed in the other participants were sudden onset of nettle rash, vomiting-diarrhea, and shortness of breath, and the side effects were treated with medication. These side effects were reported. The side effects developed in the other participants resolved spontaneously without any intervention. In our study, the majority of the side effects were injection site-related effects. The most common local adverse side effect was injection site pain, observed in 172 of 321 participants. Also, there are no significant differences in results between the two types of vaccines based on side effect development.

Table 3. Reactions by type of Vaccine

	Answer	Sinovac		Pfizer-Biotech		p
Local Reactions		**n**	**%**	**n**	**%**	
Injection Site Pain	**Yes**	31	46.3	141	55.5	0.18
	No	36	53.7	113	44.5	
Injection Site Swelling	**Yes**	12	17.9	33	12.9	0.3
	No	55	82.1	221	87.1	
Injection Site Heat Increase	**Yes**	22	32.8	78	30.7	0.74
	No	45	67.2	176	69.3	
Injection Site Redness	**Yes**	19	28.4	66	26.0	0.70
	No	48	71.6	188	74.0	
Injection Site Itching	**Yes**	10	14.9	26	10.2	0.28
	No	57	85.1	228	89.8	
Injection Site Abscess	**Yes**	4	6.0	5	2.0	0.1
	No	63	95.5	249	95.4	
Disfunction	**Yes**	3	4.5	12	4.7	0.62
	No	64	95.5	242	95.3	
Other	**Yes**	8	11.9	24	9.4	0.55
	No	59	88.1	230	90.6	
Systematic Reactions		**n**	**%**	**n**	**%**	
Urticaria / Skin Rash	**Yes**	13	19.4	54	21.3	0.74
	No	54	80.6	200	78.7	
Fever	**Yes**	17	25.4	54	21.3	0.47
	No	50	74.6	200	78.7	
Headache	**Yes**	10	14.9	39	15.4	0.93
	No	57	85.1	215	84.6	
Dizziness	**Yes**	1	1.5	5	2.0	0.63
	No	66	64.1	249	62.6	
Whole body aches	**Yes**	37	55.2	149	58.7	0.61
	No	30	44.8	105	41.3	
Lack of Appetite	**Yes**	1	1.5	12	4.7	0.21
	No	66	98.5	242	95.3	
Vomit	**Yes**	3	4.5	14	5.5	0.51
	No	64	95.5	240	94.5	
Anaphylaxis	**Yes**	3	4.5	25	9.8	0.17
	No	64	95.5	229	90.2	
Other	**Yes**	3	4.5	25	9.8	0.17
	No	64	95.5	229	90.2	

In our study, the incidence of serious adverse events was found to be low. Mild and transient side effects related to vaccination have been reported. Our results are also consistent with other studies among healthcare professionals. For example, a recent study reported majority of the side effects were mild side effects (55.9%) which included myalgia, malaise and feverish feeling and injection site-related side effects (25.2%) (10). In another study reported from South India, health care workers had minor adverse effects following immunization after the first dose (11). Another study found the rate of experiencing pain was 31.7% among those who were administered the inactive Covid-19 vaccine (12). Similar to these studies, Polack et al. reported that the most common side effect was pain at the injection site (13).

Concerns about the COVID-19 vaccine often arise from insufficient knowledge of a new vaccine and potential long-term side effects. People who have doubts about vaccines may refuse vaccines, delay vaccination, take some vaccines but refuse others (14). Healthcare workers can have a strong influence on vaccine hesitancy in the general population (15). Studies have found that vaccine hesitancy is higher among younger women (16 17). According to Kadoya et al. reported that middle-aged people had less doubts about vaccination than young and old people, and that women had more doubts about vaccination than men (18).

The sex of individuals also plays an important part in vaccine side effects. A study reported that the incidence rate of pain at the injection site of women was higher (19). Similarly, in a study in which two different vaccines were administered, it was reported that more reactions were seen in women (20). The results of these studies are similar to the literature that pain was experienced more by women.

One of the most common systemic side effects experienced after Covid-19 vaccination is high fever (21). This might be due to the dose of the medication increased (22). Heat increase might be caused by the presence of certain diseases, such as infection, chronic diseases. Another study showed that individuals with chronic illness experienced more vaccine side effects but no association with medication (23). The most important reason for vaccine hesitancy is the safety and possible side effects of the Covid vaccine (24). This study was conducted by healthcare professionals who have a higher level of knowledge about vaccines than the general public, which may help reduce public doubt about vaccination. Our study has several important public health implications. First, identifying the determinants associated with Covid-19 vaccination intent can help improve the success of future vaccination campaigns. Second, a safe and effective vaccine can be seen as a measure to help control the Covid-19 pandemic.

CONCLUSIONS

In clinical studies and current vaccine applications, serious side effects of Covid-19 vaccines have not been encountered so far. Side effects after vaccination are often mild. Healthcare workers are a particularly important risk group for whom effective vaccination protection is required due to the risk of infection at work. One of the frequently cited reasons for vaccine hesitations among these groups is concern about side effects. Vaccination of the healthcare worker should help clear up vaccine hesitancy among the population. When the risks of exposure and severe illness and the negative impact of the disease on the functioning of social life were evaluated, the side effects observed after vaccination showed an acceptable safety profile.

Limitations

The limitation of the study in terms of generalization is that it was conducted in a training and research hospital in the province of Ankara. Research results cannot be generalized to all healthcare professionals.

DECLARATIONS

Funding

This research received no specific Grant from any funding agency in the public, commercialor not-for-profit sectors.

Conflict of Interest

All authors declared that there is no conflict of interests with any financial organization regarding the material discussed in the paper.

Contributions

Study design: SA, NYŞ, NYA; data collection and analysis: NYŞ; Manuscript preparation: NYŞ, SA, NYA

Ethical Approval

The written permission of the ethics committee of Health Sciences University Hamidiye Scientific Research (numbered 16.03.2021-1112) and the Gülhane Training and Research Hospital Medical Specialization Education Board with the decision number E-50687469-799 allowed the study to be carried out.

REFERENCES

1. Kadali RAK, Janagama R, Peruru S, et al. Non-life-threatening adverse effects with COVID-19 mRNA-1273 vaccine: A randomized, cross-sectional study on healthcare workers with detailed self-reported symptoms. J Med Virol. 2021;93(7):4420-4429. doi:10.1002/jmv.26996
2. Hughes MM, Groenewold MR, Lessem SE, et al. Update: Characteristics of Health Care Personnel with COVID-19- United States, February 12-July 16, 2020. MMWR Morb Mortal Wkly Rep. 2020;69(38):1364-1368. doi:10.15585/mmwr.mm6938a3
3. Güngör S, Örün E. SARS-CoV-2 Aşı Çalışmaları. YIU Saglik Bil Derg. 2020;1:42–47.
4. Robertson E, Reeve KS, Niedzwiedz CL, et al. Predictors of COVID-19 vaccine hesitancy in the UK household longitudinal study. Brain Behav Immun. 2021;94:41-50. doi:10.1016/j.bbi.2021.03.008
5. Brandt EJ, Rosenberg J, Waselewski ME, Amaro X, Wasag J, Chang T. National Study of Youth Opinions on Vaccination for COVID-19 in the U.S. J Adolesc Health. 2021;68(5):869-872. doi:10.1016/j.jadohealth.2021.02.013
6. Ritchie, H., Mathieu, E., Rodés-Guirao, L., Appel, C., Giattino, C., Ortiz-Ospina, E., & Roser, M. Coronavirus pandemic (COVID-19). Our World in Data. 2020. Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/coronavirus' [Online Resource]
7. Remmel A. COVID vaccines and safety: what the research says. Nature. 2021;590(7847):538-540. doi:10.1038/d41586-021-00290-x
8. El-Shitany NA, Harakeh S, Badr-Eldin SM, et al. Minor to Moderate Side Effects of Pfizer-BioNTech COVID-19 Vaccine Among Saudi Residents: A Retrospective Cross-Sectional Study. Int J Gen Med. 2021;14:1389-1401. doi:10.2147/IJGM.S310497
9. Grech V, Gauci C, Agius S. Vaccine hesitancy among Maltese Healthcare workers toward influenza and novel COVID-19 vaccination. Early Hum Dev. 2020;105213. doi:10.1016/j.earlhumdev.2020.105213
10. Adhikari P, Adhikari K, Gauli B, Sitaula D. Acceptance of COVID-19 vaccine and pattern of side effects in Nepalese context: a post-vaccine cross-sectional study among health care workers in a tertiary care hospital. Journal of Chitwan Medical College. 2021;11(36):34-38.
11. Inbaraj LR, George CE, Franklyn NN. How safe is Covishield (ChAdOx1nCoV-19) Vaccine? Experience from a Tertiary Care Hospital in South India. Curr Med Issues 2021;19:162-4. doi:10.4103/cmi.cmi_50_21
12. Abu-Hammad O, Alduraidi H, Abu-Hammad S, et al. Side Effects Reported by Jordanian Healthcare Workers Who Received COVID-19 Vaccines. Vaccines (Basel). 2021;9(6):577. doi:10.3390/vaccines9060577.
13. Polack FP, Thomas SJ, Kitchin N, et al. Safety and Efficacy of the BNT162b2 mRNA Covid-19 Vaccine. N Engl J Med. 2020;383(27):2603-2615. doi:10.1056/NEJMoa2034577
14. World Health Organization. Report of the SAGE Working Group on Vaccine Hesitancy The Strategic Advisory Group of Experts; World Health Organization: Geneva, Switzerland, 2020.
15. Karafillakis E, Dinca I, Apfel F, et al. Vaccine hesitancy among healthcare workers in Europe: A qualitative study. Vaccine. 2016;34(41):5013-5020. doi:10.1016/j.vaccine.2016.08.029
16. Mohan S, Reagu S, Lindow S, Alabdulla M. COVID-19 vaccine hesitancy in perinatal women: a cross sectional survey. J Perinat Med. 2021;49(6):678-685. doi:10.1515/jpm-2021-0069
17. Berenson AB, Chang M, Hirth JM, Kanukurthy M. Intent to get vaccinated against COVID-19 among reproductive-aged women in Texas. Hum Vaccin Immunother. 2021;17(9):2914-2918. doi:10.1080/21645515.2021.1918994
18. Kadoya Y, Watanapongvanich S, Yuktadatta P, Putthinun P, Lartey ST, Khan MSR. Willing or Hesitant? A Socioeconomic Study on the Potential Acceptance of COVID-19 Vaccine in Japan. Int J Environ Res Public Health. 2021;18(9):4864. doi:10.3390/ijerph18094864
19. Riad A, Sağıroğlu D, Üstün B, et al. Prevalence and Risk Factors of CoronaVac Side Effects: An Independent Cross-Sectional Study among Healthcare Workers in Turkey. J Clin Med. 2021;10(12):2629. doi:10.3390/jcm10122629

20. Menni C, Klaser K, May A, et al. Vaccine side-effects and SARS-CoV-2 infection after vaccination in users of the COVID Symptom Study app in the UK: a prospective observational study. Lancet Infect Dis. 2021;21(7):939-949. doi:10.1016/S1473-3099(21)00224-3

21. Song JY, Cheong HJ, Kim SR, et al. Early Safety Monitoring of COVID-19 Vaccines in Healthcare Workers. J Korean Med Sci. 2021;36(15):e110. doi:10.3346/jkms.2021.36.e110

22. Zhang Y, Zeng G, Pan H, et al. Safety, tolerability, and immunogenicity of an inactivated SARS-CoV-2 vaccine in healthy adults aged 18-59 years: a randomised, double-blind, placebo-controlled, phase 1/2 clinical trial. Lancet Infect Dis. 2021;21(2):181-192. doi:10.1016/S1473-3099(20)30843-4

23. Zhang MX, Zhang TT, Shi GF, et al. Safety of an inactivated SARS-CoV-2 vaccine among healthcare workers in China. Expert Rev Vaccines. 2021;20(7):891-898. doi:10.1080/14760584.2021.1925112

24. Alabdulla M, Reagu SM, Al-Khal A, Elzain M, Jones RM. COVID-19 vaccine hesitancy and attitudes in Qatar: A national cross-sectional survey of a migrant-majority population. Influenza Other Respir Viruses. 2021;15(3):361-370. doi:10.1111/irv.12847

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 221-227
https://doi.org/10.31067/acusaglik.1077374

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI Public Environmental and Occupational Health / Halk ve Çevre Sağlığı

Comparison of Psychological Well-Being of Surgical and Non-Surgical Specialty Physicians Working in a Hospital using the General Health Questionnaire-28 (GHQ-28)

Tolga Eroğlu[1], Defne Altuğ[1], Alagül Erdem[1], İlkim Nira Yerlikaya[2], Nadi Bakırcı[3]

[1]Acıbadem Mehmet Ali Aydınlar University School of Medicine, Medical Student, Istanbul, Turkey

[2]Başkent University, Faculty of Law, Student, Ankara, Turkey

[3]Acıbadem Mehmet Ali Aydınlar University School of Medicine, Department of Public Health, Istanbul, Turkey

Tolga EROĞLU
Defne ALTUĞ
Alagül ERDEM
İlkim Nira YERLİKAYA
Nadi BAKIRCI

Correspondence: Tolga Eroğlu
Acıbadem Mehmet Ali Aydınlar University School of Medicine, Medical Student, Istanbul, Turkey
Phone: -
E-mail: tolgaeroglu00@gmail.com

Received: 22 February 2022
Accepted: 31 December 2022

ABSTRACT

Purpose: Psychological well-being of a physician affects the physician's mental and physical health, even the patient-physician relationship. This article aims to evaluate and compare the psychological well-being of surgeons and internists in a hospital and to investigate the relationship with relevant variables.

Method: Full-time physicians working in a private hospital in Istanbul between 15-30 April 2019 participated in this study. With General Health Questionnaire-28 (GHQ-28), the frequency of Probable Psychiatric Cases (PPCs) was determined. The GHQ-28 results were compared with the physician's specialty, demographic information, and answers to the job satisfaction questions that we prepared. Moreover, the relationship between these answers and the physician's specialty was evaluated.

Results: 84 (37.3%) of 225 physicians (Confidence Level= 95%, Margin of Error= 8%) participated in the study. 19 (22.6%) physicians were found a PPC with a GHQ-28 score of ≥5. Of these 19 people, 11 were surgeons and 8 were internists. The frequency of PPCs was found as 25.6% in surgeons and 19.5% in internists (p>0.05). While 90.8% of non-PPCs were satisfied with their working environment, this rate was 68.4% in PPCs (p=0.038). There was no significant difference in the answers to job satisfaction questions between the surgeons and internists (p>0.05).

Conclusion: There was no relationship between the physician's specialty and being a PPC. A relationship was found between not being a PPC and being satisfied with the physician's working environment and it should be considered in the evaluation of the mental health of the physicians.

Keywords: Physician, Specialty, Psychological Well-Being, General Health Questionnaire-28, Probable Psychiatric Case, Job Satisfaction

Bir Hastanede Çalışan Cerrahi ve Dahili Branş Hekimlerinin Psikolojik İyi Oluşlarının Genel Sağlık Anketi 28 (GSA-28) ile Karşılaştırılması

ÖZET

Amaç: Hekimin psikolojik iyi oluşu, hekimin ruh ve beden sağlığını, hatta hasta-hekim ilişkisini etkiler. Bu makale, bir hastanede cerrahların ve dahili branş hekimlerinin psikolojik iyi oluş hallerini değerlendirmeyi, karşılaştırmayı ve ilgili değişkenlerle ilişkisini araştırmayı amaçlamaktadır.

Yöntem: Bu çalışmaya 15-30 Nisan 2019 tarihleri arasında İstanbul'da özel bir hastanede tam zamanlı çalışan hekimler katılmıştır. Genel Sağlık Anketi-28 (GSA-28) ile Olası Psikiyatrik Vakaların (OPV) sıklığı belirlendi. GSA-28 sonuçları hekimin uzmanlık alanı, demografik bilgileri ve hazırladığımız mesleki tatmin sorularına verilen yanıtlar ile karşılaştırıldı. Ayrıca bu yanıtların hekimin uzmanlığı ile ilişkisi değerlendirilmiştir.

Bulgular: Çalışmaya 225 hekimden 84'ü (%37,3) (Güven Aralığı= %95, Hata Marjı= %8) katıldı. 19 (%22,6) hekim GSA-28 skoru ≥5 olarak OPV bulundu. Bu 19 kişiden 11'i cerrah, 8'i dahiliye uzmanıydı. OPV sıklığı cerrahlarda %25,6, dahiliyecilerde %19,5 olarak bulundu (p>0,05). OPV olmayan hekimlerin %90,8'i çalışma ortamlarından memnun iken, OPV olan hekimlerde bu oran %68,4'di (p=0,038). Cerrahlar ve dahili branş hekimleri arasında mesleki tatmini sorularına verilen yanıtlar arasında anlamlı farklılık yoktu (p>0.05).

Sonuç: Hekimin uzmanlık alanı ile OPV olması arasında bir ilişki bulunmamıştır. OPV olmak ile hekimin çalışma ortamından memnun olması arasındaki ters ilişki göz önüne alındığında, hekimlerin ruh sağlığı değerlendirilirken bu ilişkinin sorgulanması önerilmektedir.

Anahtar Kelimeler: Hekim, Uzmanlık, Psikolojik İyi Oluş, Genel Sağlık Anketi-28, Olası Psikiyatrik Vaka, Mesleki Tatmin

Psychological well-being has an impact on physicians' health, which influences physicians' job satisfaction, quality of patient care, and safety (1). Such negative impacts can have an adverse effect on a clinician's work performance and decision-making capacity and may threaten patient safety (2). Furthermore, physicians' personal life may be adversely affected by substance abuse, damaged relationships, and disrupted family life (2). Varieties in medicinal service strategies, increased workload, clinical responsibilities, making choices in clinically questionable situations, and the possibility of malpractice due to natural stressors already influence physicians' stress levels which affect their psychology (3). Consequently, other mental diseases, such as anxiety, depression, and burnout might develop as a result of a delay in recognizing and treating precursor conditions (2). Studies assessing the psychosocial aspects of work stress show that burnout is frequent among healthcare workers (1,4,5). Additionally, physician burnout rates change between medical specialties (6). There are other variables possibly affecting physicians' psychological well-being: age, gender, marital status, years in medicine and specialty, and years in the working environment. When physicians' job satisfaction decreases, a vicious cycle of disruptions in physicians' professional practice, poorer healthcare services, and lower job satisfaction might be created. Concerns about the mental health effects of this condition on physicians cannot be ignored, in addition to the pressure on the healthcare system. Therefore, examining the psychological well-being and job satisfaction of physicians might be significant to be aware of the ongoing situation. These suggestions for implementation should prompt an increase in physicians' mental health which is necessary to define a physician as healthy (1,3,5).

This study aims to demonstrate the difference between the psychological well-being in surgical and non-surgical departments (surgeons and internists, respectively) because of professional differences between them, and demographic characteristics comparatively by using General Health Questionnaire-28 (GHQ-28). Questions related to job satisfaction were prepared to study whether there is an association between the physician's psychological well-being and job satisfaction. With the results, it will be possible to classify the physicians into probable psychiatric cases (PPC) and probable non-psychiatric cases (non-PPCs) groups regarding their psychological well-being status, discuss the relationship between other variables and emphasize ongoing stressor factors.

MATERIALS AND METHODS

A descriptive study design (cross-sectional) was designed to detect the frequency of probable psychiatric cases (PPCs) and the job satisfaction of surgeons and internists. This study was approved by_(blinded)_. The research was conducted between 15-30 April 2019. The target population was defined as all of the medical physicians who work full-time in a private hospital in Istanbul. Among 252 physicians, 225 were found suitable for the study. It was planned to reach all specialties with at least 1 physician from each specialty. Questionnaires were handed over to all physicians by the researchers or physician's assistants. Physicians were delivered an informed consent form, a structured questionnaire about demographic characteristics, job satisfaction questions, and GHQ-28 (Turkish version). Participants were asked to fill out a self-administered questionnaire anonymously.

The first part of the questionnaire included general sociodemographic questions (gender, age, marital status, number of children), questions about their profession (specialty, years as a specialist, years at this hospital), and 8 job satisfaction questions. The independent variables were determined as those sociodemographic data and data on occupational characteristics. The second part is the General Health Questionnaire-28 itself. The dependent variables were the GHQ-28 results and answers to job satisfaction questions.

Job satisfaction questions were prepared by the researchers, directed to find how satisfied the physicians were with their job. As given in Table 3, there were 8 independent questions. Participants responded to each question by selecting one of the five choices: *1=Strongly Agree, 2=Agree, 3=Unsure, 4=Disagree, 5=Strongly Disagree*. Choices 1 and 2 are accepted as I *Agree*. Choices number 3, 4, and 5 are accepted as I *Disagree*. Each question was evaluated independently from each others to explore whether there is a significant relationship with the General Health Questionnaire-28 scores (7).

The General Health Questionnaire-28 (GHQ-28) was developed by Goldberg in 1978 and adapted to Turkish by Kılıç in 1996 (7-9). The GHQ-28 is comprised of 28 items, 7

of which are formulated in a positive manner (e.g., Do you feel perfectly well and in good health?), and 21 of which are formulated in a negative manner (e.g., Do you feel sick?). In the case of the positive items, the following scale is used: *1=more than usual, 2=as usual, 3=less than usual, 4=much less than usual*. In the case of the negative items, the following scale is used: *1=not at all, 2=not more than usual, 3=a little more than usual, 4=much more than usual*. The remaining 3 items use two other different types of response scales. The traditional scoring method of GHQ-28 is by giving 0 points for the 1st, 2nd choices and 1 point for the 3rd, 4th choices (8). Even though a high GHQ-28 score indicates a probable psychiatric case, the threshold for being or not being a probable psychiatric case varies. The User's Guide for the GHQ recommends that the best threshold score is determined in each country or setting in which it is intended to be used. The cut-off point that will be used in this study is 5, as it is reported to be 73.7% sensitive by Kılıç (9). The items were summed and participants with a score equal to or greater than 5 were considered a probable psychiatric case, and score less than 5 were considered a probable non-psychiatric case.

Statistical Analysis

In order to understand whether the physician's specialty affects the frequency of probable psychiatric cases, the Chi-Square Test of Independence was used because the variables were nominal and the distribution is non-parametric. Similarly, whether the frequency of PPCs depends on the physician's gender, marital status, and the number of children was analyzed by the Chi-Square Test of Independence. To determine the difference between the ages, years as a specialist, and years in this particular hospital of the PPCs and non-PPCs, the Mann-Whitney U test was used. Relationships between answers to job satisfaction questions to i) GHQ-28 results, and ii) physicians' specialty were analyzed with the Chi-Square Test of Independence. Analyses were done at R Studio and Mini-Tab programs.

RESULTS

Among 225 physicians working at this hospital, 84 (37.3%) of the physicians participated in the study. Some physicians could not be reached during the 2 weeks and some of them were discarded from the study because they did come to the hospital every working day and it was thought that this could affect the GHQ-28 scores and answers to job satisfaction questions. 49 (58.3%) of these 84 participants were male and 35 (41.7%) were female. The mean age of all the participants was 47.1; the mean age of males was 47.9, and females was 45.9. 43 (51.2%) participants were surgeons and the other 41 (48.8%) were internists. 68 (81.0%) of the participants were married, 10 (11.9%) were single and 6 (7.1%) were divorced. 16 (19.1%) participants had no children, 36 (42.9%) had 1 child, 29 (34.5%) had 2 children and 3 (3.5%) had 3 children. These results were given in Table 1.

The mean GHQ-28 score of the participants was calculated as 2.90 and the maximum GHQ-28 score was found as 16. 19 (22.6%) physicians out of 84 had a GHQ-28 score≥5 which were interpreted as PPCs and their mean GHQ-28 score was 9. On the other hand, the mean GHQ score of non-PPCs was 1.1. Among the 19 PPCs, 11 of them were surgeons and 8 from internists. In surgeons, the frequency of PPCs was higher, at 25.6% compared to 19.5% in internists. This difference was not found to be significant. ($p>0.05$). It was found that females had a higher PPCs frequency (22.9%) than males (22.5%) however this difference is not statistically significant ($p>0.05$). The frequency of PPCs for married participants was 22.1%, 40.0% for single, and 0.0% for divorced. The highest frequency of PPCs was found in single physicians, but this difference was not found to be statistically significant ($p>0.05$). The frequency of PPCs was highest for participants without children, 31.3%, and was lowest, 0.0% in participants with 3 children; physicians with 1 child had a frequency of 22.2% and 2 children had 20.7% probable psychological case frequency. This difference was not found significant ($p>0.05$).

The median ages of the PPCs and non-PPCs were 43 and 48 years respectively. Even though younger physicians had a higher frequency of PPCs, this difference is not significant (p-value = 0.056). The median number of years at this hospital of physicians is 5 years for both PPCs and non-PPCs. Mann-Whitney U test did not demonstrate a statistical significance ($p>0.05$). The median numbers of years as a specialist were 4 and 9 years for PPCs and non-PPCs respectively. Even though the non-PPCs worked longer as a specialist, this difference is not significant ($p>0.05$). These results were shown in Table 2.

Table 1: Demographic Information of Physicians with the Comparison of their GHQ-28 Scores				
	GHQ-28 ≥ 5 (Possible Psychiatric Cases)	GHQ-28 < 5 (Possible Non-Psychiatric Cases)	**TOTAL**	Chi-Square p-value
Surgeons	11 (25.6%)	32 (74.4%)	**43 (51.2%)**	X: 0.442 p: 0.621
Internists	8 (19.5%)	33 (80.5%)	**41 (48.8%)**	
TOTAL	19 (22.6%)	65 (77.4%)	**84**	
Female (mean age:45.9)	8 (22.9%)	27 (77.1%)	**35 (41.7%)**	X: $0.717x10^{-32}$ p:1.000
Male (mean age: 47.9)	11 (22.5%)	38 (77.5%)	**49 (58.3%)**	
Married	15 (22.0%)	53 (78.0%)	**68 (81.0%)**	X: 3.492 p: 0.198
Single	4 (40.0%)	6 (60.0%)	**10 (11.9%)**	
Divorced	0 (0.0%)	6 (100.0%)	**6 (7.1%)**	
No children	5 (31.3%)	11 (68.8%)	**16 (19.1%)**	X: 1.623 p: 0.677
1 child	8 (22.2%)	28 (77.8%)	**36 (42.9%)**	
2 children	6 (20.7%)	23 (79.3%)	**29 (34.5%)**	
3 children	0 (0.0%)	3 (100.0%)	**3 (3.5%)**	

Table 2: Physicians' Age, Years in this Hospital and Years as a Specialist and their GHQ-28 Scores							
		Minimum	First Quartile	Median	Third Quartile	Maximum	MWU p-value
Age	GHQ-28 ≥ 5	26.0	35.5	43.0	49.5	65.0	0.056
	GHQ-28 < 5	28.0	40.0	48.0	56.0	71.0	
Years in this hospital	GHQ-28 ≥ 5	0.2	1.8	5.0	15.0	23.0	0.838
	GHQ-28 < 5	0.1	2.0	5.0	12.0	23.0	
Years as a specialist	GHQ-28 ≥ 5	0.0	4.0	14.0	20.5	40.0	0.095
	GHQ-28 < 5	2.0	9.0	18.0	25.0	42.0	

Table 3 demonstrated 8 job satisfaction questions and relationships with GHQ-28 results and physicians' specialties. Among the 8 questions, it was found that there was a statistically significant relationship between job satisfaction and being a PPC in the 8th question (I am generally satisfied with my work environment.) with the Chi-Square Test of Independence analysis. The non-PPCs more agreed in frequency (90.8%) that they were satisfied with their work environment than the PPCs (68.4%) (p-value = 0.038). Other questions (2-7) did not demonstrate a statistically significant relationship between answers to job satisfaction questions and being a PPC. Table 3 also demonstrated the specialty of the participants and their answers to these 8 questions. By Chi-Square Test of Independence, it was found that there was no statistically significant relationship between the specialties and answers to any job satisfaction questions.

DISCUSSION

People with possible psychological disorders can be evaluated with GHQ-28, which is capable of detecting acute mental changes for 2 weeks and a measure of current mental health (9). GHQ-28 is proved to be a valid and trustworthy instrument across cultures including Turkey, and it detects a wide range of psychiatric problems, primarily on the anxiety/depression spectrum (9). Patients are classified by the GHQ-28 or its variant GHQ-12 as "probable psychiatric cases" or "probable non-psychiatric cases" which we preferred to use for class names (10). Some researchers used other descriptions for the term "probable psychiatric case" as "high risk of acute distress", "psychological morbidity", "having mental health issues", or "GHQ≥5" (11-14).

Table 3: Relationship Between Physicians' GHQ-28 Scores, Specialty and Job Satisfaction Questions (Chi-Square)

		Being a Possible Psychiatric Case			Physicians' Specialties			
Job Satisfaction Questions		**GHQ-28 ≥ 5 (%) (n:19)**	**GHQ-28 < 5 (%) (n:65)**	**p-value**	**Surgeons (%) (n:43)**	**Internists (%) (n:41)**	**p-value**	**Total (%)**
1. If I could go back in time I would choose to be a doctor again.	**Agree**	12 (63.2)	51 (78.5)	0.290	28 (65.1)	35 (85.4)	0.059	63 (75.0)
	Disagree	7 (36.8)	14 (21.5)		15 (34.9)	6 (14.6)		21 (25.0)
2. My current job meets my dreams in college.	**Agree**	12 (63.2)	47 (72.3)	0.630	32 (74.4)	27 (65.8)	0.536	59 (70.2)
	Disagree	7 (36.8)	18 (27.7)		11 (25.6)	14 (14.2)		25 (29.8)
3. My job is satisfactory enough.	**Agree**	13 (68.4)	55 (84.6)	0.211	35 (81.4)	33 (80.5)	1.00	68 (81.0)
	Disagree	6 (31.6)	10 (15.4)		8 (18.6)	8 (19.5)		16 (18.0)
4. I am very satisfied that I have chosen this specialty.	**Agree**	16 (84.2)	54 (83.0)	1.000	38 (88.4)	32 (78.1)	0.329	70 (83.3)
	Disagree	3 (15.8)	11 (17.0)		5 (11.6)	9 (21.9)		14 (16.7)
5. If I could go back in time I would choose this specialty again.	**Agree**	10 (52.6)	49 (75.4)	0.105	32 (74.4)	27 (65.8)	0.536	59 (70.2)
	Disagree	9 (47.4)	16 (24.6)		11 (25.6)	14 (34.2)		25 (29.8)
6. I do my job with the pleasure I had on my first day.	**Agree**	11 (57.9)	51 (78.5)	0.134	34 (79.0)	28 (68.3)	0.382	62 (73.8)
	Disagree	8 (42.1)	14 (21.5)		9 (21.0)	13 (31.7)		22 (26.2)
7. My workload is too heavy to spend time for other things	**Agree**	14 (73.7)	46 (70.8)	1.000	32 (74.4)	28 (68.3)	0.704	60 (71.4)
	Disagree	5 (27.3)	19 (29.2)		11 (25.6)	13 (31.7)		24 (28.6)
8. I am generally satisfied with my work environment.	**Agree**	13 (68.4)	59 (90.8)	**0.038***	37 (86.0)	35 (85.4)	1.000	72 (85.7)
	Disagree	6 (31.6)	6 (9.2)		6 (14.0)	6 (14.6)		12 (14.3)

The overall frequency of probable psychiatric cases was found to be 22.6% in the sample by using GHQ-28, which is lower than other studies using GHQs. In a study done on emergency physicians using the GHQ-28, a higher frequency, 36.8%, of mental health issues was found (12). Another study found that physicians with GHQ≥5 compromised 41.2% of the sample (13). By using GHQ-12 scores, a study on military physicians found psychological morbidity at 28.3% (14). In addition to studies using GHQs, different questionnaires were used in other research focusing on physicians' psychological well-being. A study done in China with a great response rate (overall response rate of 96.46% from 59 hospitals), estimates the frequency at 25.7% in 2641 participants with the anxiety and depression questionnaire they created and additional questionnaires (15). Being a probable psychiatric case (PPC) was linked to the onset of a variety of psychological and mental disorders, including anxiety, sadness, and substance dependence (2). These can have severe emotional and professional effects, as well as major issues for healthcare organizations which are aforementioned (2).

Another important aspect of this study is establishing a relationship between job satisfaction and specialty. The frequency of PPCs was found to be higher in surgeons (25.6%) than in internists (19.5%); although the lack of statistical significance and low response rate may suggest the need for a study having a larger sample size. Similar to this finding, there was no statistically significant difference in burnout or stress between the scores of 79 internal medicine and surgical specialists in another study done in a hospital in Istanbul (p>0.05) (16). Using the Maslach Burnout Inventory (MBI), Shanafelt et al. examined 7905 members of the American College of Surgeons and discovered that 40% of the surgeons were at high risk of burnout and the United Kingdom Ear, Nose and Throat surgeons' burnout prevalence rate was determined as 28.9% with GHQ-12 (17,18). Accordingly, it can be interpreted that the frequency of cases in the surgical specialties in our study is lower.

Our study found a relationship between age and psychological well-being on borderline significance (p=0.056). The median age of the PPCs, 43, is lower than the non-PPCs, 48. Further studies can be done on physicians to understand why younger physicians have higher GHQ scores compared to older. Stone et al. found that the decline in the percentage of respondents reporting stress begins in the mid-40s, accelerates downward at about age 57, and continues at slower rates at around age 75 (19). Shanafelt et al. (20) discovered a negative relation between burnout and professional experience time. The higher proportions of burnout levels in young specialists could be ascribed to their generally lower work understanding and lack of experience in coping with work stress (21).

According to statistical analysis, there is a significant relationship between being a PPC and work environment satisfaction. Non-PPCs were more likely (90.8%) to state that they are satisfied with their work environment than the PPCs (68.4%) (p-value= 0.038, highlighting a relationship. This relationship might become important in terms of awareness of ongoing conditions. Various professional organizations have set up programs to encourage awareness and assist in early treatment to address such common illnesses in the UK (18).

Our research was done in April 2019, and today physicians need to cope with the COVID-19 pandemic as well as the usual stressors of the medical profession. World Health Organization declared COVID-19 a global pandemic in early March 2020 (WHO, 2020). This is noteworthy since a recent systematic review and meta-analysis of 33,062 participants found that healthcare workers during the outbreak had high rates of depression (22.8%) and anxiety (23.2%) (22). Interestingly, our frequency was 22.6%, nearly the same as the current depression rate, however because of our limitations there can not be a direct comparison.

In this study, the number of participants is limited (84 people out of 225 were enrolled in this study (37.3%)). It is mainly a result of having limited time and the busyness of the physicians. Lower response rates of physicians (37.5%, among 173 physicians) were encountered in other studies as well (14). Additionally, this study only enrolls private hospital physicians, not state or university hospitals. As a result, this study is not an ideal presentation of the population and cannot be generalized. Another limitation of this study was the heterogeneous structure of the sample group in contrast to its low response rate. Since the sample group included physicians from over 20 specialties, it was not possible to reach inferences concerning explicit specialties or working conditions. Questionnaire questions were completely dependent on personal statements. However, in further studies, it might be interesting to go in-depth in exploring psychological well-being and job satisfaction of individual specialties. Methodological limitation stems from the study's descriptive nature and data collection method, which makes trouble in finding out causality and generalizability of the results to the entire population. We were concerned that to reach a higher sample size, one would need a questionnaire that is shorter and can detect psychological changes lasting more than 2 weeks to reach all of the physicians, which could increase the response rate. We believe that our study's results will be valuable in following up on the aftereffects of basic changes in Turkey, and it is one of the few examples of GHQ-28 being used on physicians. Generation and sharing of reliable data on physicians' psychological well-being are significant and valuable to execute healthcare changes shortly. The study and the journal are in the same institution and do not include any supporting findings other than this statement.

CONCLUSION

Being a PPC is an important issue for physicians' overall health and eventually affects public health. PPCs can be detected by GHQ-28, and the frequency of the PPCs was within normal limits in this study. There was no significant difference determined between the frequency of PPCs in surgeons and internists; on the other hand, a relationship between work environment satisfaction and being a PPC was found. Improvements in workplace conditions might be valuable to augment the mental health of physicians.

DECLARATIONS

Acknowledgement

We would like to thank Yılmaz Onat Köylüoğlu for making the necessary edits to the language of the article.

Ethics Approval

Ethical approval that the study was ethically appropriate was obtained with decision number 2019-04/33 on 28.02.2019 from the Medical Research Evaluation Board of Acıbadem Mehmet Ali Aydınlar University.

REFERENCES

1. Williams ES, Skinner AC. Outcomes of physician job satisfaction: a narrative review, implications, and directions for future research. Health Care Manage Rev, 2003; 28:119–40.
2. Upton D, Mason V, Doran B, Solowiej K, Shiralkar U, Shiralkar S. The experience of burnout across different surgical specialties in the United Kingdom: a cross-sectional survey. Surgery, 2012; 151(4):493e501.
3. Yates SW. Physician Stress and Burnout. The American journal of medicine, 2020; 133(2), 160–164.
4. Rotenstein LS, Torre M, Ramos MA, Rosales RC, Guille C, Sen S, & Mata DA. Prevalence of Burnout Among Physicians: A Systematic Review. JAMA, 2018; 320(11), 1131–1150.
5. Wallace JE, Lemaire JB, Ghali WA. Physician wellness: a missing quality indicator. Lancet, 2009; 374: 1714–21.
6. Medscape 2015 Physician Lifestyle Report. www.medscape.com/sites/public/lifestyle/2015 (17 December 2020, date last accessed).
7. Sterling M. General Health Questionnaire – 28 (GHQ-28). Journal Of Physiotherapy. 2011; 57(4): 259.
8. Kadioglu H, Ergun A, & Yildiz A. Screening of mental health problems with GHQ-28 in a sample of Turkish community dwelling adult people. Journal Of Marmara University Institute Of Health Sciences, 2013; 1.

9. Kilic C, Rezaki M, Rezaki B, Kaplan I, Ozgen G, Sağduyu A, Oztürk MO. General Health Questionnaire (GHQ12 & GHQ28): psychometric properties and factor structure of the scales in a Turkish primary care sample. Soc Psychiatry Psychiatr Epidemiol. 1997 Aug; 32(6):327-31. Doi: 10.1007/BF00805437. PMID: 9299926.
10. Goldberg D, Williams P. A users guide to the General Health Questionnaire. NFER e Nelson Publishing; 1988.
11. Bizri M, Kassir G, Tamim H, Kobeissy F, Hayek SE. Psychological distress experienced by physicians and nurses at a tertiary care center in Lebanon during the COVID-19 Outbreak. Journal of Health Psychology, 2021; Feb. https://doi.org/10.1177/1359105321991630
12. Momeni M, Fahim F, Vahidi E, Nejati A, Saeedi M. Evaluation of factors affecting psychological morbidity in emergency medicine practitioners. World Journal of Emergency Medicine, 2016; 7(3), 203. https://doi.org/10.5847/wjem.j.1920-8642.2016.03.007
13. Assadi SM, Nakhaei MR, Najafi F, Fazel S. Mental health in three generations of Iranian medical students and doctors. Social Psychiatry and Psychiatric Epidemiology, 2006; 42(1), 57–60. https://doi.org/10.1007/s00127-006-0130-7
14. Tzeng, DS, Chung WC, Fan PL, Lung FW, Yang CY. Psychological morbidity, quality of life and their correlations among military health care workers in Taiwan. Industrial Health, 2009; 47(6), 626–634. https://doi.org/10.2486/indhealth.47.626
15. Gong Y, Han T, Chen W, et al. Prevalence of anxiety and depressive symptoms and related risk factors among physicians in China: a cross-sectional study. PLoS One. 2014; 9(7): e103242.
16. Algül R, Yılmaz D, Özer Ü, Kaya B. Variables affecting burnout levels among medical doctors working in internal and surgical branches and the relationship of burnout with work engagement and Organizational Commitment. Journal of Clinical Psychiatry, 2016; 19(4), 176–184. https://doi.org/10.5505/kpd.2016.92485
17. Shanafelt TD, Balch CM, Bechamps GJ, Russell T, Dyrbye L, Satele D, et al. Burnout and career satisfaction among American Surgeons. Ann Surg 2009; 250(3), 463-71.
18. Vijendren A, Yung M, Shiralkar U. Are Ent surgeons in the UK at risk of stress, Psychological Morbidities and burnout? A national questionnaire survey. The Surgeon, 2018; 16(1), 12–19. https://doi.org/10.1016/j.surge.2016.01.002
19. Stone AA, Schneider S, Broderick JE. Psychological stress declines rapidly from age 50 in the United States: Yet another well-being paradox. Journal of Psychosomatic Research. 2017; 103, 22–28. Doi: 10.1016/j.jpsychores.2017.09.016
20. Shanafelt TD, Sloan JA, Habermann TM. The well-being of physicians. Am J Med. 2003; 114: 513-519.
21. Ozyurt A, Hayran O, Sur H. Predictors of burnout and job satisfaction among Turkish physicians. QJM. 2006; 99, 161-169.
22. Pappa S, Ntella V, Giannakas T, et al. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. Brain, 2020; Behavior, and Immunity 88: 901–907.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 228-234
https://doi.org/10.31067/acusaglik.1238538

Evaluation of The Relationship Between Addiction-like Eating Behavior, Mindful Eating, and Obesity in Adults

Betül Kocaadam-Bozkurt[1]

[1]Erzurum Technical University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Erzurum, Türkiye

ABSTRACT

Purpose: This study aimed to evaluate the relationship between addictive-like eating behavior, mindful eating, and obesity and the factors affecting them.

Materials and Methods: This study was conducted with 459 adults (47.7% male, 52.3% female, mean age 27.2±10.52 years). The study data were obtained with a web-based questionnaire. The questionnaire form includes the socio-demographic characteristics, anthropometric measurements, Addiction-Like Eating Behaviors Scale (ALEBS), and Mindful Eating Questionnaire (MEQ).

Results: 36.6% of the participants were overweight or obese. The mean MEQ score was 3.3±0.47, and the ALEBS score was 39.9±11.69. Smokers had a significantly higher ALEBS score (p=0.027). While the MEQ score was significantly lower in obese individuals (p<0.05), the ALEBS score was significantly higher (p<0.05). A negative correlation was found between the total MEQ score and the total ALEBS score (r= -0.618; p<0.001). BMI was negatively correlated with the MEQ score (r= -0.149; p= 0.001); it was positively correlated with Appetitive derive and Low diet control subscales (r= 0.307; p<0.001; r= 0.380; p<0.001, respectively).

Conclusion: This study supports that mindful eating and addiction-like eating behavior scores may related with body weight. Smoking may be a factor associated with food addiction. In preventing and treating obesity, early intervention studies are essential to increase the mindful eating in individuals and reduce food addiction.

Keywords: Mindful Eating, Addiction-Like Eating Behavior, Obesity

Yetişkin Bireylerde Bağımlılık Benzeri Yeme Davranışı, Yeme Farkındalığı ve Obezite Arasındaki İlişkinin Değerlendirilmesi

ÖZET

Amaç: Bu çalışmanın amacı, bağımlılık benzeri yeme davranışı, yeme farkındalığı ile obezite arasındaki ilişkinin ve bunları etkileyen faktörlerin değerlendirilmesidir.

Gereç ve Yöntem: Bu araştırma, 459 yetişkin birey (%47.7 erkek, %52.3 kadın, yaş ortalaması 27.2±10.52 yıl) ile yürütülmüştür. Çalışma verileri, web-tabanlı anket formu ile elde edilmiştir. Anket formunda, bireylerin sosyo-demografik özellikleri, antropometrik ölçümleri, Bağımlılık Benzeri Yeme Davranışları Ölçeği (BBYDÖ) ve Yeme Farkındalığı Ölçeği (YFÖ) yer almaktadır.

Bulgular: Katılımcıların %36.6'sı fazla kilolu veya obezdir. Ortalama YFÖ puanı 3.3±0.47, BBYDÖ puanı 39.9±11.69 olarak belirlenmiştir. Sigara içen bireylerde BBYDÖ skoru anlamlı olarak yüksek bulunmuştur (p=0.027). Obez bireylerde YFÖ skoru anlamlı olarak düşük iken (p<0.05), BBYDÖ skoru ise anlamlı olarak yüksektir (p<0.05). Toplam YFÖ puanı ile toplam BBYDÖ puanı arasında negatif ilişki olduğu saptanmıştır (r= -0.618; p<0.001). BKİ ise YFÖ skoru ile negatif ilişkiliyken (r= -0.149; p= 0.001); İştah açıcı dürtü ve Düşük diyet kontrolü alt boyutları ile pozitif ilişkilidir (sırasıyla r= 0.307; p<0.001; r= 0.380; p<0.001).

Sonuç: Bu çalışma yeme farkındalığı ve bağımlılık benzeri yeme davranışlarının, vücut ağırlığı ile ilişkili olabileceğini destekler niteliktedir. Sigara kullanımı, yeme bağımlılığı ile ilişkili bir faktör olabilir. Obezitenin önlenmesi ve tedavisinde, bireylerde yeme farkındalığını arttırmak, yeme bağımlılığını azaltmak adına erken müdahale çalışmaları önem taşımaktadır.

Anahtar Kelimeler: Yeme Farkındalığı, Bağımlılık Benzeri Yeme Davranışları, Obezite

Correspondence:
Erzurum Technical University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Erzurum, Türkiye
Phone: -
E-mail: betulkocaadam@gmail.com

Received: 18 January 2023
Accepted: 15 March 2023

Obesity remains a major public health problem. According to the World Health Organization European Regional Obesity Report, Turkey has the highest prevalence of overweight/obesity among European countries (1). In the WHO European Region, approximately 60% of adults and one-third of children are overweight or obese (29% of boys and 27% of girls) (1). External and internal factors influencing eating behaviors are complicated and interrelated (2). Obese individuals have more frequent food cravings, addictive-like eating behaviors, eating more in response to emotional states, more binge eating, decreased awareness of hunger and satiety signals, and are more sensitive to rewards (3,4).

There is increasing interest in the potential role of addictive-like eating behaviors in obesity (4-6). A meta-analysis study shows that food addiction is associated with high BMI (3). It has been reported that food addiction in obese individuals varies between 15-25%, and is higher in overweight/obese individuals than in individuals with normal body weight (3,7-8). Neurobiological studies show that obese people are more sensitive to the reward effect of food than individuals with normal body weight (9). Also, the reward effect of fatty and sugary foods is more common in obese individuals, and therefore these foods are consumed more (10).

Behavior change is important in the treatment of food addiction (11). In this context, mindfulness-based practices, particularly mindful eating, play a prominent role in behavior change therapy. Mindful eating is defined as the conscious awareness of thoughts and actions during the act of eating (12). It is assumed that mindful eating makes individuals more sensitive to the body's responses to food and hunger-satiety signals. Thus, it is believed that individuals can increase their awareness of emotional and environmental stimuli that encourage healthy food consumption and increase their enjoyment of food (13). Thus, mindful eating encourages individuals to eat healthier and protects against overeating. Practices to increase mindful eating can be a protective approach to reduce addiction-like eating behaviors. A study shows that mindful eating is lower in obese individuals (4). Although studies found differences according to gender in mindful eating and food addiction scores (4,14), some studies have found no differences (15,16). This study aimed to evaluate the relationship between addictive-like eating behavior, mindful eating, and obesity and the factors affecting them.

Materials and Methods

This cross-sectional study was conducted with 459 adults (47.7% male, 52.3% female, mean age 27.2±10.52 years) between 18-65 who agreed to participate in Erzurum/Turkey (one of the metropolitan cities in the east of Turkey). Study data were obtained with a web-based questionnaire. The questionnaire includes socio-demographic characteristics, anthropometric measurements, Addiction-Like Eating Behaviors Scale (ALEBS), and Mindful Eating Questionnaire (MEQ).

Addiction-Like Eating Behaviors Scale

The Addictive-Like Eating Behaviors Scale (ALEBS) was developed by Ruddock et al. (2017) to determine addiction-like eating habits (17). The Turkish validity and reliability of this scale were conducted by Demir et al. (2021) (18). The first ten items of the scale are presented in response options ranging from "1-Never" to "5-Always". Items 11, 12, 13, 14, and 15 are presented in response options ranging from "1-Strongly Disagree" to "5-Strongly Agree". Items 6, 11, 12, 13, and 14 are reverse-scored. The total score is obtained by adding the scores obtained from the items in the scale (maximum score = 75). The maximum score that can be obtained from the Appetitive drive subscale (1-5, 7, 9, 14, 15) is 45, and the maximum score that can be obtained from the Low dietary control subscale (6, 8, 10, 11, 12, 13) is 30. The Cronbach's alpha coefficient was 0.86 (18).

Mindful Eating Questionnaire

The Mindful Eating Questionnaire (MEQ) was developed by Framson et al. (2009) (19). Kose et al. (2016) adapted to Turkish as MEQ-30 (20). The subscales were Emotional eating, Disinhibition (mindless eating), Conscious nutrition, Eating control, Eating discipline, Mindfulness, and Interference (20). The Cronbach's alpha coefficient value of the scale was 0.73. The scale is evaluated using a 5-point Likert scale. While scoring the scale, the arithmetic mean of the subscales and the total score is taken. As the score obtained from the scale increases, the mindful eating increases (20).

Anthropometric Measurements

Height and body weight measurements were taken based on the self-reports of individuals. Body Mass Index (BMI) of participants were calculated. BMI classification is below 18.50 kg/m^2 underweight, between 18.50–24.99 kg/m^2 normal, between 25.0–29.99 kg/m^2 overweight, and above 30.0 kg/m^2 obese (21).

Data Analysis

The data was analyzed using the SPSS 23.0. Normality test was performed to determine whether the parametric test assumptions were met. T test, Mann Whitney U test, ANOVA or Kruskall Wallis test were applied to find value differences between groups. The Spearman or Pearson correlation coefficient was conducted to analyze the correlation between the parameters. The correlation coefficient is 0.05-0.30 for "low or insignificant correlation"; 0.30-0.40 for "low moderate correlation"; 0.40-0.60 for "moderate correlation"; 0.60-0.70 for "good correlation"; 0.70-0.75 for "very good correlation"; and 0.75-1.00 for "excellent correlation." (22) The statistical significance level was set at $p<0.001$ and $p<0.05$.

Ethical Approval

"Ethics Committee Approval" was received from Erzurum Technical University Ethics Committee (Meeting Number: 8, Decision Number: 6, 29.08.2022) to conduct this research. The research was carried out following the Declaration of Helsinki. Participants' consent was obtained.

RESULTS

The general characteristics of the individuals participating in the study are given in Table 1. The participants' mean age was 27.2±10.52 years (47.7% male, 52.3% female). 36.6% were overweight or obese. Most participants (57.6%) were high school graduates, and 34.2% were employed. 78.4% of the individuals reported skipping at least one main meal or snack, and 34.4% smoked. The mean MEQ score of the participants was 3.3±0.47, and the ALEBS score was 39.9±11.69.

Table 1. General characteristics of the participants (n: 459)

	n	%
Gender		
Male	219	47.7
Female	240	52.3
Education		
Primary school	12	2.6
Secondary school	13	2.8
High school	264	57.6
Bachelor/Master degree	170	37.0
Working status		
Employed	157	34.2
Unemployed	302	65.8
Smoking status		
Yes	158	34.4
No	301	64.6
BMI classification		
Underweight	40	8.7
Normal	251	54.7
Overweight	128	27.9
Obese	40	8.7
Skipping meals		
Yes	360	78.4
No	99	21.6
	Ẋ±SD	
Age (years)	27.3±10.52	
Education duration (years)	12.2±5.49	
Main meals number	2.4±0.52	
Snacks number	1.6±0.68	
MEQ	3.3±0.47	
Disinhibition	3.3±0.86	
Emotional Eating	3.4±1.07	
Eating control	3.5±0.91	
Mindfulness	3.2±0.41	
Eating discipline	2.9±0.80	
Conscious nutrition	3.2±0.41	
Interference	3.5±0.90	
ALEBS	39.9±11.69	
Appetitive drive	23.5±7.28	
Low dietary control	16.4±4.86	

ALEBS: Addictive-Like Eating Behaviors Scale, MEQ: Mindful Eating Questionnaire

There was no difference between MEQ and ALEBS scores according to gender, educational status, working status and skipping meals ($p>0.05$). However, the ALEBS score was found to be significantly higher in smokers ($p=0.027$). At the same time, significant differences were found in MEQ and ALEBS scores according to BMI classification. Accordingly, the MEQ score in obese individuals is lower than in other groups ($p<0.05$). ALEBS score was observed to be different in all groups and the highest score was detected in the obese group ($p<0.05$) (Table 2).

Table 2. The mean and standard deviation values of the total scores of MEQ and ALEBS according to the socio-demographic characteristics, meal skipping status and BMI classification of the participants

	n	%	MEQ Ẋ±SD	ALEBS Ẋ±SD	p*	p**
Gender						
Male	219	47.7	3.3±0.48	39.8±11.78	0.775	0.853
Female	240	52.3	3.2±0.46	40.1±11.62		
Education						
Primary school	12	2.6	3.5±0.46	40.7±9.87	0.101	0.922
Secondary school	13	2.8	3.2±0.39	38.0±10.08		
High school	170	37.0	3.2±0.49	39.8±12.44		
Bachelor/Master degree	264	57.6	3.4±0.54	38.8±12.91		
Working status						
Employed	157	34.2	3.3±0.48	39.0±11.94	0.052	0.243
Unemployed	302	65.8	3.2±0.46	40.4±11.54		
Smoking status						
Yes	158	34.4	3.1±0.50	42.5±11.63	0.223	0.027
No	301	64.6	3.3±0.46	39.4±11.64		
BMI classification						
Underweight	40	8.7	3.4±0.44[a]	30.7±9.22[a]	0.021	<0.001
Normal	251	54.7	3.3±0.45[a]	38.3±10.67[b]		
Overweight	128	27.9	3.2±0.50[a]	42.4±11.06[c]		
Obese	40	8.7	2.9±0.47[b]	52.1±10.15[d]		
Skipping meals						
Yes	360	78.4	3.2±0.45	40.1±11.63	0.413	0.571
No	99	21.6	3.3±0.53	39.4±9.93		

**The difference between MEQ scores by groups, ** Difference between ALEBS scores by groups*
a,b,c,d Groups with the same letters in a column are not different compared to pairwise comparisons.

Table 3 shows the correlation between MEQ, ALEBS and their subscales scores. A negative correlation was found between the total MEQ score and the total ALEBS score (r= -0.606; p<0.001). The significant negative correlations were determined between MEQ's subscales and ALEBS's subscales. At the same time, while age was positively associated with MEQ score (r= 0.232, p<0.001), it was not associated with ALEBS (p>0.05). BMI was negatively associated with the MEQ score (r= -0.149; p=0.001); It was positively associated with Appetitive drive and Low dietary control subscales (r= 0.307; p<0.001; r= 0.380; p<0.001, respectively).

DISCUSSION

Obesity is a multifactorial disease affected by environmental and genetic factors (23). Its rising prevalence in Turkey and worldwide is concerning (1). For this reason, it is essential to determine the modifiable risk factors that cause obesity and to create action plans for these. According to the WHO European Regional Obesity Report, Turkey has the highest obesity prevalence among European countries. According to this report, 66.8% of the adult population is overweight or obese, and 32.1% is obese in Turkey (1). It was determined that 36.6% of the individuals participating in this study were overweight or obese.

Table 3. Evaluation of the relationship between MEQ and ALEBS

	ALEBS total score	Appetitive drive	Low dietary control	MEQ total score	Disinhibition	Emotional Eating	Eating control	Mindfulness	Eating discipline	Conscious nutrition	Interference
ALEBS total score	-										
Appetitive drive	0.975**	-									
Low dietary control	0.942**	0.843**	-								
MEQ total score	-0.606**	-0.530**	-0.618**	-							
Disinhibition	-0.509**	-0.447**	-0.518**	0.819 **	-						
Emotional Eating	-0.491**	-0.435**	-0.497**	0.773 **	0.641 **	-					
Eating control	-0.366**	-0.319**	-0.373**	0.670 **	0.515 **	0.315 **	-				
Mindfulness	-0.114*	-0.088	-0.123*	0.203 **	-0.011	0.020	0.089	-			
Eating discipline	-0.275**	-0.243**	-0.279**	0.408 **	0.083	0.093	0.155*	0.198*	-		
Conscious nutrition	-0.283**	-0.255**	-0.284**	0.464 **	0.315 **	0.175 **	0.229*	-0.062	0.220*	-	
Interference	-0.333**	-0.272**	-0.353**	0.648 **	0.534 **	0.513 **	0.391*	-0.006	0.121*	0.216*	-

**p<0.05; **p<0.001*

Eating disorders and mindless eating behaviors are among the important factors as a cause obesity (24,25). The results of this study show that individuals with high BMI have lower eating awareness and higher addiction-like eating behavior. Many studies show that mindful eating is lower and the risk of food addiction is higher in obese individuals (4,25-27). Although studies found differences according to gender in mindful eating and food addiction scores (4,14), some studies have found no differences (15,16). In this study, there was no difference in scores according to gender. However, it was determined that mindful eating increased with increasing age. This result is consistent with findings from previous research (19,31). It is believed that individuals tend to eat more consciously with increasing age.

Mindfulness is based on observing thoughts and feelings rather than evaluating and changing thoughts and feelings. Mindful eating is believed to provide a permanent solution in the prevention/treatment of eating behavior disorders and obesity, as it enables the awareness of eating related emotions and habits without judgment (19). Therefore, intervention studies to increase mindful eating in obese individuals are promising. A meta-analysis study reported that food addiction is associated with high BMI (3). Misuse of drugs and excessive food consumption similarly affect dopamine and opiate systems and cause individuals to lose control. In addition to drug, cigarette, and alcohol dependence, symptoms of addiction to certain foods have been reported (32). Similar to other types of addiction, individuals with food addiction has been found to engage in more eating acts with craving, desire and urge to eat, especially against specific foods (fatty, sugary, high salt content) (33). In this study, addiction-like eating behavior total score, Appetite drive score, and Low dietary control scores were positively associated with BMI. This situation can be interpreted as obese individuals may lose their diet control with appetite drive. At the same time, individuals who smoke have higher ALEBS scores. This result shows that smoking may be a factor associated with food addiction.

This study determined that mindful eating scores were negatively related to addiction-like eating behavior scores. Studies examining mindful eating and food addiction in the literature are very limited (4). A study conducted with university students determined that the mindful eating was significantly lower in people diagnosed with food addiction. It has also been reported that students with low mindful eating scores have a five times greater risk of food addiction (4). Food addiction is associated with the individual's loss of control. As a result, it is anticipated that individuals with high food addiction have a low mindful eating (32).

Some limitations should be considered when evaluating study data. Firstly, the research is cross-sectional study in Erzurum/Turkey (one of the metropolitan cities in the east of Turkey), which could not establish a cause-effect relationship but was used to evaluate the relationship between the measured variables. Secondly, the participant's body weight and height information were taken based on the self-reports. The strengths of the study are as follows: large sample size; it is one of the first studies in which the relationship between addiction-like eating behaviors, mindful eating, and obesity and the factors affecting them is evaluated.

Conclusion

In conclusion, this study supports that mindful eating and addiction-like eating behaviors may affect body weight. At the same time, smoking may be a factor that can affect food addiction. Therefore, early intervention studies are important in preventing and treating obesity. In this direction, it is thought that mindfulness intervention studies will be effective in obese individuals in order to increase eating awareness and reduce food addiction.

Conflict of Interests

The author has no funding or conflicts of interest to disclose.

References

1. World Health Organization European Regional Obesity Report 2022. Copenhagen: WHO Regional Office for Europe; 2022. Licence: CC BY-NC-SA 3.0 IGO.
2. Meule A, Kübler AJA. Double trouble. Trait food craving and impulsivity interactively predict food-cue affected behavioral inhibition. Appetite. 2014;79:174-82.
3. Bao K, French EN, Schleyer B, Khaikin S, Chen EY. Food addiction is associated with greater objective binge eating and eating disorder psychopathology, and higher body mass index in youth, a meta-analysis. Psychiatry Res Commun. 2022;2(3):100067.
4. Cebioğlu İK, Bilgin GD, Kavsara HK, Koyuncu AG, Sarioğlu A, Aydin S, et al. Food addiction among university students: The effect of mindful eating. Appetite. 2022;177:106133.
5. Brown RM, Kupchik YM, Spencer S, Garcia-Keller C, Spanswick DC, Lawrence AJ, et al. Addiction-like synaptic impairments in diet-induced obesity. Biological Psychiatry. 2017;81(9):797-806.
6. Cura-Esquivel I, Ramos-Álvarez J, Delgado E, Regalado-Ceballos A. Prevalence of food addiction using the Yale-C scale in Mexican children with overweight and obesity. PeerJ. 2022;10:e13500.
7. Meule A, von Rezori V, Blechert J. Food addiction and bulimia nervosa. Eur Eat Disord Rev. 2014;22(5):331-7.
8. Penzenstadler L, Soares C, Karila L, Khazaal Y. Systematic review of food addiction as measured with the Yale Food Addiction Scale: implications for the food addiction construct. Curr Neuropharmacol. 2019;17(6):526-38.
9. Öyekçin DG, Deveci A. Yeme bagimliliginin etyolojisi/etiology of food addiction. Psikiyatride Guncel Yaklasimlar. 2012;4(2):138.
10. Stice E, Spoor S, Bohon C, Veldhuizen MG, Small DM. Relation of reward from food intake and anticipated food intake to obesity: a functional magnetic resonance imaging study. Journal of Abnormal Psychology. 2008;117(4):924.
11. Camacho-Barcia L, Munguía L, Gaspar-Pérez A, Jimenez-Murcia S, Fernández-Aranda F. Impact of food addiction in therapy response in obesity and eating disorders. Curr Addict Rep. 2022:1-7.
12. Çolak H, Aktaç Ş. Ağırlık Yönetimine Yeni Bir Yaklaşım: Yeme Farkındalığı. Adnan Menderes Üniversitesi Sağlık Bilimleri Fakültesi Dergisi 2019;3(3):212-22.
13. Bays JC. Mindful Eating: A Guide to Rediscovering a Healthy and Joyful Relationship with Food (Revised Edition): Shambhala Publications; 2017.
14. Borisenkov MF, Tserne TA, Popov SV, Bakutova LA, Pecherkina AA, Dorogina OI, et al. Food preferences and YFAS/YFAS-C scores in schoolchildren and university students. Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity. 2021;26(7):2333-43.
15. Meadows A, Higgs S. Internalized weight stigma and the progression of food addiction over time. Body Image. 2020;34:67-71.
16. Najem J, Saber M, Aoun C, El Osta N, Papazian T, Khabbaz LR. Prevalence of food addiction and association with stress, sleep quality and chronotype: A cross-sectional survey among university students. Clin Nutr. 2020;39(2):533-9.
17. Ruddock HK, Christiansen P, Halford JC, Hardman CA. The development and validation of the Addiction-like Eating Behaviour Scale. Int J Obes. 2017;41(11):1710-7.
18. Demir D, Bektas M, Demir S, Bektas I. Psychometric properties of the Turkish version of the addiction-like eating behavior scale for university students. Curr Psychol. 2021;40(6):2590-8.
19. Framson C, Kristal AR, Schenk JM, Littman AJ, Zeliadt S, Benitez D. Development and validation of the mindful eating questionnaire. J Am Diet Assoc. 2009;109(8):1439-44.
20. Gizem K, Tayfur M, Birincioğlu İ, Dönmez A. Adaptation study of the mindful eating questiionnare (MEQ) into Turkish. Journal of Cognitive-Behavioral Psychotherapy and Research. 2018;5(3):125-.
21. World Health Organisation. (2006). Global database on Body Mass Index: BMI Classification.Geneva: World Health Organization.
22. Hayran M, Hayran M. Sağlık Araştırmaları İçin Temel İstatistik (1. Basım). Art Ofset Matbaacılık Yayıncılık Organizasyon Ankara Sayfa. 2011;95:468-74.
23. Zahra A, Moazzama S, Jamal Z, Saleem A, Asghar M. "Obesity associated with depression, environmental factors, and stress related eatings": Analysis of obesity and its associated factors. ScienceOpen Preprints. 2022.
24. Kim Y-R, An Z, Kim K-H, Kim D-M, Hwang B-I, Kim M. Factors Associated with Underweight, Overweight, and Eating Disorders in Young Korean Women: A Population-Based Study. Nutrients. 2022;14(6):1315.
25. Kocaadam-Bozkurt B, Köksal E, Özalp Ateş FS. Mindful Eating Questionnaire for Children: Validation and Reliability in Turkish Children. Mindfulness. 2022:1-10.
26. Yilmaz B, Karadag MG. Evaluation of Mindful Eating, Body Image and Anthropometric Measurements of Adolescents During the Covid-19 Pandemic. Prog Nutr. 2022;24(1).
27. Shaw R, Cassidy T. Self-Compassion, Mindful Eating, Eating Attitudes and Wellbeing Among Emerging Adults. J Psychol. 2022;156(1):33-47.
28. Borisenkov MF, Tserne TA, Popov SV, Bakutova LA, Pecherkina AA, Dorogina OI, et al. Food preferences and YFAS/YFAS-C scores in schoolchildren and university students. Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity. 2021;26(7):2333-43.
29. Meadows A, Higgs S. Internalized weight stigma and the progression of food addiction over time. Body Image. 2020;34:67-71.

30. Najem J, Saber M, Aoun C, El Osta N, Papazian T, Khabbaz LR. Prevalence of food addiction and association with stress, sleep quality and chronotype: A cross-sectional survey among university students. Clin Nutr. 2020;39(2):533-9.
31. Köse G, Tayfur M. BMI, physical activity, sleep quality, eating attitudes, emotions: which one is affected by mindful eating? Prog Nutr. 2021;23
32. Schulte EM, Avena NM, Gearhardt AN. Which foods may be addictive? The roles of processing, fat content, and glycemic load. PloS one. 2015;10(2):e0117959.
33. Praxedes DR, Silva-Júnior AE, Macena ML, Oliveira AD, Cardoso KS, Nunes LO, et al. Prevalence of food addiction determined by the Yale Food Addiction Scale and associated factors: A systematic review with meta-analysis. Eur Eat Disord Rev. 2022;30(2):85-95.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 235-240
https://doi.org/10.31067/acusaglik.1149104

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nutrition and Dietetics / Beslenme ve Diyetetik

The Relationship of Wrong Laxative Use with Constipation and Eating Disorders *in vitro*: Effect on Healthy Colon Fibroblast

Aybüke Afra Keskiner[1], Ezgi Sinem Dal[2]

[1]Sabuncuoğlu Şerefeddin Vocational School of Health Services, Amasya University, Amasya, Turkey

[2]Ankara Medipol University Faculty of Health Sciences, Department of Nutrition and Dietetics, Altındağ, Ankara, Turkey

ABSTRACT

Objective: It is estimated that the use of wrong laxatives will increase the probability of developing an eating disorder by affecting the disorder in eating behavior and the physiological disorder of digestion. Long-term use of laxatives is known by many to impair normal colonic function and producing laxative dependence. In our study, it was aimed to determine the effect of the *Folliculj sennae* plant, which is used for laxative and slimming purposes, on the CCD-18Co (healthy colon fibroblast) cell line.

Materials and Methods: The effect of *Folliculj sennae* plant. Its antiproliferative effect on CCD-18Co cell line was determined by MTT test.

Results: According to the concentrations used in the CCD-18Co cell line, the % viability activities were determined between 73 and 54 and the 50% inhibitory concentration value (IC_{50}) was calculated as 47 mg/ml.

Conclusion: It is thought that the *Folliculj sennae* plant, which is used as a laxative and has a negative effect on the CCD18-Co cell line, will make an important contribution by health professionals to raise the awareness of their patients about laxatives.

Keywords: Constipation, Eating disorder, Laxative, CCD-18Co, *Folliculj sennae*

Aybüke Afra KESKİNER

Ezgi Sinem DAL

Yanlış Laksatif Kullanımının Konstipasyon ve Yeme Bozuklukları ile İlişkisi *in vitro*: Sağlıklı Kolon Epiteli Üzerine Etkisi

ÖZET

Amaç: Yanlış laksatif kullanımı, yeme davranışında düzensizliğe ve sindirimin fizyolojik düzensizliğine etki ederek bireylerde yeme bozukluğu gelişme olasılığını artıracağı tahmin edilmektedir. Laksatiflerin uzun süreli kullanımının birçok kişi tarafından normal kolonik işlevi bozduğu ve laksatif bağımlılığı ürettiği bilinmektedir. Çalışmamızda laksatif ve zayıflama amacı ile kullanılan *Folliculj sennae* (açlık otu) bitkisinin CCD-18Co (sağlıklı kolon fibroblast) hücre hattındaki etkisini belirlemek amaçlanmıştır.

Materyal ve Yöntem: *Folliculj sennae* bitkisinin etkisi CCD-18Co hücre hattı üzerinde MTT testi ile antiproliferatif etkisi belirlenmiştir.

Bulgular: CCD-18Co hücre hattında kullanılan konsantrasyonlara göre % canlılılık aktiviteleri 73 ve 54 arasında belirlenmiştir ve %50 baskılayıcı konsantrasyon değeri (IC_{50}) 47 mg/ml olarak hesaplanmıştır.

Sonuç: Laksatif olarak kullanılan ve CCD18-Co hücre hattı üzerinde olumsuz etkisine şahit olduğumuz *Folliculj sennae* bitkisinin sağlık profesyonelleri tarafından laksatifler konusunda hastalarını bilinçlendirmesi için önemli katkı sağlayacağı düşünülmektedir.

Anahtar kelimeler: Konstipasyon, Yeme bozukluğu, Laksatif, CCD-18Co, *Folliculj sennae*

Correspondence: Aybüke Afra Keskiner
Sabuncuoğlu Şerefeddin Vocational School of Health Services, Amasya University, Amasya, Turkey
Phone: +905558944497
E-mail: afrakeskiner@gmail.com

Received: 01 August 2022
Accepted: 16 December 2022

Constipation is defined as a functional bowel disorder characterized by persistent difficult, infrequent or incomplete defecation. Although it is generally considered a mild condition, it can cause many serious complications and deterioration of health-related quality of life (1). Increasing age, female gender, low socioeconomic status, low parental education, low physical activity, stressful life events, physical and sexual abuse, and depression are the factors associated with constipation (2). Chronic constipation affects approximately 10-15% of the population and is among the most common gastrointestinal disorders among primary and secondary health care seekers. It causes a significant health care burden by negatively affecting the quality of life (3). Most community-dwelling adults self-manage the condition and do not seek medical advice. Self-management often involves the use of laxative products that can be purchased over the counter from pharmacies and elsewhere. Laxatives have the properties of accelerating or stimulating defecation and are used for many purposes in the community, especially for constipation management. Laxatives generally show this effect by three different mechanisms (3,4). Mechanism pathways: (i) enhancing fluid retention through hydrophilic or osmotic mechanisms; (ii) reducing the net absorption of fluid through effects on small and large intestinal fluid and electrolyte transport; or (iii) segmentation is to alter mobility by inhibiting (non-impulsive) contractions or by stimulating repulsive contractions. The mode of action comes to the fore in the classification of laxatives. There are four main classes in categorizing; bulk-forming laxatives, stool softeners/lubricants, contact/stimulant laxatives, and osmotic laxatives. Although this classification is widely used around the world, it is included in the list of drugs for constipation defined by the World Health Organization's Anatomical Therapeutic Classification (ATC). It shows that especially family, friends and advertisements can be important factors affecting the choice of laxative (3-4-5). In the absence of any gastrointestinal disease that requires specific treatment, it has been shown that constipation should be treated for a short time with laxatives and abdominal pain with pain relieving agents (6). While data on the efficacy and safety of short-term treatment with stimulant laxatives in the adult population support the use of laxatives, there is less evidence to support long-term treatment. Today, in addition to its use for the prevention and treatment of constipation, the prevalence of laxative use is increasing, especially for body weight control, especially in the young population. This can also be an important indicator of early eating disorder (7). It is estimated that the use of laxatives will increase the probability of developing an eating disorder by affecting the disorder in eating behavior, physiological disorder of digestion or psychological disorder. While the lifetime use of laxatives for body weight control among adults is 5%, it is estimated to be between 15% and 62% in those with eating disorders. Those who abuse laxatives can generally be categorized as falling into one of four groups. The first includes patients with eating disorders. The second group consists of generally middle-aged or older individuals who start using laxatives in case of constipation but continue to use laxatives until their bowels become relatively resistant to laxatives. The third group includes individuals who engage in certain types of athletic training, including sports with certain weight limits. The fourth group includes latent laxative addicts who use drugs to cause artificial diarrhea and may have an artificial disorder (5, 8). Patients with eating disorders, who make up the largest percentage of these groups, Anorexia nervosa and Bulimia nervosa frequently abuse stimulant laxatives, and some studies have reported that up to 75% of individuals in this group abuse laxatives. Many eating disorder sufferers use laxatives to induce diarrhea to feel weaker, get rid of unwanted calories, and lose weight. Often times, laxatives are abused after binge eating when individuals believe that laxatives will clear food from the gut before it is absorbed, thereby preventing weight gain. In the case of laxative abuse, greater psychopathology and an increase in clinical severity can be observed in people with eating disorders (5, 9). In addition, failure to respond to a stimulant laxative may reduce the likelihood of responding to a second stimulant laxative (10). Self-administered, inexpensive and readily available laxatives continue to be unconsciously used by adults. In this way, *Folliculj sennae*, a plant containing anthranoid laxative, known as fasting herb, horseradish and camel eye grass, has been used very often as a stimulant laxative for a long time. It is reported that long-term use of these laxatives, which are stimulants that are easily accessible by individuals, primarily carries a risk for colon health. Because stimulant laxatives have traditionally been advocated for short-term use only, and long-term use of these laxatives is estimated by many to impair normal colonic function, produce laxative dependence, and damage the enteric nervous system and/or intestinal smooth muscle. It manages colon motility and may increase the risk of other types of cancer, especially colon and colorectal can Colon cancer is more common than rectal cancer. Recently, the World Cancer Research Fund (WCRF) and the American Cancer Research Institute (AICR) have concluded in their extensive reports on the scientific literature on diet, physical activity, and cancer prevention that colorectal cancer is mostly preventable with appropriate diets and

associated factors (13).cers. Colon and rectal cancers are the third most common type worldwide (11-12). Recently, it has been considered that long-term laxative use may be an important risk factor for healthy colon fibroblast (CCD-18Co), with a large increase in the risk of constipation, colon and rectal cancer. In our study, the effect of *Folliculj sennae* plant, which is used for laxative and weight loss purposes, was investigated by MTT analysis in CCD-18Co (healthy colon fibroblast) cell line.

MATERIAL AND METHOD

Test Compound

Folliculj sennae in May 2022 from a local herbal store in Gaziantep province, Turkey (The reason for this is that people can easily take it from herbalists and dissolve it in water and use it by drinking). *Folliculj sennae* plant was dissolved in distilled water and 1 mg/ml solution was obtained.

Cell Source

The cell line CCD-18Co (healthy colon fibroblast) (ATCC® CRL-1459TM) purchased from ATCC (American Type Culture Collection) by Gebze Technical University Chemistry Department was used.

Cell Culture

CCD-18Co (healthy colon fibroblast) cells were fed with EMEM (Eagle's Minimum Essential Medium) medium prepared by adding 10% FBS (fetal bovine serum), 1% penicillin-streptomycin and 1% sodium pyruvate in 25 mm^2 culture flasks. The media of the cells, which were kept in a 5% CO2 incubator, 37°C and 96% humidity, were changed twice a week. When the cells were confluent, they were first washed with PBS (phosphate buffered saline), removed from the flasks using trypsin-EDTA, and the cells taken into the falcon during passage were centrifuged at 16 000 rpm for 10 minutes. 1000 µL of medium was added to the pellet under the falcon, and the pellet was dissolved, 10 µL of the medium-cell mixture was added to a 0.2 mL tube and 10 µL of Trypane-blue dye was added. 10 µL of the mixture was taken and spread between the thoma slide and coverslip. Cells in 16 squares on the Thoma slide were counted using a light microscope. The number of cells was determined according to the formula A x 2 x10^4.

MTT analysis

According to the determined cell number, they were taken into 96-well plates and used in MTT analysis. The purpose of using the MTT (3-[4,5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide) method; It is based on the conversion into formazan crystals by living cells, which determines mitochondrial activity. The cells were seeded into the plates (100 µl for each well) with the help of a multipipet, so that the calculated amount of cells was poured into each well of the 96-well plates. The seeded cells were kept in the incubator for 24 hours to adhere to the plate surface. Other concentrations to be studied (100; 50; 25; 12.5; 6.25; 3.125 and 1.56 mg/ml) were prepared by serial dilutions of the main stock concentration of 1 mg/1 ml (1000 mg/ml) prepared by dissolving *Folliculj sennae* used in the experimental study in distilled water. 100 prepared on the CCD-18Co cell line; 50; 25; 12.5; 6.25; *Folliculj sennae* at concentrations of 3.125 and 1.56 mg/ml were added to the plate in triplicate. Negative control (cell control), positive control (mitomycin-C) and 1/1000 DMSO concentrations were added to the plate in triplicate and left in the incubator for 24 hours. Since MTT dye is a light-affected dye, 5 mg was weighed for 1 plate in the dark, and 1 mL of PBS (phosohate buffered saline) was added to it and 8 mL of medium was added and dissolved by vortexing. The prepared solution was inoculated into the plates and the plates covered with aluminum foil were kept in the incubator for 2-4 hours. At the end of the period, the MTT solution was aspirated and 100 µL of DMSO (100%) was added to each well to stop the reaction. After the plate was kept in the dark for 10 minutes, absorbance values were read spectrophotometrically at a wavelength of 570 nm. The antiproliferative effect of the test compound *Folliculj sennae* plant on the CCD-18Co cell line was determined.

Statistical Evaluation of Data

The values of the differences between the data were statistically analyzed by selecting the most effective doses (triple replicate) of the MTT test (25-12.5-6.25 mg/ml) in CCD-18Co cell line. Results were determined as ID50 ± SE (standard error of mean) for the CCD-18Co cell line. When the findings are evaluated statistically; Cell viability concentrations of compounds with CCD-18Co cell line were found to be statistically significant ($p < 0.005$) (Table 1) (Figure 1).

Table 1: Statistical data of Folliculj sennae plant in CCD-18Co cell line

Cell line	Concentration (mg/ml)	ID50 (µM) ± SE
		Folliculj sennae
CCD-18Co	25	1.0431±0.3318
	12.5	1.0515±0.3276
	6.25	1.0924±0.3178

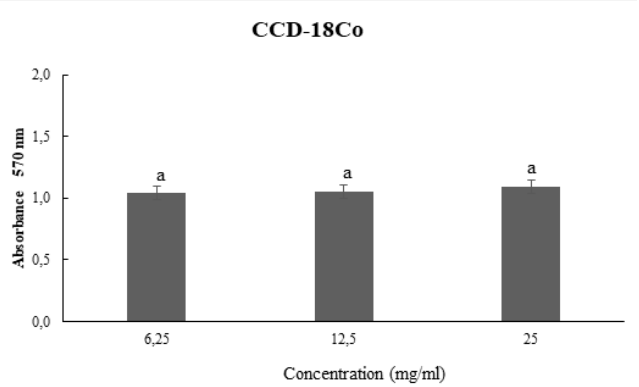

Figure 1. *Statistical analysis of Folliculj sennae plant in CCD-18Co cell line*

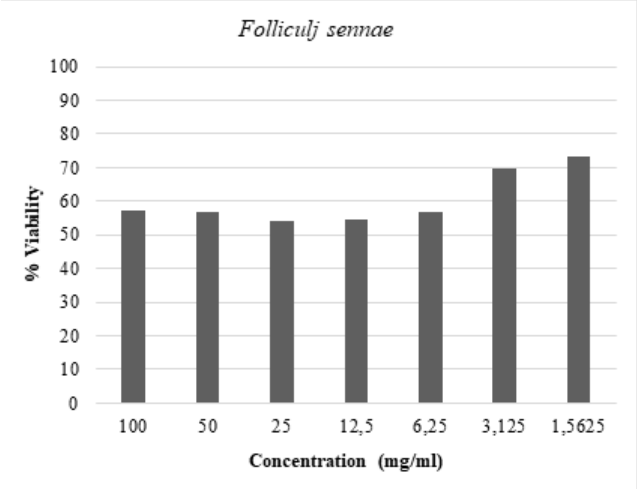

Figure 2. *Comparison of percent viability of concentrations in CCD-18Co cell line*

RESULTS

MTT Analysis Results

In this study, the in-vitro antiproliferative activities of the plant *Folliculj sennae*, which is expected to show potential antiproliferative activity on healthy colon fibroblast, were investigated.

Table 2. MTT absorbance measurements in CCD-18Co cell line		
Cell Control	1.9260	100
(+) Control	0.6070	31.5161
100 mg/ml	1.1043	57.33645
50 mg/ml	1.0970	56.95742
25 mg/ml	1.0431	54.15888
12.5 mg/ml	1,0515	54.59502
6.25 mg/ml	1.0924	56.71859
3.125 mg/ml	1.3448	69.82347
1.5625 mg/ml	1.4149	73.46314
DMSO	1.6446	85.38941

The effect of *Folliculj sennae* plant on cell viability in vitro showed the best effect at 25 mg/ml concentration when compared to DMSO used as a negative control. According to the concentrations used in the CCD-18Co cell line, the % viability activities were determined between 73 and 54%. The effect on cell density was read with a spectrophotometer by MTT method, and the % viability curve was determined with the help of the Microsoft Excel program, and the 50% inhibitory concentration value (IC_{50}) was calculated as 47 mg/ml.

DISCUSSION

In a study conducted on 277 patients diagnosed with eating disorders in France, 22% of the participants were found to abuse laxatives. In addition, in this study, it was found that patients who had attempted suicide in the last 28 days abused laxatives at a higher rate than patients who did not (14). In a 2017 study conducted on adults with 2295 eating disorders (anorexia nervosa, bulimia nervosa), 25% of the participants were found to abuse laxatives. In addition, it has been observed that patients with anorexia nervosa abuse laxatives at a higher rate than patients with bulimia nervosa (15).

In a study conducted on 102,072 Brazilian adolescents, a strong correlation was observed between many unhealthy habits, abuse of laxatives and self-induced vomiting in both genders (16). Guerin et al. (17) aimed to investigate the relationship between the risk of developing colorectal cancer and benign colorectal neoplasm by classifying patients with and without chronic constipation according to the severity of constipation. As a result of the study, patients with chronic constipation were associated with the prevalence and incidence of colorectal cancer and benign colorectal neoplasm compared to patients without chronic constipation. It has been determined that these risks increase with the severity of chronic constipation. In the study conducted on 1021 people (18) eating disorders, personality disorders and traits, and obsessive-compulsive features were evaluated. Laxative abuse was associated with worse eating disorder and general psychopathology and higher prevalence of borderline personality disorder

(BPD). Also, symptom level analyses revealed that specific features of BPD, including suicidality and self-harm, feelings of emptiness, and anger, were most strongly associated with laxative abuse. In 2018, Citronberg et al. (19) examined the relationship between non-fiber laxative use and fiber-based laxative use and colorectal cancer risk in a multisite International Colon Cancer Family Registry cohort study of 4025 controls. Epidemiological risk factor questionnaires were administered to all participants and exposures were determined approximately 1 year before diagnosis for cases and over a comparable period for controls. Known and suspected risk factors for colorectal cancer have been identified, including regular use of laxatives, defined as laxative intake for more than one month at least twice a week. People who reported regularly using non-fibre-based laxatives were found to be at a significantly increased risk for colorectal cancer compared to those who reported that they never used laxatives. Cell viability was determined on CCD-18Co (healthy colon fibroblast) cell line of *Folliculj sennae* plant, which is used as a laxative to evaluate its antiproliferative activity. Its antiproliferative effect against CCD-18Co cell line was most effective at 25 mg/ml.

CONCLUSION

Considering the evaluation of the findings and the negative effects experienced by the patients due to constipation and the strong side effects caused by the laxatives used, medical nutrition therapy under the control of a dietitian is important. In our study, the effect of the *Folliculj sennae* plant, which we have witnessed on the healthy colon fibroblast, which is used as a laxative, should be investigated with large-scale studies, and it is thought that the result of our study will make an important contribution to raising the awareness of the patients about laxatives by the health professionals.

DECLARATIONS

Funding

None.

Conflicts of Interest/Competing Interests

None.

Ethics Committee Approval

None.

Availability of Data

Available upon request.

Authors' Contributions

Aybüke Afra KESKİNER conducted this study and wrote the article.

Acknowledgements

Author wishes to thank our advisor Prof. Dr. Nevin ŞANLIER.

REFERENCES

1. Alsalimy N, Madi L, Awaisu A. Efficacy and safety of laxatives for chronic constipation in long-term care settings: A systematic review. J Clin Pharm Ther. 2018 Oct;43(5):595-605. doi: 10.1111/jcpt.12721. Epub 2018 Jun 9. PMID: 29885259.
2. Bharucha AE, Wald A. Chronic Constipation. Mayo Clin Proc. 2019 Nov;94(11):2340-2357. doi: 10.1016/j.mayocp.2019.01.031. Epub 2019 May 1. PMID: 31054770; PMCID: PMC6829047.
3. Aziz I, Whitehead WE, Palsson OS, Törnblom H, Simrén M. An approach to the diagnosis and management of Rome IV functional disorders of chronic constipation. Expert Rev Gastroenterol Hepatol. 2020 Jan;14(1):39-46. doi: 10.1080/17474124.2020.1708718. Epub 2020 Jan 2. PMID: 31893959.
4. Werth BL, Williams KA, Fisher MJ, Pont LG. Use of over-the-counter laxatives by community-dwelling adults to treat and prevent constipation: a national cross-sectional study. Eur J Clin Pharmacol. 2020 Jul;76(7):1003-1010. doi: 10.1007/s00228-020-02865-5. Epub 2020 Apr 15. PMID: 32296858.
5. Roerig JL, Steffen KJ, Mitchell JE, Zunker C. Laxative abuse: epidemiology, diagnosis and management. Drugs. 2010 Aug 20;70(12):1487-503. doi: 10.2165/11898640-000000000-00000. PMID: 20687617.
6. Bohlin J, Dahlin E, Dreja J, Roth B, Ekberg O, Ohlsson B. Longer colonic transit time is associated with laxative and drug use, lifestyle factors, and symptoms of constipation. Acta Radiol Open. 2018 Oct 22;7(10):2058460118807232. doi: 10.1177/2058460118807232. PMID: 30364803; PMCID: PMC6198400.
7. Hazzard VM, Simone M, Austin SB, Larson N, Neumark-Sztainer D. Diet pill and laxative use for weight control predicts first-time receipt of an eating disorder diagnosis within the next 5 years among female adolescents and young adults. Int J Eat Disord. 2021 Jul;54(7):1289-1294. doi: 10.1002/eat.23531. Epub 2021 May 5. PMID: 33949709; PMCID: PMC8273146.
8. Levinson JA, Sarda V, Sonneville K, Calzo JP, Ambwani S, Austin SB. Diet Pill and Laxative Use for Weight Control and Subsequent Incident Eating Disorder in US Young Women: 2001-2016. Am J Public Health. 2020 Jan;110(1):109-111. doi: 10.2105/AJPH.2019.305390. Epub 2019 Nov 21. PMID: 31751147; PMCID: PMC6893330.
9. Gibson D, Benabe J, Watters A, Oakes J, Mehler PS. Personality characteristics and medical impact of stimulant laxative abuse in eating disorder patients-a pilot study. J Eat Disord. 2021 Nov 4;9(1):146. doi: 10.1186/s40337-021-00502-9. PMID: 34736530; PMCID: PMC8567337.
10. Bonilla S, Nurko S, Rodriguez L. Long-term Use of Bisacodyl in Pediatric Functional Constipation Refractory to Conventional Therapy. J Pediatr Gastroenterol Nutr. 2020 Sep;71(3):288-291. doi: 10.1097/MPG.0000000000002795. PMID: 32459741.
11. Ferlay J, Bray F, Pisani P, Parkin DM. (2004)GLOBOCAN 2002 Cancer Incidence, Mortality and Prevalence Worldwide. International Agency for Research on Cancer CancerBase No. 5, version 2.0. Lyon: IARC.
12. Parkin DM, Whelan SL, Ferlay J, Teppo L. and Thomas DB. (2002). Cancer incidence in five continents. Lyon: International Agency for Research on Cancer. Vol. VIII. International Agency for Research on Cancer, 155.

13. American Cancer Society. What causes cancer?, 2018. https://www.cancer.org/ cancer/cancercauses.html. Last Access Date: 05.06.2022

14. Lengvenyte A, Strumila R, Maimoun L, Seneque M, Olié E, Lefebvre P, Renard E, Courtet P, Guillaume S. A specific association between laxative misuse and suicidal behaviours in patients with anorexia nervosa and bulimia nervosa. Eat Weight Disord. 2022 Feb;27(1):307-315. doi: 10.1007/s40519-021-01180-x. Epub 2021 Apr 1. PMID: 33797033.

15. Elran-Barak R, Goldschmidt AB, Crow SJ, Peterson CB, Hill L, Crosby RD, Mitchell JE, Le Grange D. Is laxative misuse associated with binge eating? Examination of laxative misuse among individuals seeking treatment for eating disorders. Int J Eat Disord. 2017 Sep;50(9):1114-1118. doi: 10.1002/eat.22745. Epub 2017 Aug 2. PMID: 28766762; PMCID: PMC5861734.

16. de Souza ALG, de Almeida AA, Noll PRES, Noll M. Unhealthy life habits associated with self-induced vomiting and laxative misuse in Brazilian adolescents. Sci Rep. 2021 Jan 28;11(1):2482. doi: 10.1038/s41598-021-81942-w. PMID: 33510267; PMCID: PMC7843628.

17. Guérin A, Mody R, Fok B, Lasch KL, Zhou Z, Wu EQ, Zhou W, Talley NJ. Risk of developing colorectal cancer and benign colorectal neoplasm in patients with chronic constipation. Aliment Pharmacol Ther. 2014 Jul;40(1):83-92. doi: 10.1111/apt.12789. Epub 2014 May 15. PMID: 24832002.

18. Tozzi, F., Thornton, L. M., Mitchell, J., Fichter, M. M., Klump, K. L., Lilenfeld, L. R., Price Foundation Collaborative Group. (2006). Features associated with laxative abuse in individuals with eating disorders. Psychosomatic medicine, 68(3), 470-477.

19. Citronberg JS, Hardikar S, Phipps A, Figueiredo JC, Newcomb P. Laxative type in relation to colorectal cancer risk. Ann Epidemiol. 2018 Oct;28(10):739-741. doi: 10.1016/j.annepidem.2018.06.011. Epub 2018 Jul 9. PMID: 30150160; PMCID: PMC6415945.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 241-249
https://doi.org/10.31067/acusaglik.1221812

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Health Management / Sağlık Yönetimi

The Use of Strategic Management Tools in Changing Environment: A Qualitative Case Study in a Turkish University Hospital During Covid-19

Pınar Aktürk[1], Aliye Aslı Sonsuz[2]

[1]Istanbul Medipol University, Graduate School of Health Sciences, Department of Health Management, Istanbul, Türkiye

[2]Istanbul Medipol University, School of Health Sciences, Department of Health Management, Istanbul, Türkiye

ABSTRACT

Purpose: This study aims to examine the managerial practices of a hospital managers to keep up with the changing environment during the Covid-19 (pandemic) period. The authors aim to better understand and research what the managers of this hospital do while keeping up with the staggering change, by placing the use of strategic management tools (SMTs) on the theoretical ground of the Normative Model of Strategic Management (NMSM).

Methods: This is exploratory, qualitative, and a single case study. The data were collected through in-depth interviews with 12 mid-level and senior managers of hospital's, each of which lasted an average of 50 minutes, through a semi-structured form. The data were evaluated using inductive content analysis methods in line with predetermined themes.

Results: The main finding is that both middle and senior managers use 16 SMTs at various stages of strategic management process to respond to the changing internal and external environment during the pandemic. SMTs were used most intensively in the strategic analysis phase. At this phase, with the reengineering, which is the most used tool, and non-emergency health services were postponed, workflows were renewed, and many services were digitized.

Conclusion: By using different SMTs in their decisions, managers can gain strategic advantage for their purposes. While supply chain management is a tool used only by the purchasing unit manager, reengineering can be a tool that every manager uses to adapt to the environment. Being aware of these tools by managers at all levels and diversifying them will enable them to make better managerial practices.

Keywords: Normative Model of Strategic Management, Strategic Management Tool, Qualitative Research, Hospital Management, Covid-19

Pınar AKTÜRK
Aliye Aslı SONSUZ

Değişen Çevrede Stratejik Yönetim Araçlarının Kullanımı: Covid-19 Döneminde Bir Türk Üniversite Hastanesinde Nitel Bir Vaka Çalışması

ÖZET

Amaç: Bu çalışma, bir hastanenin yöneticilerinin Covid-19 (pandemi) döneminde değişen çevreye ayak uydurmak için yönetsel uygulamalarını incelemeyi amaçlamaktadır. Yazarlar stratejik yönetim araçlarının (SYA) kullanımını, Normatif Stratejik Yönetim Modelinin (NSYM) teorik zeminine yerleştirerek, bu hastanenin yöneticilerinin baş döndürücü değişime ayak uydururken neler yaptığını daha iyi anlamayı ve araştırmayı amaçlamaktadır.

Yöntem: Bu keşifsel, nitel ve tek durum çalışmasıdır. Veriler, hastanenin 12 orta ve üst düzey yöneticisi ile ortalama 50 dakika süren derinlemesine görüşmeler yoluyla yarı yapılandırılmış bir form aracılığıyla toplanmıştır. Veriler önceden belirlenmiş temalar doğrultusunda tümevarımsal içerik analizi ile değerlendirilmiştir.

Bulgular: Ana bulgu hem orta hem de üst düzey yöneticilerin, pandemi sırasında değişen iç ve dış çevreye yanıt vermek için stratejik yönetim sürecinin çeşitli aşamalarında 16 SYA'yı kullandığıdır. SYA'lar en yoğun olarak stratejik analiz aşamasında kullanılmıştır. Bu aşamada en çok kullanılan araç olan değişim mühendisliği ile acil olmayan sağlık hizmetleri ertelenmiş, iş akışları yenilenmiş ve birçok hizmet dijitalleştirilmiştir.

Sonuç: Yöneticiler, kararlarında farklı SYA'ları kullanarak amaçları doğrultusunda stratejik avantaj elde edebilirler. Tedarik zinciri yönetimi sadece satın alma birimi yöneticisi tarafından kullanılan bir araçken, değişim mühendisliği her yöneticinin çevreye uyum sağlamak için kullandığı bir araç olabilir. Her seviyedeki yöneticinin bu araçlardan haberdar olması ve çeşitlendirmesi daha iyi yönetsel uygulamalar yapmalarını sağlayacaktır.

Anahtar Kelimeler: Normatif Stratejik Yönetim Modeli, Stratejik Yönetim Aracı, Nitel araştırma, Hastane Yönetimi, Covid-19

Correspondence: Aliye Aslı Sonsuz
Istanbul Medipol University, School of Health Sciences, Department of Health Management, Istanbul, Türkiye
Phone: +902166815100
E-mail: aasonsuz@medipol.edu.tr

Received: 20 December 2022
Accepted: 27 February 2023

Today, it has become mandatory for organizations operating in a dynamic environment to adopt a strategic management approach to continue their existence (1). As a service organization, the environmental risks and the challenges faced by managers due to the complex nature of hospitals already showed the necessity of a strategic management approach in this sector (2). However, with the emergence of the pandemic in 2019, the staggering change experienced in every field on a global scale showed its first effects on health systems and the organizations involved in it, and hospital managers who had to cope with this challenging environment had to make new strategic decisions to adapt to this situation. The change experienced with the strategic management approach, which can be defined as a series of managerial decisions that guide the direction, scope, and performance of an organization in the long term and provide a competitive advantage in a changing environment, also reduces risks, and guarantees a stable future (3, 4). Hospitals as an organization also make a difference to the extent that they can transform and implement these strategies in response to internal and environmental changes. Ridder et al (5) draw attention to the fact that hospitals must adapt to the competitive environment by extensively reorganizing their processes, structures, and cultures. At this point, tools that we can define as techniques, models, technology, methodology or approach that help managers in making strategic decisions are designed (6). These methods and techniques, called SMTs, do not make strategy: it is the role of managers. However, they serve a useful purpose in presenting information in different ways so that new insight can be gained and can be included in all stages of the strategic management process. There is no right technique for all occasions, and the manager's first task is to select approaches that are relevant and potentially helpful (7). According to many authors, many SMTs will enable decision making in strategic management, but there does not seem to be a clear distinction as to what these tools are and their quantity (8, 9). Grint (10) emphasizes that at least one new approach to transformation has emerged every year in the last four decades. When the empirical studies carried out in health institutions for the last 10 years are examined, it is seen that most of them examine the level of use/knowledge/satisfaction of SMTs. In their studies, Özzeybek and Seyhan (11) 13, Cagatay and Ozturk (12) 17, Demir and Ugurluoglu (1) 16, Cınar et al. (13) 13, Jaworzynska (4) 6, and Bicer (14) referred to 16 SMTs. Bicer's study addressed the same 16 SMTs using the questionnaire in Demir and Ugurluoglu's study and is therefore not shown in Figure 1. It is seen that the studies in Figure 1 jointly examine 3 tolls: MV,BS, and SP.

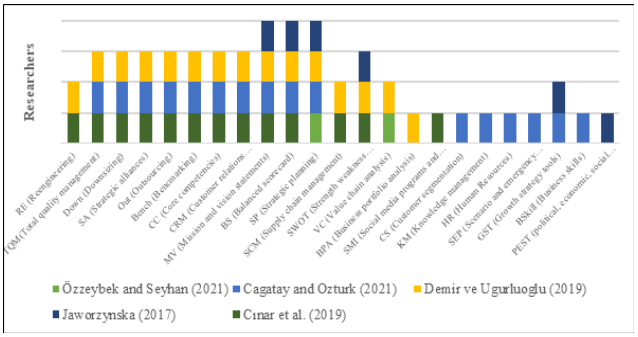

Figure 1: Most Examined SMTs in Empirical Studies in Healthcare Institutions.

Managers who use SMTs that can change according to the structure and objectives of the organizations can be classified as a senior-top, middle, and lower-level managers according to their hierarchical structure (15). According to the traditional understanding, although strategic management is often seen as the job of top-level managers, mid-level managers, who are limited in providing coordination between top management and lower management, have become a valuable organizational resource with new management understanding and they have started to take more roles in developing new ideas, shaping the resources of the enterprise, and influencing innovations strategically (16). Mid-level managers, who have more knowledge on both internal and external environmental operations due to their position, help to align the actions in organizations with the strategic intentions of the management by transforming broad directives into harmonious operational plans and programs thanks to this information (17). Moreover, as Quinn (18) notes, there may be significant discretion for mid-level manager influence in implementing strategy since the strategy is likely to be modified to incorporate new information as it presents itself. This study aims to examine how the senior and mid-level managers of a hospital make managerial practices despite the changing environment during the pandemic. In line with this main purpose, answers were sought for 2 questions; 1) Which SMT did the managers use at which stage of which NMSM? 2) How did they use the SMTs?

Methods

Design

This study was conducted as a qualitative research using a single case approach. Case study research supports our understanding of real-world phenomena and assumes

that this understanding covers relevant contextual conditions (19). The study was carried out in a university hospital that provides service in the province of Istanbul, where the highest responsibilities in service delivery and the highest number of cases were observed during the pandemic period. Because managers working in such a hospital were more likely to give comprehensive answers to our research questions about strategic management. The purpose of the interview was to explore the interviewee's perspective in depth through open-ended and exploratory questions.

Participants

Participants of the research are mid-level and senior managers working in a university hospital in Istanbul and were selected by purposeful sampling method. Purposeful sampling is widely used in qualitative research for the identification and selection of information-rich cases related to the phenomenon of interest (20). The research was carried out with 12 managers who accepted the interview and took part in the strategic management and planning processes of the hospital. The human resources policy of the hospital was taken into consideration in the selection of the participants and the distinction between senior and middle-level managers was made accordingly. Two of the participants are senior managers, and ten are middle-level managers. The age ranges range from 30 to 50, with 8 males and 4 females. Carrying out qualitative research, adequacy of sample size is a key marker for the research's quality. However, there is no consensus for the exact size of a proper sample (21). The debate among writers on this topic is that too many interviews are too large to be managed and analyzed, and too few interviews will be inadequate. The consensus among the authors on this issue is that the number of samples may vary according to the purpose and design of the study, and there is no ideal sample size. We studied with 12 participants (sample) where the codes reached ideal saturation according to Boddy (22).

Table 1. Research protocol

Theme	Questions	Display of the questions in NMSM
1. Situation Assessment	1.1 How did you evaluate the situation of your I (institution)/ U (unit) in the health sector during the pandemic period?	**Phase 1: Where are we now?** (Evaluation of current position identification of strategic issues)
2. Strategic Analysis	**1.1** How did you create alternatives for your I/U in an uncertain period like the pandemic? **1.2** How did you determine your priorities while making the evaluation? **1.3** How did you evaluate the alternatives you chose? **1.4** How did you choose the strategy that you would put into practice for your institution/unit during the pandemic period?	**Phase 2: Where are we going?** (Generation of strategic alternatives evaluation of strategic alternatives Selection of a specific strategy)
3. Strategic Implementation	**1.1** How did you create detailed plans for the strategy you decided to implement regarding your I/U during the pandemic period? **1.2** What method did you follow to monitor the performance of the strategies you implemented? **1.3** How accurate were the assumptions on which you built your strategic plan?	**Phase 3: How do we get there?** (Development of detailed plans to achieve the strategy Implementation of the strategic plans. Monitoring of strategic performance)

Source: The authors.

Data Collection

Data were collected between August - November 2021 using a semi-structured form with an interview technique. In the preparation of the form, a literature review was made, and a draft form was created based on the theoretical ground of NMSM (23). Afterwards, the draft questions were finalized [Table1] by taking the opinions of 4 academicians and 1 researcher working in the field of qualitative research methods and strategic management. Each interview lasted an average of 50 minutes.

Data Analysis

In this study inductive content analysis method was used. With this method identified concepts, categories and themes will serve as the basis for reporting content analysis results (24). The Miles and Huberman formula was used to evaluate the consensus between the researchers on the themes for the study's reliability. According to this coefficient of the agreement was calculated as 0.86 (Suggested score is over 80) (25).

Introductory questions, which constitute the first questions of the interview form, were not included in the coding, and were prepared in a way to warm up the participant. Here, the participant was explained the expressions, and it was tried to ensure that there was no ambiguity for the main questions. Participants were coded as follows according to the departments they worked in: P (purchasing), IT (information technologies), IS (Inpatient services), Q (Quality), OS (Outpatient services), GA (General accounting), CM (Corporate Marketing), NS (Nursing services), SS (Support services), HR (Human resources), PR (Patient rights), LS (Laboratory services)

Results

In this study, it was determined that participants used total 16 SMTs at different phase of strategic management and they stated that they use SMTs most intensively during the strategic analysis phase.

Use of SMTs in the Situation Assessment Phase

During the situation assessment phase, the participants stated that they used 4 SMTs: SP, SWOT, PEST, and Porter's 5 forces. In this phase, a total of 34 expressions related to the use of SMTs were identified and some key expressions showing which SMT the expressions would be coded for in line with the answers of the participants were shown as Illustrative Quotes [Table 2].

SP tool has been used to the most intensively and closely monitor the market, to make a warm analysis, to have foresight, to make backups in suppliers, to update products that are not in the critical product list in the purchasing area in this phase. In SP, for IS and OS, it is necessary to act quickly and in line with the possibilities available, to adapt the personnel according to the change of the patient group, to make constant observations, and the plans adapted to the available resources. In the SWOT tool, managers in all units said that they made an internal evaluation. With the PEST tool, the managers said that they evaluated their environmental positions, used online systems to prevent the problems experienced, worked with the latest technology products in the hospital, and provided a rapid transition to every new factor in environmental changes. With Porter's 5 forces tool, the managers said that they first assessed the immediate environment, that they did not make any changes in the payment methods for the stock purchases, and that they continued to work with maturity in this period. They said that the understanding and communication of generating income from the public has changed, and that they are arranging the works according to national and international regulations.

Table 2. How did the participants use SMTs during the situation assessment phase?

SMTs and number of expressions	Participant	Illustrative Quote
SP (14)	P	".....a purchasing manager should not only be a person who orders and **monitors the products, but also a buyer should be able to follow the market and make a warm analysis..."**
	NS	"..We tried to identify our shortcomings according to the evaluations. **We planned what we could do against the opposite situations that might happen....**
SWOT (10)	HR	"…..**We made internal evaluations**, tried to identify the situations that could be more beneficial to us and the situations that could create a disadvantage, and tried to make our moves accordingly…."
	SS	"**We made internal evaluations**. As the support team, we are active in all areas from the dining hall to cleaning. There were many routine tasks such as cleaning the elevators …"
PEST (6)	GA	**How was the market in this situation and how are we according to them? How much did they get, and how much did we get? What can we do if their technology is more suitable for us or not?** These are our competitive strategies."
	CM	"**We took the regulations into account in our evaluations.** We comply with the predictions and instructions of both the WHO and our health authority. I can also say the same for international patient transfers..."
Porter's 5 force (4)	GA	As an institution, we made stock purchases. **There have also been changes and increases in many products we buy per patient. We are working with the term. Our aim in these bulk purchases was to make the payments like the routine operation, and that was it."**
	CM	**"While evaluating, we were aware that some things had changed. If we consider it as the private health sector, communication with the public has changed. We have entered a different period in which the understanding of generating income from the public has changed,** the health expectation is shaped on the patient's side…"

Source: The authors.

Use of SMTs in the Strategic Analysis Phase

During the strategic analysis phase, the participants stated that they used 6 SMTs: RE, Bst (Brainstorming), Bench, SEP, CSF (Critical success factors), and CUA (Cost-utility analysis). In this phase, a total of 94 expressions related to the use of SMTs were identified and some key expressions showing which SMT the expressions would be coded for in line with the answers of the participants were shown as Illustrative Quotes [Table 3].

With RE, all managers stated that very different concepts and processes entered their working life: remote research, remote meetings, remote training, remote patient examination etc. They also said that the system of tracking the entries of the personnel with the fingerprint system was removed and they switched to the card system. Another RE action is related to the priorities of inpatients. Half of the bed resource allocated for chronic patients was allocated to the new priority, namely pandemic patients.

Table 3. How did the participants use SMTs during the strategic analysis phase?

SMTs and number of expressions	Participant	Illustrative Quote
RE (29)	P	"We talked about how many junk products **have become important. So we changed the classification tables of our suppliers…."**
	IT	**"We tried to make your online connections more qualified and secure,** as well as the connection we made with our other branches, and **we also carried out different activities to enable our patients to access our health services online."**
	IS	"Considering that we reserved 100 beds for chronic patients, we later increased this number to 50. **This was a change we made in our hospitalization strategy.** Of course, this would not have happened if the number of cases had not increased…"
	Q	"We started using Zoom, **we started doing what we normally do physically online."**
Bst (23)	IS	"…..We tried to look at the decisions we will implement from multiple perspectives, not from a single direction. **Everyone expressed their opinion on the decisions to be taken within this scope."**
	Q	"When the first case was announced in Turkey, a meeting was held with the top management. **Top managers came together and we started talking about how we will manage these patients……."**
Bench (22)	CM	"….Although we are taking care of a small number of patients, we have reached high turnovers because we are a comprehensive hospital. **Maybe while the turnover losses in other hospitals were 40-50-70 percent, it was below 20-25 in our hospital…."**
	IT	**"….We have heard that** many hospitals implement remote patient examinations with applications such as WhatsApp and facetime. However, we are using a safer communication method over the hospital line……" "We shared and discussed with people we work in **how can we serve our patients remotely, what are other institutions doing in this regard..."**
SEP (12)	P	**"…Along with the primary agreements, we also agreed with another alternative company in case the current supplier could not bring the product to us,** and we went to such a practice by giving 70 percent of our agreement to the first company and 30 percent to the second company…."
	NS	**"…There is no disruption in the lack of equipment, if there is no personnel, who can take care of it, how long should the test be given or what are the vaccination processes. We quickly identified these process flows** and provided site management accordingly…"
CSF (5)	P	**"We have some criteria that we determine when choosing our suppliers;** the delivery speed of the products, the ease of maturity they provide us, the quality documents of the products they sell to us...."
	HR	"We have determined it according to our current business structure and field requirements. **We have made a list of what are the most important factors for a situation and this way our priorities have been shaped...."**
CUA (3)	IT	"…..There are many costs such as food expenses in the institution, air conditioning in the environment, lighting or cleaning the environment. **He saw that these costs can turn into an environment where we can save."**

Source: The authors.

Administrative, clinical, and technical managers in different units came together and stated that they conveyed the situations in the units to each other, and that they used the Bst. tool by evaluating the need for the service, personnel or material needed by a unit. By expressing that they completed the tests faster than other institutions, they showed us that the Bench. was used. In addition, all other managers stated that they constantly compare themselves both among the units within the hospital and with similar units of other hospitals. They mapped the workflow processes by using the SEP tool and that they reviewed the strategies implemented by all departments for emergencies. With the CSF tool they stated that while purchasing a product, they consider factors such as ensuring the fastest delivery and adequately meeting the current need. They made backups of personal protective equipment such as masks and visors to be prepared for emergency surgeries. According to them they achieved more successful results by focusing on some critical factors instead of focusing on many things during the pandemic period. In the statements they conveyed through CUA, it was seen that the pandemic period could turn into an environment where costs could be saved. They also stated that they agreed with the companies and made a commitment to them at the beginning of the pandemic period in order not to increase the costs in the field of purchasing.

Use of SMTs in the Strategic Implementation Phase

During the strategic implementation phase, the participants stated that they used 6 SMTs: CRM, TQM, BS, SMI, SCM, and Bud (Budgeting). In this phase, a total of 67 expressions related to the use of SMTs were identified and some key expressions showing which SMT the expressions would be coded for in line with the answers of the participants were shown as Illustrative Quotes [Table 4].

Table 4. How did the participants use SMTs during the strategic implementation phase?

SMTs and number of expressions	Participant	Illustrative Quote
CRM (28)	IT	"If we say specifically for the pandemic period, we have worked on service alternatives for patients outside the hospital and **we have progressed by planning them, as I said, we are a hospital, we work patient-oriented so that they are happy..."**
	IS	"We took COVID-positive patients and **measured the satisfaction rates of these patients.** Satisfaction was about %80. **We also measured the dissatisfied part, and there we got more data about the lack of information."**
TQM (23)	IS	**"We conducted research with the quality department in patient transfer processes.** We tried to provide maximum service by moving the patient around the hospital at a minimum level….
	OS	" ..Yes, conditions have changed. But **our priority was to create a quality service and a satisfied patient group."**
BS (6)	CM	"….We draw **a road map for ourselves within the framework of patient satisfaction, loyalty management and other tools. In the roadmap, we create some algorithms both in Turkey and abroad, taking into account the branch and physician-based, number of patients and turnover-based profitability…."**
	SS	**"…We tried to measure each area. Are the employees satisfied, are there many financial losses, do our patients leave satisfied?** The results of such outputs became our starting point."
SMI (5)	CM	**"Informing was made using the power of social media.** Of course, the rapid spread of misinformation is another point."
	NS	"We had a pregnant school where we did face-to-face training. We started doing it online……. **We also used the effective power of social media here.** In this way, we reached the patients who needed more."
SCM (2)	P	"What kind of changes took place in this period; we have experienced the advantage of implementing a **sustainable purchasing strategy with our suppliers..."** "……Purchasing is a very important department. **We are living in a period where the concept of winning once buying feels more important."**
Bud (2)	GA	"…I think we have declared that we are strong in the sector by continuing our investments in this period. For this, **we have taken our steps more carefully by reviewing our financial resources many times."**
	CM	"….Of course, the **price research we have done also has an effect. Because if we had spent our financial resources in one direction, the pandemic period would have caused us serious losses."**

Source: The authors.

In this phase most intensive tool was **CRM**. All the managers stated that they are trying to implement reassuring strategies for the anxiety of the potential patient group during the pandemic period.

According to them the way to ensure patient satisfaction is possible by providing a quality service. Also they said that they ensured that the patient receives more satisfactory service by taking the patient around the hospital the least, and that this had a good effect on the satisfaction measurements. All the executives stated that efficient workflow processes can only be possible if a quality service is provided, and they said that the **TQM** tool is an indispensable method in implementation and evaluation decisions. By using the **BS** tool, the managers stated that all departments advance the workflow together, they deal with all kinds of initiatives separately in terms of financial, internal business processes, employee and patient satisfaction, but they continue by combining them on a common denominator and thus they gain benefits. In addition, they stated that they created roadmaps for each of the patient groups to reduce the number of physician or branch-based patients and turnover losses in national and international platforms. That they saw the benefit of the internet by starting online trainings such as pregnant school. They benefited from the power of social media and used the **SMI** tool to reach more individuals both in online training and in conveying the stages of the pandemic process. They increased their stocking activities with the onset of the pandemic. Emphasizing the importance of the concept of earning while buying, the managers expressed reflexively that they took successful steps because of the agreements they made and that they used the **SCM** tool. With the **Bud** tool, the managers stated that they did not spend their financial resources in a single direction, and that the turnover losses were much less than other institutions thanks to the price increases they made. Also they reduced income loss by continuing the transactions of chronic diseases with countries where patient transfers are open.

Discussion

Hospitals, which are complex and must adapt very quickly to environmental changes to survive, are the first organizations to face the staggering change created by the pandemic. Hospital managers, who have adopted the strategic management approach that focuses on the environmental compliance of organizations, have been able to gain advantage in this process by using various SMTs (4, 26). Considering strategic management as a process, SMTs can be used at all stages by managers: situation assessment, strategic analysis, and strategic implementation (9). In studies in the health sector, many authors have focused on how much SMTs are known/used by managers, namely the quantitative dimension (1, 14, 11, 13), while others deeply examine one tool using (26, 27). To our knowledge, this is the first qualitative study to investigate the "how" as well as "how much" middle and senior managers in hospitals used existing strategic management tools during the pandemic period.

The first question of this research was which (how much) strategic management tools the hospital administrators used. As a result of this study, it has been determined that in the changing environment created by the pandemic, senior and middle managers act together in strategic practices and use 16 different SMTs at various stages of the strategic management process. It is thought that this harmony between managers at different levels contributes to managerial success in adapting to the changing environment. Because one of the most important obstacles to the change and placement of strategies in different conditions is that middle and senior managers do not adopt this behavior and there is no cooperation between them (28). SMTs used in hospitals may different (2). So, managers can use different SMTs in different hospitals and in various situations. For example, many studies conducted in a stable period indicates that RE is one of the least used and known SMTs by managers (1, 13, 14). Since our study was conducted in a period of intense change, it is thought that the most used tool is RE.

With the second question of our research, namely how SMTs are used, we presented a lot of evidence in the results. To give a few striking examples of the results; it has been observed that some health services have been postponed making room for pandemic patients. It was found that care was taken to make this change without harming existing patients and without disrupting the service to be provided to them. Because one of the most challenging issues for hospitals during the pandemic period was to provide uninterrupted treatment of chronic diseases such as cancer (29). In another example, managers state that online working principles, online trainings for both patients and staff, and remote patient examination practices are carried out with the RE tool.

Limitations

The limitation of this study is that the data were collected during the 4-month period of the pandemic in Turkey and based on the self-report of the managers who accepted the attend interview. In addition, since this study is a single case study, it does not claim to generalize.

Conclusion

Consequently, this study has shown us that both middle and senior managers actively use total 16 SMTs at every stage of the strategic management process during the pandemic period. This study revealed that while RE is the most used tool by managers at all levels in a changing environment, SCM is used only by the purchasing manager. In line with this result, it can be said that SMTs strengthen the hand of both senior and middle managers in hospitals where strategic management is adopted. For this, it will be beneficial for managers at all levels to learn these tools and share their experiences with each other. Because managers can gain an advantage by using different SMTs in different decisions, just like a golf club.

Declarations

Ethics Committee Approval

The study was approved by The Ethics Committee of Istanbul Medipol University Non-Invasive Clinical Research (Number: 941/ 24.12.2020). Additionally, Ministry of Health COVID-19 Scientific Research Approval was received on 7 November 2021.

Informed Consent

Written informed consent was obtained from all participants who participated in this study.

Declaration of Interests

The authors have no conflicts of interest to declare.

Funding

This research was supported by scientific research project fund Istanbul Medipol University (BAP) number 2021/08.

Authors' Contributions

Establishing the main idea and hypothesis of the study: A.P and S.A.A; Designed and conducted the analysis: A.P and S.A.A; Collected the data: A.P; Contributed data analyzing: A.P and S.A.A; Wrote the paper: A.P and S.A.A; Execution of the project in which the research article is published: S.A.A.

Acknowledgements

This study was produced from the first author's thesis. The author wishes to thank Istanbul Medipol University Scientific Research Commission.

References

1. Demir Bilgin İ, Uğurluoğlu Ö. Evaluation of the use of Strategic Management Tools by Hospital Executives in Turkey, Journal of Health Management. 2019; 21 (1): 38-52. https://doi.org/10.1177/0972063418822216
2. Pascuci LM., Júnior VM, Crubellate JM. Strategic Management in Hospitals: Tensions Between the Managerial and Institutional Lens, Brazilian Administration Review. 2017; 14 (2): http://dx.doi.org/10.1590/1807-7692bar2017160092
3. Phiri W. A critical analysis of strategic management process, International Journal of Commerce and Management Research. 2019; 5 (1), 138-142.
4. Jaworzynska M. Using Tools of Strategic Management in Medical Facilities of Lublin Region, Engineering Management in Production and Services. 2017; 9 (2): 82-89. https://doi.org/10.1515/emj-2017-0017
5. Ridder HG, Doege V, Martini S. Differences in the Implementation of Diagnosis-Related Groups across Clinical Departments: A German Hospital Case Study, Health Research and Educational Trust. 2007; 42 (6): 2120-2139. https://doi.org/10.1111/j.1475-6773.2007.00723.x
6. Stenfors S, Tanner L, Syrjänen M, Seppälä T, Haapalinna, I. Executive Views Concerning Decision Support Tools, European Journal of Operational Research . 2007; 181 (2): 929-938. https://doi.org/10.1016/j.ejor.2006.06.024
7. Hussey DE. Glossary of Techniques for Strategic Analysis. Strategic Change. 1997; (6): 97-115. https://doi.org/10.1002/(SICI)1099-1697(199703)6:2<97::AID-JSC223>3.0.CO;2-I
8. Qehaja AB, Kutlovci E, Pula JS. Strategic Management Tools and Techniques Usage: a Qualitative Review. Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis. 2017; 65 (2): 585-600. https://doi.org/10.11118/actaun201765020585
9. Clark DW. Strategic Management Tool Usage. Journal of Strategic Chance. 1997; (6): 417-427. https://doi.org/10.1002/(SICI)1099-1697(199711)6:7<417::AID-JSC281>3.0.CO;2-9
10. Grint K. Fuzzy Management: Contemporary Ideas and Practices. Oxford : Oxford University Press. 1997.
11. Özzeybek Taş M. Seyhan F. Sağlık çalışanlarının stratejik yönetim araçları bilgi ve kullanım düzeyleri hakkında görüşleri üzerine bir araştırma: Ankara ili örneği. SagAkaDerg. 2021; 8(4): 304-322.
12. Çağatay A, Öztürk Z. Sağlık Kurumlarındaki Yöneticilerin Stratejik Yönetim Araçları Kullanım Görüşleri, Cumhuriyet Üniversitesi İktisadi ve İdari Bilimler Dergisi. 2021; 22, 1-29. https://doi.org/10.37880/cumuiibf.743058
13. Çınar F, Demircan F, Nişancı Z. Hastane Yöneticilerinin Stratejik Yönetim Araçlarını Kullanım Durumlarının İncelenmesi: Nitel Bir Çalışma, Sağlık ve Sosyal Refah Araştırmaları Dergisi. 2019; 1 (2): 40-52. Retrieved from https://dergipark.org.tr/tr/pub/sarad/issue/46957/594234
14. Biçer EB. Sağlık Kurumları Yöneticilerinin Stratejik Yönetim Tekniklerine Bakış Açılarının ve Yaklaşım Tarzlarının Belirlenmesi: Sivas İli Örneği, Yönetim ve Ekonomi Araştırmaları Dergisi. 2018; 16(4): 405-427. https://doi.org/10.11611/yead.482685
15. Stoner JAF, Freeman RE. Management. New Jersey: Prentice Hall. 1989.
16. Currie G, Procter SJ. The Antecedents of Middle Managers Strategic Contribution: The Case of Professional Bureaucracy, Journal of Management Studies. 2005; 42 (7): 1325-1355. https://doi.org/10.1111/j.1467-6486.2005.00546.x
17. Gökçe Ş. Stratejik Yönetim Sürecinde Orta Düzey Yöneticiler, Yeni Ekonomik Trendler ve İş Fırsatları. 5. Uluslararası Ekonomi ve İşletme Kongresi. Bursa. 2019; 10(5): 601-607.
18. Quinn JB. Strategic change: Logical Incrementalism, Sloan Management Review. (pre-1986); 20: 7-21.

19. Yin RK. Case Study Research: Design and Methods. 5th Edition. Thousand Oaks, CA: Sage Publications. 2014
20. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research, Adm Policy Ment Health. 2015; 42 (5): 533-544. https://doi.org/10.1007/s10488-013-0528-y.
21. Daniela RM. Determining the Sample Size in Qualitative Research. International Multidisciplinary Scientific Conference on the Dialogue between Sciences and Arts, Religion and Education. 2020; 181-187. Romania. https://doi.org/10.26520/mcdsare.2020.4
22. Boddy CR. Sample size for Qualitative Research. Qualitative Market Research: An International Journal. 2016; 19 (4), 1352-2752. https://doi.org/10.1108/QMR-06-2016-0053
23. Clark DN, Scott JL.Strategic Level MS/OR Tool in the United Kingdom: An Empirical Survey, The Journal of the Operational Research Society. 1995; 46(9): 1041-1051.
24. Kyngas H., Mikkonen K., Kaariainen M.. Inductive Content Analysis. The Application of Content Analysis in Nursing Science Research, Springer. 13–21. https://doi.org/10.1007/978-3-030-30199-6. 2020.
25. Miles MB, Huberman AM. Qualitative Data Analysis: An Expanded Sourcebook, 2nd ed. Sage. 1994
26. Young GJ, Charns MP, Shortell SM. Top Manager and Network Effects on the Adoption of Innovative Management Practices: A study of TQM in a Public Hospital System, Strategic Management Journal. 2001; 22 (10): 935–951. https://doi.org/10.1002/smj.194
27. Saleh S, Kaissi A, Semaan A, Natafgi NM. Strategic Planning Proccesses and Financial Performance Among Hospitals in Lebonan, The International Journal of Health Planning and Management. 2012; 28 (1): 34-45. https://doi.org/10.1002/hpm.2128
28. Schneider LN. Strategic Management as Adaptation to Changes in the Ecosystems of Public Hospitals in Israel, Naamati Schneider Israel Journal of Health Policy Research. 2020; 9(65): 2-11. https://doi.org/10.1186/s13584-020-00424-y
29. Bartlett, D.L., Howe, J.R., Chang, G. et al. Management of Cancer Surgery Cases During the COVID-19 Pandemic: Considerations. Ann Surg Oncol. 2020; 27: 1717–1720. https://doi.org/10.1245/s10434-020-08461-2

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 250-256
https://doi.org/10.31067/acusaglik.1236613

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Evaluation of Maternal Attitudes Towards The Nutrition of Pre-School Children

Tuğba Cengiz[1] , **Selen Özakar Akça**[1]

[1]Department of Child Health and Diseases Nursing, Faculty of Health Sciences, Hitit University, Corum, Turkey

ABSTRACT

Purpose: The aim of this study is to evaluate the attitudes of mothers with pre-school children towards child nutrition and to determine the relationship between these attitudes of mothers and the children's body mass index (BMI).

Methods: This descriptive study was conducted with mothers of children aged 4-6 years in kindergartens. The data were collected by using the Mother Descriptive Characteristics Form, Child Descriptive Characteristics Form" and " Mother's Attitudes Towards the Feeding Process Scale (MATFPS). BMI (kg/m^2) of all children was determined.

Results: In the study, MATFPS total mean score of mothers with pre-school children was 60.09±17.60, and mothers' attitudes towards the feeding process were at a good level. MATFPS mean score of mothers of children with a birth weight of 1000-2000 grams was statistically significantly higher than those with a birth weight of 2001-3000, 3001-4000 and 4001-5000 grams ($p<0.01$). According to the BMI of the children of the mothers participating in the study, 19.4% were underweight, 10.0% were at underweight risk, 47.6% were healthy, 10.5% were slightly obese, and 12.0% were obese; the difference between the mean scores of the mothers and the BMIs of the children is highly significant ($p<0.001$).

Conclusion: Mothers' attitudes towards the feeding process are at a good level. However, the low birth weight causes the negative attitudes in mothers towards the feeding process. Again, BMI which is an indicator of growth and development in children, negatively affects maternal attitudes in the feeding process. Pediatric nurses can provide counseling to mothers in order to develop positive attitudes.

Keywords: Attitude, mother, nurse, nutrition, preschool child

Tuğba CENGİZ
Selen ÖZAKAR AKÇA

Okul Öncesi Çocukların Beslenme Sürecinde Anne Tutumlarının Değerlendirilmesi

ÖZET

Amaç: Bu çalışma ile okul öncesi çocuğu olan annelerin beslenme süreci tutumlarının değerlendirilmesi ve annelerin bu tutumları ile çocuklarının beden kütle indeksi (BKİ) arasındaki ilişkinin belirlenmesi amaçlanmıştır.

Yöntem: Tanımlayıcı olan bu araştırma, 4-6 yaş arasındaki çocukların anneleri ile yürütülmüştür. Veriler, "Anne Tanıtıcı Özellikler Formu, Çocuk Tanıtıcı Özellikler Formu" ve "Beslenme Süreci Anne Tutumları Ölçeği (BSATÖ)" kullanılarak toplanmıştır. Ayrıca tüm çocukların BKİ'leri (kg/m^2) belirlenmiştir.

Bulgular: Araştırmada okul öncesi çocuğu olan annelerin BSATÖ toplam puan ortalaması 60,09±17,60 olup, annelerin beslenme sürecine dair göstermiş olduğu tutumlar iyi düzeydedir. Doğum ağırlığı 1000-2000 gram olan çocukların annelerinin BSATÖ puan ortalaması doğum ağırlığı 2001-3000, 3001-4000 ve 4001-5000 gram olanlara göre istatistiksel olarak anlamlı derecede yüksektir ($p<0,01$). Çalışmaya katılan annelerin çocuklarının BKİ'ye göre %19,4'ü zayıf, %10,0'ı zayıflık riski, %47,6'sı normal, %10,5'i hafif şişman, %12,0'ı şişman olup, annelerin ölçek puan ortalamaları ile çocukların BKİ'leri arasındaki fark ileri düzeyde anlamlıdır ($p<0,001$).

Sonuç: Annelerin beslenme sürecine dair göstermiş olduğu tutumlar iyi düzeydedir. Ancak, çocukların doğum ağırlığının düşük olması beslenme sürecindeki anne tutumlarının olumsuzluğuna neden olmaktadır. Yine çocuklarda büyüme ve gelişmenin göstergesi olan çocukların BKİ'leri beslenme sürecindeki anne tutumlarını olumsuz etkilemektedir. Pediatri hemşireleri olumlu tutum geliştirmeleri için annelere danışmanlık yapabilirler.

Anahtar kelimeler: Tutum, anne, hemşire, beslenme, okul öncesi çocuk

Correspondence: Selen Özakar Akça
Department of Child Health and Diseases Nursing, Faculty of Health Sciences, Hitit University, Corum, Turkey
Phone: +903642230730
E-mail: selenozakar@hotmail.com

Received: 17 January 2023
Accepted: 19 February 2023

In the preschool period, while psychological, biological, familial and sociocultural factors are among the main causes of malnutrition, parental attitudes are extremely important in the nutrition of children (1-3). Parental attitudes are important determinants of eating problems that may occur in the future. Therefore, understanding the feelings, thoughts about and approaches of mothers towards the feeding process is extremely important in terms of evaluating their attitudes towards the feeding process (3, 4).

The development of nutrition-related behaviors in preschool children takes place in and around the care-giver. When problems with nutrition last for a long time, this negatively affects the growth and development of the child (5-7). For this reason, it is very important to determine the eating problems of children and to understand the attitudes of mothers in the process of feeding their children. Pediatric nurses have the primary role in evaluating the preschool child and mother with a holistic care approach, determining the child and mother's attitudes towards nutrition, planning arrangements for and taking necessary precautions against negative attitudes as well as reinforcing positive attitudes (4, 8-10). As pediatric nurse is in an ideal position as a role model for the child, family and society when it comes to adequate and balanced nutrition, they will ensure success in raising healthy children (10, 11).

It is extremely important to understand the eating behavior problems of children, to determine the attitudes of mothers during the feeding process and to support the growth and development of the child (12-14). The attitudes of mothers towards feeding process help the child to develop food liking and to gain self-feeding skills. These acquired skills can affect the healthy eating behavior, growth and weight status of the child later in life (15). For this reason, it is necessary to determine the positive or negative attitudes of mothers that affect the weight and eating habits of children during the nutrition process (16-18). In this context, there is a need to determine children's eating behaviors, mothers' attitudes towards the feeding process, and to evaluate negative maternal attitudes that may reinforce the eating problem in children (19, 20). It is thought that determining the factors affecting the eating habits of preschool children will be effective in preventing various nutritional problems. Based on this idea, this study aimed to evaluate maternal attitudes in the feeding process of preschool children and to determine the relationship between these attitudes of mothers and their children's Body Mass Index (BMI).

MATERIALS and METHODS

Type of Study

The study adopted descriptive research design.

The Population of the Study

The population consisted of mothers with children aged 4-6 years who continue their education in kindergartens affiliated to the Provincial Directorate of National Education in the 2019-2020 academic year (N=1961). In deciding on the sample of the study, the

$$\frac{N*t^2*p*q}{d^2(N-1)+t2*p*q}$$

formula was used since the volume of the population is known for a finite population. When the formula was satisfied with the given data. N = 1961, p = 0.5, q = 0.5, t = 1.96, d = 0.05, the sample size was found n = 321. This study was conducted with 324 mothers.

Inclusion criteria for the study are that mothers must have children in the age group of 4-6 studying in kindergartens affiliated to the Provincial Directorate of National Education in the 2019-2020 academic year, have the ability to read and understand the questions in the introductory information form, and be volunteering to participate in the study. Mothers who were illiterate or did not volunteer to participate in the study or whose children had a chronic disease were excluded from the study.

Data Collection Tools: Mother and Child Descriptive Characteristics Form and Mother's Attitudes Towards the Feeding Process Scale (MATFPS) were used to collect the data. In addition, all children's height (m) and body weight (kg) were measured and their BMI (kg/m^2) calculated and these data were used in the study.

Mother and Child Descriptive Characteristics Form; This form was prepared by the researcher in line with literature (3-8, 10, 19-22) and covers items to explore descriptive characteristics of mothers and child.

Mother's Attitudes Towards the Feeding Process Scale (MATFPS); It is a 5- point Likert type scale developed by Dilsiz and Dağ, and consists of 27 items (22). The scale produces five factors: Negative Affect During Meal, Attitudes about Insufficient/Unbalanced Feeding, Negative Feeding Strategies, Forced Feeding and Reaction to the Viewpoints of Others. Scale items were designed in a five-point likert structure from never to always. The total score that can be obtained from the MASFP ranges from 27-135.

The increase in the scores obtained in terms of each factor and the total score of the scale shows that the problems related to the attitudes of the mothers towards the feeding process also increase . The Cronbach Alpha value of the scale was determined as 0.91, and the test-retest reliability coefficient was found to be 0.94 (22). In this study, the Cronbach Alpha value of the scale was determined as 0.917.

Evaluation of Children's BMI; defined by the United States of America National Center for Health Statistics and approved by the US Centers for Disease Control and Prevention and World Health Organization (WHO), international standard indicators related to BMI were used to evaluate the BMI of Children (23-25). BMI was calculated using the formula Weight [kg]/Height^2 [m^2]. In this study, these percentage curves were used for Turkish children, and those with BMI <3% were considered underweight, 3-15% were at risk of underweight, 15-85% were healthy, 85-97% were slightly obese, and those with a BMI >97% percent were considered obese (21, 23).

This study was conducted after having obtained the ethics committee's approval and in accordance with the rules of the Helsinki declaration. Ethics committee approval (28.02.2019/2019-86) was received from the ethics committee in order to conduct the research. All participants to be included in the study were informed and their written consent was obtained.

Statistical Analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS for Windows, v. 22.0). Number, percentile, and mean (minimum and maximum) were used for analysis. The nonnormally distributed data were analyzed using the Kruskal-Wallis and Mann-Whitney U tests. Mann Whitney U post-hoc multiple comparison test with Bonferroni correction was used to determine the group that differed after the Kruskal Wallis test.

RESULTS

Figure 1 provides the mothers' total mean scores of MATFPS and sub-scales. The total mean score of the scale is 60.09 ± 17.60, and the sub-scale mean scores of negative affect during meals, attitudes about insufficient/unbalanced feeding, negative feeding strategies, forced feeding, reaction to the viewpoints of others are 12.81±5.53, 23.71±7.81, 9.68±3.82, 5.28±1.96, 8.61±3.66 respectively (Figure 1).

It was determined that 201 of the 324 mothers participating in the study were between the ages of 30-40, 290 had nuclear family, and 174 had a university or higher education degree (Table 1). Table 1 shows the comparison of the mothers' MATFPS total mean scores with certain descriptive characteristics.

In Table 2, the comparison of the MATFPS total mean score of the mothers with certain introductory characteristics of their children is given. MATFPS total mean score among the mothers of children with a birth weight of 1000-2000 grams (74.25±22.69) was determined statistically significantly higher than those with birth weight of 2001-3000 (64.07±16.91), 3001-4000 (58.47±17.00) and 4001-5000 (52.79±17.77) grams ($p<0.01$; Table 2).

Table 3 shows the comparison of the MATFPS total mean score of the mothers with the BMI of their children. It was determined that the total mean score of the mothers of the children with low BMI in the study was statistically significantly higher than the mean score of the mothers of healthy, slightly obese and children with obesity ($p<0.001$; Table 3).

When the relationship between the total mean scores and sub-scale mean scores of the mothers in the study was analyzed, it was found that there was a statistically low level of negative correlation between the total and subscale means scores of the mothers and their children's weight (kg), height (cm) and BMI ($p<0.001$; Table 4).

DISCUSSION

The attitudes of mothers in the feeding process of their children help the child to develop food liking and to gain self-feeding skills. These acquired skills can affect the healthy eating behavior, growth and weight of the child later in life (3, 16, 25). For this reason, it is necessary to determine the positive or negative attitudes of mothers that affect the weight and eating habits of children during the eating process (17, 18). It has been observed in the literature that studies on determining the attitudes of mothers with preschool children are limited. This study will be a guide to determine the attitudes of mothers with pre-school children in the feeding process, understand the nutritional behaviors of children, and nurses' help early intervention in the negative attitudes of mothers in the feeding process and problematic eating behaviors of children.

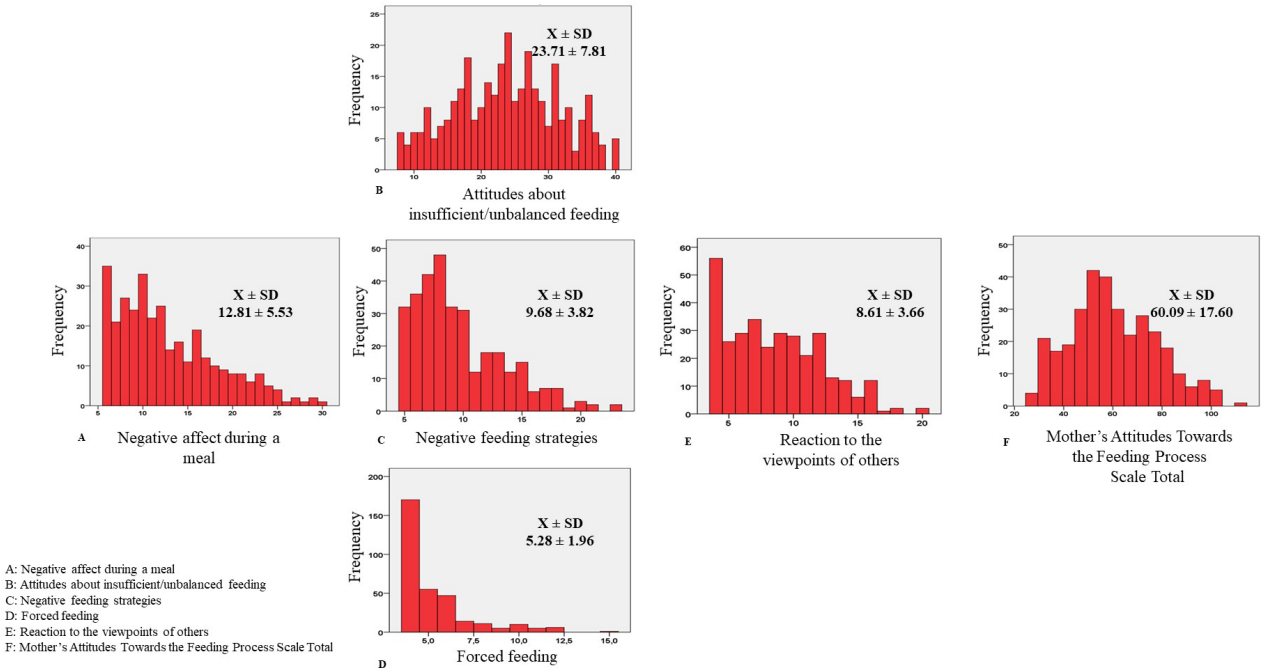

Figure 1. Means of Mothers' Total and Sub-scale Scores of "Mother's Attitudes Towards the Feeding Process Scale (MATFPS)".

Table 1. Comparison of mothers' MATFPS mean scores with certain descriptive characteristics

Mothers' Descriptive Characteristics	n (%)	ẋ ± SD	Median (Q1-Q3)	P
Maternal age				
20-30	82 (25.4)	62.45 ± 20.16	59 (28-104)	0.308[a]
30-40	201 (62.0)	58.81 ± 16.77	57 (27-111)	
≥ 40	41 (12.6)	61.66 ± 15.80	62 (33-97)	
Family type				
Nuclear family	295 (91.0)	59.98 ± 17.76	58 (27-111)	0.484[b]
Extended family	29 (9.0)	61.24 ± 16.05	58 (27-98)	
Mother's educational status				
Primary school	27 (8.3)	60.81 ± 18. 84	57 (30-92)	0.308[a]
Middle School	32 (9.9)	65.28 ± 17. 52	60.5 (28-104)	
High school	91 (28.1)	57.46 ± 17. 29	57 (27-103)	
University and higher	174 (53.7)	60.62 ± 17. 91	59 (27-111)	
Economic situation of the family				
Income less than expenses	44 (13.6)	63.18 ± 16. 57	61.5 (28-104)	0.375[a]
Income equal to expenses	155 (47.8)	59.32 ± 18. 26	57 (27-104)	
Income greater than expenses	125 (38.6)	59.96 ± 17. 12	59 (27-111)	
Mother's working status				
Working	146 (45.1)	59.63 ± 17. 05	59 (27-111)	0.760[b]
Not working	178 (54.9)	60.47 ± 18. 07	57 (27-104)	
Number of children the Mother has				
one	92 (28.4)	62.67 ± 18. 96	60 (27-111)	0.413[a]
2	165 (50.9)	59.05 ± 16. 99	57 (27-104)	
3 and more	67 (20.7)	59.07 ± 16. 74	55 (30-98)	

[a]Kruskal Wallis Test, [b]Mann Whitney U Test, SD: Standard Deviation, MATFPS: Mother's Attitudes Towards the Feeding Process Scale

Table 2. Comparison of mothers' MATFPS scores with children's descriptive characteristics

Child' Descriptive Characteristics	n (%)	ẋ ± SD	Median (Q1-Q3)	P
Gender				
Girl	134 (41.4)	58.69 ± 17.51	57 (27-98)	0.346[b]
Boy	190 (58.6)	61.08 ± 17.64	59 (27-111)	
Age				
4	82 (25.3)	58.20 ± 17. 20	57 (27-104)	0.379[a]
5	104 (32.1)	61.89 ± 17. 66	60 (28-111)	
6	138 (42.6)	59.86 ± 17. 78	57 (27-103)	
Birth weight				
1000-2000 grams	12 (3.7)	74.25 ± 22. 69	80 (37-100)	0.004[a]
2000-3000 grams	74 (22.8)	64.07 ± 16. 91	61.5 (30-98)	
3000-4000 grams	224 (69.2)	58.47 ± 17. 00	56.5 (27-111)	
4000-5000 grams	14 (4.3)	52.79 ± 17. 77	51.50 (27-85)	
Birth week				
28-36 weeks	41 (13.9)	64.80 ± 20. 48	61 (27-104	0.156[b]
36 weeks or more	283 (86.1)	59.41 ± 17. 07	57 (27-111)	

[a]Kruskal Wallis Test, [b]Mann Whitney U Test, SD: Standard Deviation, MATFPS: Mother's Attitudes Towards the Feeding Process Scale

Table 3. Comparison of mothers' MATFPS mean scores with children's BMI

Children BMI	n (%)	Mothers' MATFPS ẋ ± SD	Median (Q1-Q3)	P	Post-hoc p value
Underweight	63 (19.4)	69.57 ± 15.97	69 (35-103)	< 0.001	1-2: 1.000 1-3: < 0.001
The Risk of Underweight	34 (10.5)	67.15 ± 16.33	63 (34-103)		1-4: < 0.001 1-5: < 0.001
Healthy	154 (47.6)	58.81 ± 17.43	55 (27-111)		2-3: 0.085 2-4: 0.018
Slightly Obese	34 (10.5)	54.29 ± 14.33	51 (33-84)		2-5: < 0.001 3-4: 1.000
Obese	39 (12)	48.74 ± 14.87	49 (28-81)		3-5: 0.018 4-5: 1.000

Kruskal Wallis Test, SD: Standard Deviation, MATFPS: Mother's Attitudes Towards the Feeding Process Scale BMI: Body Mass Index

Table 4. Correlation analysis between mothers' total and sub-scale scores of MATFPS and children's height, weight and BMI

		MATFPS Total	Negative affect during a meal	Attitudes about insufficient/ unbalanced feeding	Negative feeding strategies	Forced feeding	Reaction to the viewpoints of others
Height (cm)	**r**	-0.289*	-0.327*	-0.180*	-0.235*	-0.132*	-0.180*
	P	< 0.001	< 0.001	< 0.001	< 0.001	0.018	< 0.001
Weight (kg)	**r**	-.491*	-.430*	-.425*	-.349*	-.148*	-.345*
	P	< 0.001	< 0.001	< 0.001	< 0.001	0.007	< 0.001
BMI	**r**	-.390*	-.297*	-.383*	-.243*	-.109*	-.289*
	P	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

** Spearman's rho Correlation*
MATFPS: Mother's Attitudes Towards the Feeding Process Scale
BMI: Body Mass Index

In this study, it was determined that mothers with children in the age group of 4-6 obtained 60.09±17.60 points in MATFPS. Considering the minimum and maximum values (27-135) of the scale used in this study and the low score indicating a positive attitude, it can be said that the attitudes of the mothers towards the feeding process are at a good level (Figure 1). However, it draws attention to the fact that more studies should be carried out for the importance, intelligibility and awareness of the attitudes of parents with preschool children in the feeding process.

Nutrition is a process that is based on mutual communication between the child and the mother and is shaped by reactions. The most important factor affecting children's feeding behavior is mother's attitudes (19, 25, 26). In this study, it was determined if the difference between mothers' MASFP mean scores and such descriptive characteristics as age, family type, educational status, etc. was statistically significant ($p>0.05$; Table 1). This results shows that the attitudes of the mothers towards the feeding process of their children are similar regardless of their age, educational status and economic status.

The attitudes of mothers towards the feeding process change according to the birth weight and week of their children, and as a result, negative or positive effects of maternal attitudes on the growth and development of children are observed (19, 27, 28). In this study, it was determined that the difference between mothers' MATFPS mean scores and their children's gender and week of birth was not statistically significant ($p>0.05$), while the difference between birth weight was significant ($p<0.01$; Table 2). In this study, as the birth weights of the children of the participating mothers decrease, the increase in their MATFPS mean score shows that their attitudes towards the feeding process are negatively affected.

BMI is one of the anthropometric measurements that reflects the nutritional status as well as showing growth and development. Chen et al. and Bergmeier et al. have reported that children's BMI has an effect on parental attitudes (26, 27). In this study, it was determined based on the children's BMI that total mean score of the mothers of underweight children was significantly higher than the mean score of the mothers of healthy, slightly obese and children with obesity ($p<0.001$; Table 3). This study produced results in line with the literature that the attitudes of mothers of children with low BMI towards the feeding process are negative compared to mothers of healthy, slightly obese and children with obesity.

It is important to determine the nutritional status and patterns of pre-school children and to determine the factors affecting these nutrition patterns in preventing various nutritional problems that may occur. Height, weight and BMI measurements form the basis of the evaluation of the nutritional status of the child (29, 30). In this study, it was determined that there was a negative, low-level and significant relationship between the mothers' MASFP total scores and sub-scale scores and their BMI ($p<0.001$; Table 4). Bergmeier et al. reported that there was a significant relationship between parental feeding style and children's BMI (27). In this study, the determination of a negative, low-level, and significant relationship between children's BMI and mothers' scale total and sub-scale scores shows that negative maternal attitudes in the feeding process negatively affect height, weight and BMI, which are indicators of growth and development in children.

CONCLUSION

In line with the findings obtained from the research, mothers' attitudes towards the feeding process are at a good level. However, the low birth weight of children causes negative maternal attitudes in the feeding process. Again , children's height, weight and BMI, which are indicators of growth and development in children, negatively affect maternal attitudes in the feeding process. In this direction, pediatric nurses should organize trainings for mothers on the follow-up and evaluation of growth and development in children, early detection of deviations from normal and appropriate guidance.

Acknowledgements

The authors thank the students for participating in the study. The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article. The author(s), no funding was obtained for data collection, designing of the study, data analysis and manuscript writing.

We would like to thank all participating nursing who took the time to complete the questionnaires and made this study possible.

REFERENCES

1. Rahmaty Z, Johantgen ME, Storr CL, et al. Patterns of caregivers' feeding practices and associated characteristics among preschool-age children in the United States. Appetite. 2022;168:105769. DOI:10.1016/j.appet.2021.105769
2. Schlottmann H, Broome M, Herbst R, et al. Nurse-led telephone follow-up to improve parent promotion of healthy behaviors in young children with motivational interviewing techniques. J Pediatr Health Care. 2019;33:545-54. DOI: 10.1016/j.pedhc.2019.02.003

3. Almeida C, Azevedo J, Gregório MJ, et al. Parental practices, preferences, skills and attitudes on food consumption of pre-school children: Results from the nutriscience project. PloS One. 2021;16:e0251620. DOI: 10.1371/journal.pone.0251620
4. Melo P, Sousa MI, Dimande MM, et al. Descriptive study of children's nutritional status and identification of community-level nursing diagnoses in a school community in Africa. Int J Environ Res Public Health. 2020;17:6108. DOI: 10.3390/ijerph17176108
5. Folayan MO, El Tantawi M, Oginni AB, et al. Malnutrition, enamel defects, and early childhood caries in preschool children in a sub-urban Nigeria population. PLoS One. 2020;15:e0232998. DOI: 10.1371/journal.pone.0232998
6. Gebru NW, Gebreyesus SH, Yirgu R, et al. The relationship between caregivers' feeding practices and children's eating behaviours among preschool children in Ethiopia. Appetite. 2021;157:104992. DOI: 10.1016/j.appet.2020.104992
7. Ansuya Nayak BS, Unnikrishnan B, George A, et al. Risk factors for malnutrition among preschool children in rural Karnataka: a case-control study. BMC Public Health. 2018;18:283. DOI: 10.1186/s12889-018-5124-3
8. Piro SS and Ahmed HM. Impacts of antenatal nursing interventions on mothers' breastfeeding self-efficacy: an experimental study. BMC Pregnancy Childbirth. 2020;20:19. DOI: 10.1186/s12884-019-2701-0
9. Estrem HH, Pados BF, Thoyre S, et al. Concept of pediatric feeding problems from the parent perspective. MCN Am J Matern Child Nurs. 2016;41:212-20. DOI: 10.1097/NMC.0000000000000249
10. Xu X, Parker D, Ferguson C, et al. Where is the nurse in nutritional care? Contemp Nurse. 2017;53:267-70. DOI: 10.1080/10376178.2017.1370782
11. Schlottmann H, Broome M, Herbst R, et al. Nurse-led telephone follow-up to improve parent promotion of healthy behaviors in young children with motivational interviewing techniques. J Pediatr Health Care. 2019;33:545-54. DOI: 10.1016/j.pedhc.2019.02.003
12. Tedik SE. Healthy life and role of nursing in the control of body weight. Turk J Diab Obes. 2017;2:54-62. DOI: 10.25048/tjdo.2017.9
13. Al Yazeedi B, Berry DC, Crandell J, et al. Family influence on children's nutrition and physical activity patterns in Oman. J Pediatr Nurs. 2021;56:e42-e48. DOI: 10.1016/j.pedn.2020.07.012
14. Cole NC, Musaad SM, Lee SY, et al. Home feeding environment and picky eating behavior in preschool-aged children: A prospective analysis. Eat Behav. 2018;30:76-82. DOI: 10.1016/j.eatbeh.2018.06.003
15. Sanlier N, Ulusoy HG, Kocabaş S, et al. Mediterranean diet adherence among preschoolers and its association with parents' beliefs, attitudes, and practices. Ecol Food Nutr. 2021;60:225-43. DOI: 10.1080/03670244.2020.1833874
16. Kim SY and Cha SM. Evaluation of dietary behaviors of preschool children in Seoul and Gyeonggi-do associated with the level of parents' health consciousness: using nutrition quotient for preschoolers (NQ-P). Nutr Res and Pract. 2021;15:248-65. DOI: 10.4162/nrp.2021.15.2.248
17. Broilo MC, Vitolo MR, Stenzel LM, et al. Mothers' perceptions of their own diets and the diets of their children at 2–3 years of age. Psicol Refl Crít. 2017;30:1-11. DOI: 10.1186/s41155-017-0067-7
18. Goodman LC, Roberts LT, Musher-Eizenman DR. Mindful feeding: A pathway between parenting style and child eating behaviors. Eat Behav. 2020;36:101335. DOI: 10.1016/j.eatbeh.2019.101335
19. Freitas FR, Moraes DEB, Warkentin S, et al. Maternal restrictive feeding practices for child weight control and associated characteristics. J Pediatr (Rio J). 2019;95:201-8. DOI: 10.1016/j.jped.2017.12.009
20. Warkentin S, Mais LA, Latorre MDRDO, et al. Relationships between parent feeding behaviors and parent and child characteristics in Brazilian preschoolers: a cross-sectional study. BMC Public Health. 2018;18:704. DOI: 10.1186/s12889-018-5593-4
21. Bradwisch SA, Smith EM, Mooney C, et al. Obesity in children and adolescents: An overview. Nursing. 2020;50:60-6. DOI: 10.1097/01.NURSE.0000718908.20119.01
22. Dilsiz H and Dağ I. Mother's attitudes towards the feeding process scale: development, validity and reliability study. Turkish J Pediatric Disease. 2018;14:7-15. DOI: 10.12956/tjpd.2018.380
23. World Health Organization. Obesity, 2020. Available at: https://www.who.int/newsroom/fact-sheets/detail/obesity-and-overweight.
24. Nujić D, Karšić M, Milas V, et al. Body mass index trend as a new parameter for evaluating children's nutritional status. Public Health. 2019;173:138-45. DOI: 10.1016/j.puhe.2019.04.014
25. Estay K, Kurzer A, Guinard JX. Mothers' perceptions and attitudes towards children's vegetable consumption-a qualitative, cross-cultural study of Chilean, Chinese and American mothers living in Northern California. Foods. 2021;10:519. DOI: 10.3390/foods10030519
26. Chen JL, Guo J, Esquivel JH, et al. Like mother, like child: the influences of maternal attitudes and behaviors on weight-related health behaviors in their children. J Transcult Nurs. 2018;29:523-31. DOI: 10.1177/1043659617736883
27. Bergmeier H, Skouteris H, Horwood S, et al. Associations between child temperament, maternal feeding practices and child body mass index during the preschool years: a systematic review of the literature. Obes Rev. 2014;15:9-18. DOI: 10.1111/obr.12066
28. Parrino C, Vinciguerra F, La Spina N, et al. Influence of early-life and parental factors on childhood overweight and obesity. J Endocrinol Invest. 2016;39:1315-21. DOI: 10.1007/s40618-016-0501-1
29. Leme AC, Muszynski D, Mirotta JA, et al. Diet quality of Canadian preschool children: associations with socio-demographic characteristics. Can J Diet Pract Res. 2021;82:131-5. DOI: 10.3148/cjdpr-2021-009
30. Shinsugi C, Tani Y, Kurotani K, et al. Change in growth and diet quality among preschool children in Tokyo, Japan. Nutrients. 2020;12:1290. DOI: 10.3390/nu12051290

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 257-263
https://doi.org/10.31067/acusaglik.1208293

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

The Relationship Between Nursing Students' Attitudes Towards Nursing Diagnosis and Their Professional Values

Berna Akay[1], Berna Köktürk Dalcalı[2]

[1]Faculty of Health Sciences, Department of Internal Medicine Nursing, Bandirma Onyedi Eylul University, Balıkesir, Turkey

[2]Faculty of Health Sciences, Fundamentals of Nursing Department, Bandirma Onyedi Eylul University, Balıkesir, Turkey

Berna AKAY

Berna KÖKTÜRK DALCALI

Correspondence: Berna Akay
Faculty of Health Sciences, Department of Internal Medicine Nursing, Bandirma Onyedi Eylul University, Balıkesir, Turkey
Phone: +905306126241
E-mail: bakay@bandirma.edu.tr

Received: 21 November 2022
Accepted: 19 February 2023

ABSTRACT

Purpose: The research was planned to examine the relationship between the attitudes of nursing students against the nursing diagnoses and their professional values.

Methods: The sample of this descriptive and correlational study consisted of 147 second, third- and fourth-year nursing students in the nursing department of a state university at the South Marmara Region. Personal information form was used to collect data, Positions on Nursing Diagnosis Scale was used to evaluate attitudes towards nursing diagnoses, and Nurses Professional Values Scale-Revised was used to evaluate professional values. The scales were converted into an online questionnaire in the Google® Survey database and were sent to students via electronic communication programs between February and May 2021. Descriptive statistics were used in the analysis of sociodemographic characteristics and scale responses, Pearson Correlation Analysis was used to examine the relationship of the scales.

Results: The mean age of the students participating in the study was 21.16±1.43. It was determined that the professional values score averages of students were at a high level with 120.54±10.76, and their attitudes towards nursing diagnosis mean scores were quite positive with 124.82±15.87 and there was a moderately strong positive relationship between them (r=.472 p< .01).

Conclusion: Adoption of professional values by nursing students is an important element to provide an understanding of nursing knowledge and science. Nursing diagnoses are the visible face of nursing science in patient care. It is recommended to increase the course content that will positively affect the attitudes towards these two issues and to support it with in-service training in professional life.

Keywords: Attitudes; nursing diagnosis; nursing students; professionalism

Hemşirelik Öğrencilerinin Hemşirelik Tanılarına Yönelik Tutumları ile Mesleki Değerleri Arasındaki İlişki

ÖZET

Amaç: Araştırma, hemşirelik öğrencilerinin hemşirelik tanılarına yönelik tutumları ile mesleki değerleri arasındaki ilişkiyi incelemek amacıyla planlanmıştır.

Gereç Yöntem: Tanımlayıcı ve ilişki arayıcı nitelikteki bu araştırmanın örneklemini Güney Marmara Bölgesi'ndeki bir devlet üniversitesinin hemşirelik bölümünde okuyan ikinci, üçüncü ve dördüncü sınıf hemşirelik öğrencilerinden 147 öğrenci oluşturmuştur. Veri toplamak için kişisel bilgi formu, hemşirelik tanılarına yönelik tutumları değerlendirmek için Hemşirelik Tanıları Hakkındaki Görüşler Ölçeği ve mesleki değerleri değerlendirmek için Revize Edilen Hemşirelerin Mesleki Değerler Ölçeği kullanılmıştır. Ölçekler, Google® Anket veri tabanında çevrimiçi bir ankete dönüştürülmüş ve elektronik iletişim programları aracılığıyla Şubat -Mayıs 2021 tarihleri arasında öğrencilere gönderilmiştir. Sosyodemografik özelliklerin ve ölçek yanıtlarının analizinde tanımlayıcı istatistikler kullanılırken, ölçeklerin ilişkisinin incelenmesinde Pearson Korelasyon Analizi kullanıldı.

Bulgular: Çalışmaya katılan öğrencilerin yaş ortalaması 21.16±1.43'tür. Hemşirelik öğrencilerinin mesleki değerlerinin puan ortalamasının 120.54±10.76 ile yüksek düzeyde, hemşirelik tanılarına yönelik tutumlarının 124.82±15.87 puan ortalaması ile oldukça olumlu olduğu ve aralarında orta düzeyde güçlü pozitif ilişki olduğu bulundu (r=.472 p< .01).

Sonuç: Hemşirelik öğrencilerinin mesleki değerleri benimsemeleri, hemşirelik bilgi ve bilim anlayışını sağlamada önemli bir unsurdur. Hemşirelik tanıları, hasta bakımında hemşirelik biliminin görünen yüzüdür. Bu iki konuya yönelik tutumları olumlu yönde etkileyecek ders içeriklerinin artırılması, meslek yaşantısında hizmet içi eğitimlerle desteklenmesi önerilmektedir.

Anahtar kelimeler: Hemşirelik öğrencileri; hemşirelik tanısı; profesyonellik; tutum

Nursing is a professional profession that systematically provides individualized care to the healthy/sick individual. The systematic approach, that is adopted in the delivery of care, emerges as the nursing process (1,2). The common point that unites the nurses, who are working in various fields, is the nursing process. Nursing diagnosis allows the nurse to make a clinical judgment about the patient's current or potential health condition and requirements based on the data collected from the patient and is considered as the main stage of the nursing process (3). Nursing diagnoses enable nurses to use professional language in sharing information, organizing information, making decisions, determining nursing practices and appropriate patient outcomes (4). In this way, the autonomy of nurses increases and they go beyond the traditional approach of this profession (3).

Using a standard terminology in nursing care ensures that all nurses have the same understanding of the patient's needs, nursing interventions are distinguished from other healthcare team interventions, and nursing care is recorded. Thus, it is ensured that nursing interventions become visible, the quality-of-care increases, and national/international comparisons can be made (5). Curriculum in nursing schools should be arranged in line with this purpose. In order for graduate nurses to provide effective care; it is necessary to understand the philosophy of nursing, why they are doing the applications and to gain the knowledge, skills and behaviors suitable for professional nursing (6). The diagnosis of North American Nursing Diagnosis Association (NANDA) plays an important role in determining patient needs or potential risks during nursing student education (4,7). Creating positive attitudes towards NANDA nursing diagnoses in nursing students is a step towards improving compliance with NANDA in clinical practice (8).

However, there is no information in the literature about the factors affecting students' attitudes towards nursing diagnoses. Considering that values are one of the most important factors affecting attitudes, behaviors and practices of nurses, it is thought that attitudes towards nursing diagnoses may also be related to values (9).

To assess professional values, beliefs and attitudes of the practitioner and/or professional group in the nursing literature is defined as "the framework, standards and principles of action" and these values, in turn, affect the behavior of nurses (10). In clinical decision making, nurses think long and hard on what they have learned and what they believe to be true. Therefore, these values are both the basis of nursing practices and guidelines for nurses in their interaction with patients, colleagues, other professions and society (11). Internalization of professional values provides the ability to resolve conflicts and identify priority actions, ensuring that a safe, quality and ethical care is maintained (12). Nurses use these professional values when giving care to healthy individuals /patients, making decisions about ethical dilemmas, and applying the nursing process. Nurses who adopt professional values gain competence in solving patient problems and determining priority actions, use the nursing process effectively and provide quality care. Professional values guide the correct nursing process practice by improving the critical thinking skills of nursing students (13,14).

It is thought that this study will contribute to the literature in terms of showing the relationship between nursing students' professional values and attitudes towards nursing diagnoses by examining them together.

MATERIAL AND METHODS

Aim and the Type of the Study

The study was planned in a descriptive, cross sectional and correlational manner. In this study, it was aimed to examine the views of nursing students about nursing diagnoses and their relationship with professional values.

Research Questions

1. What is the level of the attitudes of nursing students about nursing diagnoses?

2. What is the level of professional values of nursing students?

3. Is there a relationship between nursing students' attitudes about nursing diagnoses and their professional values?

Sample

The sample of this study consisted of 328 second, third- and fourth-year nursing students in the nursing department of a state university at the South Marmara Region of Türkiye. First-year students were excluded from the study because they did not have enough information about nursing diagnoses. Finally, 147 students who volunteered to participate in the study and filled out the electronic questionnaire completely were included in the study. The rate of participation is 44.8%.

Data Collection Tools

Data was collected with the help of personal information form, Positions on Nursing Diagnosis Scale, and Nurses Professional Values Scale-Revised.

Personal Information Form: It consists of five questions questioning the age, gender, class, income status and family structure of the students. The form was created by the researchers in the light of the relevant literature (9-11).

Positions on Nursing Diagnosis (POND) Scale: The POND scale, developed by Lunney and Krenz in 1994, is a tool that measures nursing students' thoughts about nursing diagnoses. The POND scale consists of 20 items. In each item, there are two items (one being the most positive and the other the most negative) representing the opposite characteristics, aiming to determine the opinions about the nursing process. In this scoring, which ranges from one to seven, one point represents the most negative and seven points represent the most positive thoughts. The minimum score that can be obtained from the scale is 20 and the maximum score is 140, and a high score indicates a positive attitude (15). Turkish validity and reliability study was conducted by Zaybak et al. (2020). The Cronbach alpha value of the scale is 0.95 (5). In this study, the Cronbach's alpha value was found to be 0.96.

Nurses Professional Values Scale-Revised (NPVS-R): It is a five-point Likert type (1-not important, 2-somewhat important, 3-important, 4-very important, 5-extremely important) was scale that was developed by Weis and Schank (2009) to determine the perception levels of nurses and nursing students about professional values. The total scores that can be obtained from the scale are between 26-130 (16). A high score indicates strong adherence to professional values. NPVS-R does not contain subdimensions. The Turkish validity and reliability study was conducted by Acaroğlu (2014). The Cronbach alpha value of the scale was found to be 0.96 (17). In this study, the Cronbach's alpha value was found to be 0.95.

Data Collection

Data collection tools were created in the Google® survey database and tools were sent to 2nd, 3rd and 4th grade nursing students through electronic communication programs (Whatsapp, Telegram) between February and May 2021. The data of the students who filled out the questionnaire completely were included in the research.

Data Analysis

The statistical analysis of the data collected in this study was performed using the SPSS (Statistical Package for the Social Sciences) 21.0 software. The kurtosis and skewness values were checked for the normality distribution. Values between -1.5- +1.5 are accepted as normal distribution. Both scales were found to have a normal distribution. While descriptive statistics (frequency, percentage, mean, and standard deviation) were used in the analysis of sociodemographic characteristics and scale responses, Pearson Correlation Analysis was used to examine the relationship of the scales. Significance level was accepted as $p<.05$.

Ethical Aspect

In order to carry out the research, the permission numbered 2021-9 from the non-interventional ethics committee of a university and the permission of the institution where the research will be conducted were obtained. The students who participated in the study were informed about the research on the first page of the online link where the questions were included. It was stated that participation in the study was on a voluntary basis, their information would be kept confidential, they could withdraw from the study at any point in the study, and their participation in the study would not affect their course grades. Students who agreed to participate in the study were asked to tick the "I approve to participate in the study" consent box.

RESULTS

The mean age of the students participating in the study was 21.16±1.43. Among these students, 87.8% were female and 39.5% were in the second grade. Considering their income status; it was seen that the income of 77.5% of the students is equal to their expenses. It was seen that the family structure of 81.6% of the students consists of mother, father and children (Table 1).

Table 1. Sociodemographic Characteristics of Students

Characteristic		Number (n=147)	Percentage
Age (mean±sd)	**21.16±1.43**		
Gender (n/%)	Female	129	87.8
	Male	18	12.2
Grade (n/%)	2nd grade	58	39.5
	3rd grade	32	21.8
	4th grade	57	38.7
Income status (n/%)	Income less than expenses	21	14.3
	Income equals expense	114	77.5
	Income more than expenses	12	8.2
Family status (n/%)	Mother, father and children	120	81.6
	Parents are divorced	5	3.4
	There are elders living together with the family	16	10.9
	Other	6	4.1

sd: Standard deviation

It was determined that the NPVS-R score averages of students were at a high level with 120.54±10.76, and their POND scale mean scores were quite positive with 124.82±15.87 (Table 2).

Table 2. NPVS-R and POND Scale Scores of Students

Scale	Min-max	Mean ±sd
NPVS-R	85-130	120.54±10.76
POND	59-140	124.82±15.87

NPVS_R: Nurses professional values scale – Revised
POND: Positions on nursing diagnosis scale
sd: Standard deviation

The opinion scores of students about NANDA-I nursing diagnoses are given in Table 3. It was determined that the highest score was given to the item related to worth/value (6.55±0.74). The items related to the Relevancy (6.50±0.83) were at the second place and items related to Importance (6.48±0.87) were at the third place. It was determined that the lowest scores were given to the items about difficulty (5.29±1.43), creativity (5.53±1.68) and clarity (6.02±1.01), respectively. It was seen that all items were given a score above 3.5, which is the midpoint of the scale (Table 3).

Table 3. POND Scale Items Mean Scores

Item		Mean ± sd
1	Clarity	6.02±1.01
2	Reality	6.30±0.91
3	Pleasantry	6.14±1.00
4	Strength	6.18±0.95
5	Worth/value	6.55±0.74
6	Positivity	6.40±0.85
7	Intelligence	6.46±0.81
8	Comfort	6.17±1.04
9	Difficulty	5.29±1.43
10	Meaningfulness	6.28±0.99
11	Helpfulness	6.42±0.89
12	Validity	6.34±0.91
13	Significance	6.35±0.91
14	Rewarding	6.31±0.95
15	Creativity	5.53±1.68
16	Convenience	6.29±0.98
17	Acceptability	6.40±0.90
18	Advantage	6.34±0.90
19	Relevancy	6.50±0.83
20	Importance	6.48±0.87
Mean score of all items		6.24±0.79

POND: Positions on nursing diagnosis scale
sd: Standard deviation

When the relationship between POND and NPVS-R was examined by Pearson Correlation analysis, a positive moderately strong relationship was found (p<.01) (Table 4).

Table 4. The relationship between POND and NPVS-R

	NPVS-R
POND	r*= .472
	p**=.000

**Pearson Correlation, **p< .01*
NPVS_R: Nurses professional values scale – Revised
POND: Positions on nursing diagnosis scale

DISCUSSION

In this study, which was conducted to examine the relationship between the attitudes of nursing students towards nursing diagnoses and professional values, it was determined that the attitudes of students towards nursing diagnoses were quite positive (124.82±15.87) and their perspectives on the importance of professional values were high (120.54±10.76). In many studies conducted in Türkiye, it has been determined that nursing students care about professional values (18-21). Studies have shown that education causes differences in the formation of professional values and that nursing educators have a significant impact on the adoption of professional values (11,22). These findings suggest that the nursing education given in our country is effective in adopting professional values. Similar studies that were conducted in various countries have also found that nursing students give great importance to professional values. Mean NPVS-R score of Indonesian, Spanish, Colombian nursing students and different program types in USA were found as 95.80 (23), 109.82, 116.30 (24), and 113.23-102.96 (25), respectively. Appropriate development of professional values is an important educational goal. Understanding the importance of these values and integrating them into clinical nursing from the beginning of the career increases the quality and safety of care (26). Both our study and the results of other studies are promising from this point of view.

In another study conducted with nursing students in our country; it was determined that the first three highest scores were for the items of importance, acceptability and relevancy, respectively (5). In the study conducted with Jordanian students, it was found that the three highest attitudes were towards the items of positivity, importance and relevancy (8). It was seen in this study that the first three highest scores for the POND scale are for the items of worth/value, relevancy and importance.

As the common findings of these three studies, it can be said that the students found the nursing diagnoses relevant and important. In the study of Zaybak et al. (2020), the lowest top three attitudes were towards the following items: difficulty, creativity and comfort. On the other hand, El-Rahman et al. (2017), found in their study the following three items as the lowest top three: comfort, difficulty and pleasantry. It was determined that the lowest three attitudes in our study were for the difficulty, creativity and clarity, respectively. According to the results of the study, it is seen as a common finding that nursing students have difficulties in using NANDA diagnoses, but it is noteworthy that in all three studies, the attitude scores towards all items had a higher average than the middle point. However, in their study on nurses, Ramezanian et al. (2017), detected that meaningfulness, pleasantry and reality items got the highest score and clarity, creativity and validity items were under the average point (27). In another study measuring the views of nurses, it was determined that the worth/value received the highest score, difficulty received the lowest score, and there was no item with a score below the average point (28).

In a study comparing the attitudes of nursing students and working nurses towards nursing diagnoses; It has been determined that nursing students have more positive attitudes towards diagnoses. It has been stated that this result may be due to the fact that nursing students are more in contact with diagnoses, and attitudes towards nursing diagnoses are associated with nursing diagnostic knowledge (29). It seems difficult to determine whether positive attitudes towards nursing diagnoses lead to more contact with nursing diagnoses or whether more contact with diagnoses leads to more positive attitudes. The study of Collins (2013) sheds some light on the answer to this question. Collins taught nurses 12 hours of nursing diagnoses, critical thinking, and clinical reasoning, and found that nurses who had more contact with nursing diagnoses displayed more positive attitudes (30). First-year students who have just started nursing education and who do not have sufficient knowledge about nursing diagnoses were not included in this study. It is thought that the high attitude scores in our study are due to the inclusion of second, third- and fourth-year students who have taken courses on nursing diagnoses and who frequently use nursing diagnoses in their clinical practice.

In a study that compared the importance that nursing students and nurses gave to professional values, the importance given to professional values by both groups was found to be high, and it was also determined that the perspective of nursing students on the importance of professional values was more positive than that of the nurses (11). It is thought that the reason for students have a more positive perspective on professional values than nurses, as in nursing diagnoses, may be related to the fact that professional values are mentioned in many courses and their knowledge is fresh. However, the way nurses work (31), time constraints and lack of knowledge (32), not seeing the professional value they deserve, lack of motivation, burnout syndrome (11,20), education level (31,33) can affect the level of caring about professional values and use of nursing diagnoses.

In our study, a moderately strong positive relationship was found between attitudes towards nursing diagnoses and professional values. In the study of Su and Köse (2021), similar to our study, it was determined that as the professional values of nursing students increased, their perception of nursing diagnoses increased (18).

Limitations

The fact that the data is based on the statements of the participants is one of the limitations of the study. The fact that the study was conducted in a single center limits the generalization of the study results. The fact that first year students were not included in the study is another limitation. It is recommended that future studies be conducted with a larger sample size in different geographical regions and academic units (state and foundation universities).

CONCLUSION

In this study, it was found that there was a moderately strong positive and high level relationship between nursing students' attitudes about nursing diagnoses and their professional values. It is thought that the high level of professional values of nursing students will cause them to use the nursing process more effectively in the future, to provide quality care and thus to provide more satisfaction from the profession.

It is predicted that the autonomy and visibility of nursing will improve, and the gap between theory and practice will be reduced by increasing the topics related to professional values and nursing diagnoses in the course contents and ensuring that students adhere to these values and diagnoses throughout their professional lives.

DECLARATIONS

Acknowledgments

The authors would like to thank the students who participated in the study.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Conflict Of Interest

The authors declare that no conflict of interest.

Ethics Approval

Ethical approval was obtained from Bandırma Onyedi Eylul University Health Sciences Non Interventional Researches Ethics Committee on 14 February 2021 (Decision no: 2021-9).

REFERENCES

1. Dikmen Y, Ak B, Yorgun, S. Teorikten Pratiğe: Bilgisayar Destekli Hemşirelik Süreci Uygulaması, Journal of Human Rhythm 2015; 1(4): 162-167.
2. Baraki Z, Girmay F, Kidanu K, Gerensea H, Gezehgne D, Teklay H. A cross sectional study on nursing process implementation and associated factors among nurses working in selected hospitals of Central and Northwest zones, Tigray Region, Ethiopia. BMC Nurs. 2017; 16(54):1-9.
3. Lumillo-Gutierrez I, Romero-Sánchez JM, D'Agostino F, Paramio-Cuevas JC, Fabrellas N, Moreno-Corral LJ, Paloma-Castro O. Nurses' characteristics and practice environments: Comparison between clusters with different attitude and utilisation profiles regarding nursing diagnosis. J Nurs Manag. 2019;27(1):93-102.
4. Yönt GH, Khorshid L, Eşer İ. Examination of nursing diagnoses used by nursing students and their opinions about nursing diagnoses. International Journal of Nursing Terminologies and Classifications 2009;20(4): 162-168.
5. Zaybak A, İsmailoğlu EG., Erol A, Özdemir H. (). Adaptation of the positions on nursing diagnosis scale to Turkish. Turkiye Klinikleri Journal of Nursing Sciences 2020;12(4), 520-527.
6. Orak NS, Alpar ŞE. Validity and reliability of the nurses' professional values scale's Turkish version. Marmara Üniversitesi Sağlık Bilimleri Enstitüsü Dergisi 2012;2(1):22-31.
7. Ogunfowokan AA, Oluwatosin AO, Olajubu AO, Alao OA, Faremi AF. Student nurses' perceived use of NANDA-I nursing diagnoses in the community setting. Int J Nurs Knowl. 2013;24(1):37-43.
8. Abed El-Rahman M, Al Kalaldeh MT, Malak MZ. Perceptions and Attitudes Toward NANDA-I Nursing Diagnoses: A Cross-sectional study of Jordanian nursing students. Int J Nurs Knowl. 2017;28(1):13-18.
9. Dalcalı BK, Şendir M. Determining the relationship between nurses personal values and their ethical sensitivity. Florence Nightingale Journal of Nursing 2016;24(1):1-9.
10. İlaslan E, Geçkil E, Kol E, Erkul M. Examination of the professional values of the nurses and the associated factors. Perspectives in Psychiatric Care 2021;57(1):56-65.
11. Poorchangizi B, Borhani F, Abbaszadeh A, Mirzaee M, Farokhzadian J. The importance of professional values from nursing students' perspective. BMC Nurs. 2019;18(26):1-7.
12. Can Ş, Acaroğlu R. Relation of professional values of the nurses with their individualized care perceptions. Florence Nightingale Journal of Nursing 2015;23(1): 32-40.
13. Zengin M, Yayan E H, Yıldırım N, Akın E, Mamiş E. Effect of professional values upon professional attitudes of pediatric nurses. Sağlık Bilimleri ve Meslekleri Dergisi 2018;5(3): 316-23.
14. Olmaz D, Karakurt P. The extent to which nurses knowledge and apply the nursing process when giving care. Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi 2019; 12(1): 3-14.
15. Lunney M, Krenz M. Adaptation and validation of the "positions on Nursing Diagnosis" tool to Portuguese language. Brazilian J Nurs. 1994;59(2):136-67.
16. Weis D, Schank MJ. Development and psychometric evaluation of the Nurses Professional Values Scale--Revised. J Nurs Meas. 2009;17(3):221-231.
17. Acaroğlu R. Reliability and validity of Turkish version of the nurses professional values scale – Revised. Florence Nightingale Journal of Nursing 2014;22(1): 8-16.
18. Su S, Köse KN. Investigate the relationship between nursing students' professional values and perception of nursing diagnosis. Journal of General Health Sciences 2021;3(1):20-28.
19. Caner N, Sezer Efe Y, Erdem E, Başdaş Ö, Bayat M, Yıldırım M. Professional values and ethical sensitivity in intern nurses. Journal of Health Sciences 2019;28(3):123-128.
20. Arkan G, Ordin YS, Haney MÖ. The relatıonship between nursing students' burnout levels and their professional values. Acıbadem University Health Sciences Journal 2019;10(3):443-450.
21. Yağcan H, Uludağ E, Okumuş H. The comparison of nursing students' emotional intelligence and professional values. Dokuz Eylül Üniversitesi Hemşirelik Fakültesi Elektronik Dergisi 2021;14(3): 224-231.
22. Bang KS, Kang JH, Jun MH, Kim HS, Son HM, Yu SJ, Kwon MK, Kim JS. Professional values in Korean undergraduate nursing students. Nurse Educ Today. 2011;31(1):72-75.
23. Nelwati, Abdullah KL, Chong MC. Factors influencing professional values among Indonesian undergraduate nursing students. Nurse Educ Pract. 2019;41:102648.
24. Rodríguez-Gázquez MLÁ, Basurto Hoyuelos S, González-López JR. Countries' cultures and professional nursing values: Cross-cultural evidence from Spanish and Colombian nursing students. Nurse Educ Pract. 2021;50:102953.
25. Feller LM, Fisher M, Larson J, Schweinle W. Nursing students' professional value development: Can we do better? Nurs Educ Perspect. 2019;40(6):317-321.
26. Green G. Examining professional values among nursing students during education: A comparative study. Nursing Forum 2020;55 (4):589- 594.
27. Ramezanian T, Mohammadipour F, Mohammadi R, Kordestani-Moghaddam P. Translation and psychometric properties of the Persian version of the position on nursing diagnosis scale. Nursing Open 2021;8:1615-1624.
28. D'Agostino F, Vellone E, Cerro E, Di Sarra L, Juárez-Vela R, Ghezzi V, Zega M, Alvaro R. Psychometric evaluation of the Positions on Nursing Diagnosis scale. Appl Nurs Res. 2016;29:e1-6.
29. Olivia APV, de Almeida Lopes D, Volpato MP, Hayashi AAM. Positions on nursing diagnosis: Attitudes of nurses and nursing students. ACTA Paulista de Enfermagem 2005;18(4):361-367.
30. Collins A. Effect of continuing nursing education on nurses' attitude toward and accuracy of nursing diagnosis. International Journal of Nursing Knowledge 2013;24 (3): 122-128.

31. Dündar T, Özsoy S, Topbaş B, Aksu H. Professional values and influencing factors in nursing. Journal of Ege University Nursing Faculty, 2019;35(1):11-19.
32. Mahmoud MH, Bayoumy HM. Barriers and facilitators for execution of nursing process from nurses perspective. International Journal of Advanced Research, 2014;2 (2): 300-315.
33. Sibandze BT, Scafide KN. Among nurses, how does education level impact professional values? A systematic review. International Nursing Studies 2018;65(1): 65-77.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 264-271
https://doi.org/10.31067/acusaglik.1189917

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

The Effect of FoMO on Physical Symptoms in Nursing Students

Ayşe Aydınlı[1], **Hatice Ağralı**[1]

[1]Süleyman Demirel University, Departmant of Nursing, Faculty of Health Sciences, Isparta, Turkey

ABSTRACT

Background: Nowadays, the use of social media is increasing with the increase in smartphone and internet access. With the widespread use of social media, fear of missing out (FoMO) may occur in individuals. This condition, which is a problematic attachment style, can cause physical symptoms in individuals.

Objectives: This study was conducted to determine nursing students' fear of missing out on social media and to determine the effect of their fear of missing out on social media on physical symptoms.

Method: The research was conducted as a descriptive study. The population of the study consists of nursing students studying in Turkey in the 2021-2022 academic year. 451 students who agreed to participate and used smartphones and social media were included in the study. The data were collected using the introductory information form and the Fear of Missing Out on Social Media Scale (FoMO Scale).

Results: The total score of the nursing students' FoMO scale was 23.44±7.55. It was determined that there was no statistically significant difference between the socio-demographic characteristics of the nursing students and their total scores on the FoMO scale ($p>0.05$). Moreover, it was concluded that there was a significant relationship between the levels of FoMO and the fatigue and insomnia of nursing students ($p<0.05$). FoMO levels of nursing students were found to be moderate.

Conclusion: FoMO levels of nursing students were found to be moderate. It was concluded that as the FoMO level increased, the fatigue and insomnia levels of nursing students increased.

Keywords: FoMO, nursing, student, physical symptoms

Ayşe AYDINLI
Hatice AĞRALI

FoMO'nun Hemşirelik Öğrencilerinde Fiziksel Semptomlara Etkisi

ÖZET

Giriş/Arka plan: Günümüzde akıllı telefon ve internete erişimin artması ile birlikte sosyal medya kullanımı giderek artmaktadır. Sosyal medyanın yaygın kullanımı ile birlikte bireylerde gelişmeleri kaçırma korkusu (FoMO) ortaya çıkabilmektedir. Problemli bir bağlanma şekli olan bu durum bireylerde fiziksel semptomlara neden olabilmektedir.

Amaç: Bu çalışma hemşirelik öğrencilerinin sosyal medyada gelişmeleri kaçırma korku düzeylerinin belirlenmesi ve sosyal medyada gelişmeleri kaçırma korku düzeylerinin fiziksel semptomlar üzerine etkisini belirlemek amacıyla yapılmıştır.

Yöntem: Araştırmanın evrenini Türkiye'de 2021-2022 eğitim öğretim yılında öğrenim gören hemşirelik öğrencileri oluşturmuştur. Çalışmaya katılmayı kabul eden, akıllı telefon ve sosyal medya kullanan 451 öğrenci araştırmaya dahil edilmiştir. Veriler tanıtıcı bilgi formu ve Sosyal Medyada Gelişmeleri Kaçırma Korkusu Ölçeği (GKKÖ) kullanılarak toplanmıştır.

Bulgular: Hemşirelik öğrencilerinin GKKÖ toplam puanı 23,44±7,55'dir. Hemşirelik öğrencilerinin sosyo-demografik özellikleri ile GKKÖ toplam puanları arasında istatistiksel olarak anlamlı bir farklılık görülmediği belirlenmiştir ($p>0.05$). FoMO düzeyleriyle hemşirelik öğrencilerinin yorgunluk ve uykusuzluk yaşama durumları arasında anlamlı bir ilişki olduğu sonucuna ulaşılmıştır ($p<0,05$).

Sonuçlar: Hemşirelik öğrencilerinin FoMO düzeyleri orta düzeyde bulunmuştur. FoMO düzeyi arttıkça hemşirelik öğrencilerinin yorgunluk ve uykusuzluk düzeylerinin arttığı sonucuna ulaşılmıştır.

Anahtar kelimeler: FoMO, hemşirelik, öğrenci, fiziksel semptomlar

Correspondence: Ayşe Aydınlı
Süleyman Demirel University, Departmant of Nursing, Faculty of Health Sciences, Isparta-Turkey
Phone: +902462113314
E-mail: aysezeynep38@gmail.com

Received: 16 October 2022
Accepted: 27 December 2022

With the rapid development of technology, the communication methods used have also changed greatly. One of the most common communication methods today is social media (1). Social media is an interactive communication platform where users create online communities to share personal messages, ideas, information and other content (2). The use of social media is increasing all over the world, as access to the internet becomes easier every year the use of smartphones increases (3). The most frequently used social media tools are WhatsApp, YouTube, Instagram, Twitter, Snapchat, Facebook and Tiktok (2).

Especially young people can spend most of their time by sharing on social networks and updating their social media posts. This continuous updating and monitoring behavior fed by social networks is called FoMO. It has been translated into Turkish as the fear of missing out (4,5). FoMO is also defined as a pervasive concern that others may be experiencing more rewarding experiences in the absence of the individual. It is characterized by a desire to constantly stay in touch with what others are doing (6).

As the use of smartphones increases, individuals spend more time on social media for fear of missing something (5). Similarly, as the FoMO level increases, the duration and frequency of smartphone use increase (7). Excessive use of smartphones and computer-like technological devices can cause depression, anxiety, sleep problems and other physical health problems (8). Furthermore, it can cause neck and eye disorders and disorders in the musculoskeletal system (9).

Studies report that nursing students use social media and smartphones intensively (5,10,11). There are concerns that long-term use of smartphones and computer-like technological devices by nursing students negatively affects the physical health of students (12). This situation can negatively affect nursing education and patient care quality. It is necessary to determine the factors associated with the fear of missing out, which is one of the situations that increases the duration of smartphone use by nursing students. Since the concept of fear of missing out is very new, not many studies have been found on this subject. This study was conducted to determine the effect of nursing students' fear of missing out on social media on physical symptoms.

DESIGN AND METHODS

Type of the Research

The research was conducted as a descriptive cross sectional study to determine the effect of nursing students' fear of missing out on social media on physical symptoms. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement was used to report data (13).

Population and Sample of the Research

The population of the study consists of nursing students studying in Turkey in the 2021-2022 academic year. The minimum sample size of the study was calculated with an online sample size calculation engine (https://www.questionpro.com). Since the population size was not known exactly, the population was >5,000, the confidence interval was 95%, the margin of error was 5%, and the estimated sample size was 384. It was thought that there might be missing data, therefore, 20% more than the minimum sample number was reached. In line with this calculation, the study was completed with 451 people who met the inclusion criteria. The inclusion criteria consisted of nursing students who used smartphones and social media and volunteered to participate in the study.

Data Collection Form and Tools

The data were collected using the introductory information form and the Fear of Missing Out on Social Media Scale.

Introductory Information Form: The form, which was prepared by the researchers using the literature, consists of 11 questions that include some sociodemographic characteristics of the students such as age and gender, the characteristics of smartphone and social media usage situations, and the physical symptoms they experience due to social media use (1,2,5).

The Fear of Missing out Scale: The FoMO scale was developed by Przybylski. Moreover, Turkish validity and reliability were done by Gökler et al. (2016) (4,6). The scale is a five-point Likert-type scale and consists of 10 items: "1=Not at all True, 2=Slightly True, 3=Moderately True, 4=Very True, 5=Extremely True". The lowest score that can be obtained from the scale is 10 and the highest score that can be obtained is 50. The scale has no cut-off point. As the score obtained from the scale increases, the probability of experiencing the fear of missing out on developments also increases. The original scale Cronbach's alpha value is 0.95 (6). The Cronbach's alpha value for the Turkish version of the scale was calculated as 0.81 (4). In this study, the Cronbach's alpha value of the scale was calculated as 0.85.

Data Collection

The data of the study were collected online between May and June 2022. The online questionnaire form was shared

via Google Forms and collected digitally. Before the study, 10 students were pre-applied to test the intelligibility of the forms, but the students who had pre-applied were not included in the sample. After it was understood that there was no problem in electronic terms, the survey form was shared on many social media platforms (Instagram, telegram, WhatsApp and Facebook). In the shares, the subject of the research and the criteria for inclusion in the study were explained. The informed consent form was added to the first part of the online questionnaire and it was stated that they could participate in the study voluntarily. The first question of the online questionnaire was "Do you voluntarily agree to participate in the study?" thus the consent of the students was obtained in this way. Furthermore, no gifts or fees were given to the students who participated in the study. The online questionnaire consisted of 22 questions in total. After the students entered the survey, they were able to see the questions in two parts, and after the first part, they clicked the "next" button and went to the other part. The first part consisted of the informed consent form and the electronic consent question, the second part consisted of the Introductory Information Form and f the Fear of Missing Out on Social Media scale. Nursing students answered the questionnaire in about 5 minutes. Since the answer to the previous question was required for the continuation of the answers to the online survey questions, no missing data occurred. There was a Google sign-in requirement to prevent the same respondents from filling out surveys again.

Evaluation of Data

Analysis of the study data was done with the Statistical Package for the Social Sciences (SPSS) 22.0 statistical program. Reliability analysis was applied to the FoMO scale, which was used as a measurement tool in the research. As a result of the analysis, the scale was found to be reliable, and the study was started. Shapiro-Wilk normality test was applied to decide on the analyzes to be applied and the level of significance was determined as $p<0.000$ after the test. Q-Q graphs were evaluated and the distribution was found to be not normal. Therefore, it was decided to use nonparametric tests. Data are expressed as a percentage (%), standard deviation, mean, and mean rank. The Mann-Whitney U Test was used to determine whether there was a difference between the FoMO scale total score and the two independent groups. Whether there was a difference between more than two independent groups was examined with the Kruskal-Wallis Test. In cases where there was a difference between the groups, Tamhane's T2, which is one of the Post Hoc analyses, was used to determine the group that caused the difference. The statistical significance level for this study was accepted as $p<0.05$.

Ethical Dimension of the Research

Ethical approval of the study was obtained from the XXX Ethics Committee (Decision No: 58/1, Date: 25.05.2022). The research was conducted in accordance with the principles of the Declaration of Helsinki. Informed consent of the nursing students participating in the study was obtained online in the first part of the questionnaire.

FINDINGS

The data of 451 nursing students were evaluated in the study. The total FoMO score of the nursing students participating in the study was determined as 23.44±7.55 (Table 1).

In Table 2, the sociodemographic characteristics of the participants and the relationship between their sociodemographic characteristics and the FoMO total score are presented. It was determined that there was no statistically significant difference between the perceptions of age, gender, class, or income status of nursing students and their FoMO total scores ($p>0.05$).

TABLE 1. Nursing students' FoMO on social media scores (n=451)

Variables	Mean	SD	Min.	Max.	α
Fear of Missing Out on Social Media Scale	23.44	7.55	10.00	50.00	0.854

SD= Standard Deviation; Min= Minimum; Max= Maximum; α= Cronbach's Alpha reliability coefficient

In the study, a statistically significant difference was found between the year of using smartphones and social media and the total FoMO score (x2= 9.136; x2= 8.084; p<0.05, respectively). According to these findings, the fear score levels of students who have been using smartphones and social media for 11 years or more were significantly higher than the scores of students who have been using smartphones and social media for less. In addition, a statistically significant difference was found between the daily social media usage time and the frequency of checking social media notifications and the total score of the FoMO scale (respectively x2= 18.066; x2= 13.352; p<0.05). The fear score levels of the students who use social media for 6 hours or more and who check the notifications every hour were significantly higher than the score levels of the students who use social media for fewer hours and check social media notifications less (Table 2).

TABLE 2. The relationship between the FoMO levels of nursing students and their sociodemographic characteristics (N= 451)		
Variables	**N (%)**	**FoMO Total Score,** Mean Rank
Gender		
Female	446 (98.9)	226.80
Male	5 (1.1)	154.60
Z;p		U=758.000 p=0.218
Grade		
1st grade	133 (29.5)	247.07
2nd grade	146 (32.4)	216.35
3rd grade	93 (20.6)	218.49
4th grade	79 (17.5)	217.20
X^2;p		X^2=4.955 p=0.175
Perception of income status		
Income equal to expenses	262 (58.1)	220.55
Income less than expenses	148 (32.8)	233.40
Income more than expenses	41 (9.1)	234.10
X^2;p		X^2=1.095 p=0.578
Smartphone usage time		
1-5 years (a)	175 (38.8)	204.96
6-10 years (b)	254 (56.3)	236.36
11 years and above (c)	22 (4.9)	273.77
X^2;p		X^2=9.136 **p=0.010 Difference: c-b.a**
Social media usage time		
1-5 years (a)	242 (53.7)	210.02
6-10 years (b)	188 (41.7)	243.08
11 years and above (c)	21 (4.7)	257.19
X^2;p		X^2=8.084 **p=0.018 Difference: c-b,a**
Daily social media usage time		
0-1 hour (a)	4 (0.9)	211.63
1 hour (b)	8 (1.8)	193.98
2 hours (c)	90 (20.0)	211.11
3 hours (d)	138 (30.6)	201.74
4 hours (e)	59 (13.1)	245.88
5 hours (f)	84 (18.6)	267.39
6 hours or more (g)	68 (15.0)	309.50
X^2;p		X^2=18.066 **p=0.006 Difference: g-f,e,a,c,d,b**
Frequency of checking social media notifications		
Every hour	239 (53.0)	245.45
Several times a day	178 (39.5)	198.53
At least once a day	34 (7.5)	233.09
X^2;p		X^2=13.352 **p=0.001 Difference: a-c,b**
Age (year)	**Mean ± SD (Min-Max)**	**r; p**
	20.95±2.03 (18.00-36.00)	r=-0.032 p=0.493

x^2=Kruskal Wallis Test; U=Mann-Whitney U Test; Difference=Tamhane's T2; Min=Minimum; Max=Maximum; SD=Standard Deviation; r=Spearman's rho Correlation Coefficient; p= Significance Level

In the study, the relationship between the total FoMO score of nursing students and the physical symptoms they experience is examined in Table 3. It was determined that there was no statistically significant difference between the cases of experiencing headaches, burning eyes, feeding problems and neck-extremity pain due to social media use of nursing students and their FoMO total score (p>0.05). Furthermore, a statistically significant difference was found between the fatigue and insomnia related to social media use and the FoMO total score (respectively x2= 20284.500; x2= 21201.000; x2= 18609.500; p<0.05). According to these findings, the fear score levels of students who experience fatigue and insomnia due to social media use were significantly higher than the scores of students who do not experience fatigue and insomnia due to social media use.

In the study, it was determined that there was no statistically significant difference between the number of social media accounts used by nursing students and the total FoMO score (p>0.05).

Table 4 examines the relationship between nursing students' social media usage characteristics and the physical symptoms they experience. In the study, a statistically significant difference was found between daily use of social media and insomnia, feeding problems and experiencing neck-extremity pain (x2= 14.500; x2= 19.203; x2= 16.109; x2= 10.929; p<0.05). According to the findings of the research, the students whose daily social media usage time is 3 hours or more were significantly higher than the students whose daily social media usage time is less than 3 hours. Besides, students who check their social media notifications every hour had significantly higher insomnia and neck extremity pain than students who check their social media notifications less frequently.

TABLE 3. The relationship between the FoMO levels of nursing students and the physical disorders they experience (N= 451)

Variables	N (%)	**FoMO Total Score,** Mean Rank
Headache due to social media use		
Yes	208 (46.1)	234.90
No	243 (53.9)	218.38
Z;p		U=23420.000 p=0.179
Fatigue due to social media use		
Yes	177 (39.2)	243.22
No	274 (60.8)	214.88
Z;p		U=21201.000 **p=0.024**
Insomnia due to social media use		
Yes	157 (34.8)	254.47
No	294 (65.2)	210.80
Z;p		U=18609.500 **p=0.001**
Burning eyes due to social media use		
Yes	177 (57.0)	231.98
No	274 (43.0)	218.07
Z;p		U=23391.500 p=0.261
Nutritional problems due to social media use		
Yes	25 (5.5)	273.14
No	426 (94.5)	223.23
Z;p		U=4146.500 p=0.063
Neck and extremity pain due to social media use		
Yes	192 (42.6)	238.97
No	259 (57.4)	216.38
Z;p		U=22373.500 p=0.069

N= Number of people; %= Percentage; X2=Kruska-Wallis Test; U=Mann-Whitney U Test; p= Significance Level

TABLE 4. The relationship between the social media usage characteristics of nursing students and the physical disorders they experience (N= 451)

Variables	Headache		Fatigue		Insomnia		Burning eyes		Nutritional problems		Neck and extremity pain	
	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)	Yes N (%)	No N (%)
Social media usage time												
1-5 years	114 (25.2)	129 (28.5)	103 (22.7)	140 (30.9)	81 (17.9)	162 (35.8)	140 (30.9)	103 (22.7)	15 (3.3)	228 (50.3)	95 (21.0)	148 (32.7)
6-10 years	88 (19.4)	101 (22.3)	69 (15.2)	120 (26.5)	70 (15.5)	119 (26.3)	109 (24.1)	80 (17.7)	10 (2.2)	179 (39.5)	88 (19.4)	101 (22.3)
11 years and above	8 (1.8)	13 (2.9)	7 (1.5)	14 (3.1)	8 (1.8)	13 (2.9)	10 (2.2)	11 (2.4)	0 (0.0)	21 (4.6)	9 (2.0)	12 (2.6)
X^2;p	X^2=0.608 p=0.738		X^2=1.885 p=0.390		X^2=0.725 p=0.696		X^2=0.819 p=0.664		X^2=1.442 p=0.486		X^2=2.423 p=0.298	
Daily social media usage time												
0-1 hour	3 (0.7)	1 (0.2)	2 (0.4)	2 (0.4)	3 (0.7)	1 (0.2)	2 (0.4)	2 (0.4)	2 (0.4)	2 (0.4)	4 (0.9)	0 (0.0)
1 hour	4 (0.9)	4 (1.9)	5 (1.1)	3 (0.7)	1 (0.2)	7 (1.5)	3 (0.7)	5 (1.1)	0 (0.0)	8 (1.8)	1 (0.2)	7 (1.5)
2 hours	35 (7.7)	55 (12.1)	33 (7.3)	57 (12.6)	25 (5.5)	65 (14.3)	46 (10.2)	44 (9.7)	3 (0.7)	87 (19.2)	34 (7.5)	56 (12.4)
3 hours	68 (15.0)	71 (15.7)	51 (11.3)	88 (19.4)	54 (11.9)	85 (18.8)	87 (19.2)	52 (11.5)	3 (0.7)	136 (30.0)	50 (11.0)	89 (19.6)
4 hours	21 (4.6)	38 (8.4)	22 (4.9)	37 (8.2)	11 (2.4)	48 (10.6)	34 (7.5)	25 (5.5)	2 (0.4)	57 (12.6)	27 (6.0)	32 (7.1)
5 hours	42 (9.3)	43 (9.5)	32 (7.1)	53 (11.7)	32 (7.1)	53 (11.7)	43 (9.5)	42 (9.3)	5 (1.1)	80 (17.7)	40 (8.8)	45 (9.9)
6 hours or more	37 (8.2)	31 (6.8)	34 (7.4)	34 (7.4)	33 (7.2)	35 (7.7)	45 (9.7)	24 (5.3)	10 (2.2)	58 (12.8)	36 (7.9)	29 (7.0)
X^2;p	X^2=7.512 p=0.276		X^2=6.688 p=0.351		X^2=19.203 p=0.004		X^2=7.658 p=0.264		X^2=16.109 p=0.013		X^2=10.929 p=0.091	
Frequency of checking social media notifications												
Every hour	117 (25.8)	124 (27.4)	102 (22.5)	139 (30.7)	104 (23.0)	137 (30.2)	143 (31.6)	98 (21.6)	17 (3.8)	224 (49.4)	105 (23.2)	136 (30.0)
Several times a day	79 (17.4)	99 (21.9)	63 (13.9)	115 (25.4)	44 (9.7)	134 (29.6)	97 (21.4)	81 (17.9)	7 (1.5)	171 (37.7)	66 (14.6)	112 (24.7)
At least once a day	14 (3.1)	20 (4.4)	14 (3.1)	20 (4.4)	11 (2.4)	23 (5.1)	19 (4.2)	15 (3.3)	1 (0.2)	33 (7.3)	21 (4.6)	13 (2.9)
X^2;p	X^2=1.109 p=0.574		X^2=2.095 p=0.351		X^2=15.361 p=0.000		X^2=1.003 p=0.606		X^2=2.376 p=0.305		X^2=7.420 p=0.024	

X^2= Kruskal-Wallis Test; p= Significance Level

DISCUSSION

In recent years, the use of social media has increased, especially among young people, due to the increase in the use of smartphones and access to the Internet (14). The constant updating behavior of individuals in social networks has caused a new behavioral disorder called FoMO (15). While social media tools connect individuals with constantly incoming notifications, they also brought some problems with problematic smartphone use (1). In this study, the effect of the fear of missing out on social media on the physical symptoms of nursing students, who use social media and smartphones, was investigated.

In our study, no significant relationship was found between the age, gender, class and income status of nursing students and their FoMO levels. Similar to our findings, Hizarcı's (2018) study with postgraduate students stated that age, gender and income level did not affect FoMO levels (16). Oral et al., in their study with medical faculty students, found that there was no relationship between FoMO levels and gender and income levels (1). Similarly, Kargın et al. found that there was no relationship between nursing students' FoMO levels and gender and income levels (5). The fact that age was not an effective factor in

our study can be explained by the fact that the ages of the students were very close since the study was conducted with undergraduate students. In addition, the fact that smartphone usage and internet access do not change according to gender and there are purchasing opportunities according to every budget can be explained as the reason why the scale scores do not differ according to gender and income level.

In this study, it was determined that the FoMO levels of nursing students increased as the number of years of social media and smartphone use, daily social media usage time and the frequency of checking social media notifications increased. In the study by Coşkun and Muslu, it was found that FoMO levels increased as the number of years of smartphone use, frequency and duration of social media usage increased, similar to our study (17). Similarly, Barry et al found a positive relationship between the frequency of checking social media and FoMO levels in their study with adolescents (18). As the FoMO score increases, it is expected that the frequency of checking social media notifications increase and the daily use of social media increase, and these situations can trigger each other (7,17,18). As individuals' fear of missing out increases, the frequency of checking notifications and the increase in daily social media usage hours become inevitable (7).

In this study, it was determined that as the FoMO levels of nursing students increased, the cases of headache, burning in the eyes, feeding problems and neck-extremity pain due to using social media were not affected, while the cases of fatigue and insomnia due to social media use increased. As the FoMO levels increase, the increase in the fatigue and insomnia levels of the students is expected as the duration of phone use related to social media use increases. Besides, the fact that headache, burning in the eyes, feeding problems and neck-extremity pain were not affected by FoMO levels were unexpected results, but this may be due to the fact that the FoMO level of our study group was not very high. When we look at the literature, in a study conducted with nursing students with higher FoMO levels, it was found that more than half of the students experienced headaches and nearly half of them had insomnia (7). As the fear of missing the news can cause habits that negatively affect sleep hygiene, such as taking the phone to bed, sleep problems may increase as the FoMO level increases.

In our study, it was concluded that those who use social media for more than 3 hours daily experience more insomnia, feeding problems and neck-extremity pain than those who use less than 3 hours. Moreover, it was determined that students who check social media notifications every hour were more likely to experience insomnia and neck extremity pain than students who check social media notifications less frequently. Similar to our findings, Günal and Pekçetin found in their study with university students that as the daily mobile phone usage time increased, the pain in the upper extremities and cervical region increased (19). Gupta et al., in their study with medical faculty students, found that students could be busy on the phone even while eating. They also found that students who spend a long time with their smartphones have problems such as difficulty waking up (20). Similarly, Levenson et al., in their study with young adults, found that the frequency of sleep problems increased as the duration of social media use increased (21). These findings support our results. As the daily smartphone usage time increases and smartphones are used inappropriately, the daily routine of individuals may change and sleep time may be shortened (20). It is thought that another factor affecting sleep quality is that participants check notifications more frequently due to the fear of missing out on developments.

Implication for nursing practice

As a result of the study, it was determined that nursing students' fear of missing out on social media was moderate. It was determined that FoMO levels were not affected by socio-demographic characteristics such as age, gender and income status. It was determined that the FoMO levels of nursing students who had a high frequency of checking social media usage year, smartphone usage year, daily social media usage time and social media notifications were high. In addition, as the FoMO levels of the students increased, it was concluded that although the states of experiencing insomnia and fatigue increased, the state of experiencing headache, burning in the eyes, feeding problems and neck extremity pain were not affected.

In line with these results, it is recommended to give seminars to increase the awareness of nursing students about the physical symptoms that may be caused by the use of smartphones and social media, to encourage the correct use of social media and smartphones, and to support the literature by conducting studies in this area.

Limitations of the Research

The data of the research were collected by online survey method, since the data were collected through social media networks, students who were not social media users could not be included in the sample. This is among the limitations of the study.

Author Contributions

Study design: AA, HA; Data collection: AA, HA; Data analysis: AA, HA; manuscript preparation: AA, HA.

Acknowledgement

We thank all nursing students who participated in the study.

Conflict of Interest

The authors do not have any conflict of interest.

Research Support

No financial support was received from any person or organization during the study.

Declarations

The study was not presented in any congress.

REFERENCES

1. Oral B, Şimşek A, Yıldız O, Ural AZ, Aras EB, Mutlutürk HM. Evaluation of fear of missing the developments in social environments and related factors in 3rd grade students of Ankara University Faculty of Medicine. CBU-SBED. 2021;8:613–20.
2. Mert Karadaş M, Koç G, Sayar G, Şahin S, Sevgi T. Student nurses' social media usage, aims of usage and ethical dimension. Gazi Sağlık Bilim Derg. 2021;6(1):11–21.
3. Global Digital Report (2018). Weare social. Available from: https://wearesocial.com/blog/2018/01/global-digital-report-2018
4. Gökler ME, Aydin R, Ünal E, Metintaş S. Determining validity and reliability of Turkish version of fear of missing out scale. Anadolu Psikiyatr Derg. 2016;17:53–9.
5. Kargın M, Türkben Polat H, Coşkun Şimşek D. Evaluation of internet addiction and fear of missing out among nursing students. Perspect Psychiatr Care. 2020;56(3):726–31.
6. Przybylski AK, Murayama K, Dehaan CR, Gladwell V. Motivational, emotional, and behavioral correlates of fear of missing out. Comput Human Behav. 2013;29(4):1841–8. Available from: http://dx.doi.org/10.1016/j.chb.2013.02.014
7. Eşer AK, Alkaya SA. Examination of nursing students' social media addiction and fear of evading developments. Univ Heal Sci J Nurs. 2019;1(1):27–36.
8. Liu H, Zhou Z, Huang L, Zhu E, Yu L, Zhang M. Prevalence of smartphone addiction and its effects on subhealth and insomnia: a cross-sectional study among medical students. BMC Psychiatry. 2022;22(1):1–7. Available from: https://doi.org/10.1186/s12888-022-03956-6
9. Sarla GS. Excessive use of electronic gadgets: health effects. Egypt J Intern Med 2020 314. 2020;31(4):408–11. Available from: https://ejim.springeropen.com/articles/10.4103/ejim.ejim_56_19
10. Terzi B, Bulut S, Kaya N. Factors affecting nursing and midwifery students' attitudes toward social media. Nurse Educ Pract. 2019;35:141–9.
11. Alharbi M, Kuhn L, Morphet J. The relationship between social media usage by undergraduate nursing students and development of their professional identity: A correlational study. Nurse Educ Today. 2022;112:105337. Available from: https://doi.org/10.1016/j.nedt.2022.105337
12. Ramjan LM, Salamonson Y, Batt S, Kong A, McGrath B, Richards G, et al. The negative impact of smartphone usage on nursing students: An integrative literature review. Nurse Educ Today. 2021;102:104909. Available from: https://doi.org/10.1016/j.nedt.2021.104909
13. Cuschieri, S. The STROBE guidelines. Saudi J. Anaesth. 2019;13:31-34.
14. Çatıker A, Büyüksoy GDB, Özdil K. Is there a relationship between nursing students' smartphone use, their fear of missing out and their care-related behaviour? Nurse Educ Pract. 2021;54:1–7.
15. Yıldırım S, Kişioğlu AN. New diseases due to technology: nomophobia, netlessphobia, FoMO. SDU Med Fac J. 2018;25(4):473–80.
16. Hızarcı Ö. An examination of the relationship between problematic cell phone use, fearing of missing out (FoMO), life satisfaction and attachment styles in terms of demographic variables. [Master Thesis]. Üsküdar Üniversitesi; 2018.
17. Coskun S, Karayagız Muslu G. Investigation of problematic mobile phones use and fear of missing out (FoMO) level in adolescents. Community Ment Health J. 2019;55(6):1004–14. Available from: https://doi.org/10.1007/s10597-019-00422-8
18. Barry CT, Sidoti CL, Briggs SM, Reiter SR, Lindsey RA. Adolescent social media use and mental health from adolescent and parent perspectives. J Adoles. 2017;61:1–11. Available from: https://doi.org/10.1016/j.adolescence.2017.08.005
19. Günal A, Pekçetin S. Relationship between smartphone addiction and the pain in cervical Region-upper extremity among university students. STED. 2019;28(2):38–40.
20. Gupta N, Garg S, Arora K. Pattern of mobile phone usage and its effects on psychological health, sleep, and academic performance in students of a medical university. Natl J Physiol Pharm Pharmacol. 2016;6(2):132–9.
21. Levenson J, Shensa A, Sidani J, Colditz J, Primack B. The association between social media use and sleep disturbance among young adults. Prev Med (Baltim). 2016;85:36–41.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 272-278
https://doi.org/10.31067/acusaglik.1179250

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Perceptions and Emotions of Nursing and Health Management Students About Distance Learning During the COVID-19 Pandemic: A Qualitative Study

Rujnan Tuna[1], **Safiye Şahin**[2]

[1]Department of Nursing Administration, Faculty of Health Sciences, Istanbul Medeniyet University, Istanbul, Turkey

[2]Department of Health Management, Faculty of Health Sciences, Istanbul Medeniyet University, Istanbul, Turkey

ABSTRACT

Purpose: This study was conducted to determine the perceptions and emotions of nursing and health management students, who had clinical/vocational practice course, about distance learning during the COVID-19 pandemic.

Methods: Phenomenological design was employed in this qualitative study. The study was conducted with 39 full-time health sciences students in nursing and health management. Data were collected by in-depth interviews. The interviews were conducted with ten open-ended and semi-structured questions between December 2020-January 2021. Data were analyzed using content analysis.

Results: At the end of the study, it was classified into three themes and 14 sub-themes: "emotional state", "the effect of distance learning on theoretical courses" and "the effect of distance learning on clinical/vocational practice". Results have indicated that distance learning is insufficient especially in terms of clinical/vocational practices and that the emotional states of students are negatively affected.

Conclusion: It is important to use learning methods that will increase the effectiveness of psychological support and distance education during the pandemic process.

Keywords: COVID-19, distance learning, nursing students, health management students, students' emotions

Rujnan TUNA

Safiye ŞAHİN

COVID 19: Hemşirelik ve Sağlık Yönetimi Üniversite Öğrencilerinin Uzaktan Eğitim Algılarının ve Duygu Durumlarının Belirlenmesi: Kalitatif Bir Çalışma

ÖZET

Amaç: Çalışma, COVID-19 pandemisi sırasında uygulamalı meslek eğitimi alan hemşirelik ve sağlık yönetimi üniversite öğrencilerinin uzaktan eğitim algılarının ve duygu durumlarının belirlenmesi amacıyla gerçekleştirilmiştir.

Yöntemler: Bu kalitatif çalışma fenomenolojik tasarımda gerçekleştirilmiştir. Çalışma tam zamanlı 39 hemşirelik ve sağlık yönetimi üniversite öğrencisi ile gerçekleştirilmiştir. Görüşmeler açık uçlu, yarı yapılandırılmış ve derinlemesine 10 görüşme sorusuyla Aralık 2020-Ocak 2021 tarihleri arasında gerçekleştirilmiştir. Elde edilen veriler içerik analizi kullanılarak analiz edilmiştir.

Bulgular: Çalışma sonunda "duygu durumu", "uzaktan eğitimin teorik derslere etkisi" ve "uzaktan eğitimin mesleki uygulamaya etkisi" olmak üzere üç tema ve 14 alt temada sınıflandırılmıştır. Uzaktan eğitimin özellikle mesleki uygulamalar açısından yetersiz kaldığı ve öğrencilerin duygu durumlarının olumsuz etkilendiği belirlenmiştir.

Sonuç: Pandemi sürecinde psikolojik desteğin ve uzaktan eğitimin etkinliğini arttıracak öğrenme yöntemlerinin kullanılması önemlidir.

Anahtar Kelimeler: COVID-19, uzaktan eğitim, hemşirelik öğrencileri, sağlık yönetimi öğrencileri, öğrencilerin duyguları

Correspondence: Rujnan Tuna
Department of Nursing Administration, Faculty of Health Sciences, Istanbul Medeniyet University, Istanbul, Turkey
Phone: +902162803153
E-mail: rujnantuna@yahoo.com

Received: 23 September 2022
Accepted: 02 March 2023

The new coronavirus (COVID-19), which emerged with the notification of pneumonia cases of unknown etiology to the World Health Organization (WHO) on December 31, 2019 in Wuhan, has affected the whole world as a global pandemic (1-3). In order to prevent the spread of COVID-19 and control it, all countries in the world have closed their borders and have gone to social isolation in line with the experiences of previous pandemics (4). This unexpected and unprepared pandemic process brought along unwanted emotions such as anxiety, fear of death, and stress (5-7). As a result, COVID-19 has been regarded as a milestone not only in the development of measures and strategies for new outbreaks, but also in the education of future healthcare professionals (8).

Especially with the COVID-19 pandemic affecting the whole world, the prominence of distance learning has increased. Although distance learning was used effectively in some universities in the world before this pandemic and had many advantages, it has also been reported that distance learning causes social isolation and interruption of student-teacher interaction (9). In particular, the inability of distance learning to replace clinical practice, negative effects such as decrease in concentration, motor skills, and self-confidence have been reported as problems of nursing students during COVID-19 pandemic (10, 11). From this point, in the current study, it is aimed to determine (a) perceptions and (b) emotions of nursing and health management students, whose clinical/vocational practice in hospitals were canceled due to the COVID-19 pandemic, about distance learning.

METHODS

Study Design

The descriptive qualitative study was carried out in phenomenological design. The qualitative method is the best data collection method used to convey individual life experiences and emotions that cannot be objectively measured. Phenomenological design is appropriate when there are very few studies describing the phenomenon in question (12, 13).

Participants and Setting

The convenience sampling method was used in this study (14). Within the scope of this study, nursing students and health management students, whose clinical/vocational practice courses were cancelled due to COVID-19, were included. Due to the lack of the distance learning experiences of freshman students, only second, third and fourth grade students were included in the study. This qualitative study was carried out with 39 university students who voluntarily agreed to participate in the study at the faculty of health sciences of a state university in Istanbul.

Data Collection

The research data were collected with ten questions prepared by researchers based on relevant literature (15, 16) and with the support of three experts in the field (Table 2). Before starting the interviews, the pilot study was conducted with 5 randomly selected students and the interview form was finalized. Individual, in-depth, and semi-structured interviews were conducted with 39 students until new data were not available (16). All interviews were conducted in Turkish with the participation of two researchers at the same time. The interviews were conducted over the zoom application in accordance with the semi-structured interview form, with online sessions, and audio recording. The interviews lasted 45-60 minutes, an average of 51 minutes, and were held between December 2020-January 2021.

Data Analysis

Each interview was analyzed within 24 hours by two researchers who conducted the interviews. The sound recordings were first written in the native language and translated from the native language to English and back to the native language to ensure accuracy. Data were analyzed using content analysis (17). This process includes five steps: (i) multiple readings of the parsed data to obtain the main idea; (ii) line by line coding of the analyzed data; (iii) researching and defining themes; (iv) reviewing the relationships between themes; and (v) finalizing the analysis and documentation (13). In the last stage, by comparing the similarities and differences between the code groups, three themes and 14 sub-themes were reached as a result of analyses (Table 3).

Rigor and Trustworthiness

The day after the interview, each participant was asked whether the analysis of the interviews accurately reflected the truth in order to verify the reliability of the data. In addition, the qualitative content analysis results of each interview were discussed and reconsidered by the researchers every two weeks. Finally, the codes and themes of the analyzed qualitative data were verified by each participant (16, 17).

Ethical Approval

Before collection the data, Ethics Committee approval and institutional permission from the university where the study was planned were obtained. At the beginning of the interviews, the participants were informed about the study and their verbal consent was requested.

RESULTS

Three themes and 14 sub-themes were specified in the present study conducted with nursing and health management students (Table 3) (See Table 4 for more interview texts). The majority of the students interviewed were women (76.9%, n = 23.1), health management students (51.3%, n = 20), and third grade students (48.7%, n = 19). The average age of the students was 20.32 ± 1.09 (Table 1).

Table 1: Demographic characteristics of the participants (N: 39)

Variables		n	%
Gender	**Male**	9	23.1
	Female	30	76.9
Department	**Nursing**	19	48.7
	Health management	20	51.3
Grade	**2nd class**	8	20.5
	3rd class	19	48.7
	4th class	12	30.8
Age		20.32±1.09 (Minimum=19, Maximum=25)	

Table 2: Interview questions

1. Can you briefly introduce yourself, please?
2. Which emotions did the pandemic process aroused in you? Can you tell us about your feelings?
3. How has the pandemic affected your education life? What has changed in your life? What feelings do these changes arouse in you?
4. How has the pandemic affected your social life? What has changed in your life? What feelings do these changes arouse in you?
5. How do you perceive the distance learning process? Which feelings does it arouse in you?
6. What do you think about the adequacy and effectiveness of distance learning?
7. Have you had any problems during the distance learning process?
8. Which feelings do you have when you cannot have clinical/ vocational practices in hospitals, which constitute an important part of your education life?
9. Do you think you have received effective and sufficient clinical/ vocational trainin with distance education?
10. Can you evaluate the effectiveness of the distance learning process for applied professions?

Table 3: Themes and subthemes of the study

Themes	Subthemes	
1 Emotional state	1.1 Fear	
	1.2 Anxiety	
	1.3 Loneliness	
	1.4 Hopelessness	
	1.5 Strengthening family ties	
2 The effect of distance learning on theoretical courses	2.1 Positive affect	2.1.1 Avoid wasting time
		2.1.2 Efficient and easy learning
	2.2 Negative affect	2.2.1 Decrease in concentration
		2.2.2 Withdrawal from education, perceived as if there is no education life
3 The effect of distance learning on clinical/ vocational practice	3.1 Professional inadequacy	
	3.2 Decrease in self-confidence	
	3.3 Fear of harm and making mistakes	
	3.4 Distancing from the profession	
	3.5 Decrease in motor skills	

Theme 1: Emotional State

1.1. Fear

All of the students participating in the study stated that they feared infecting their relatives during the pandemic and explained this situation with the "fear" phenomenon. Students stated that "*I am afraid… I am afraid of infecting my loved ones and my family.*" (Participant [P] 3), and "*I fear losing my relatives*" (P 18).

1.2. Anxiety

According to this phenomenon, half of the students (51.3%, n = 20) stated that they were worried about the uncertainty of the future. Both nursing and health management students expressed that "*I am worried whether this process will end or not, what will happen.*" (P 27), and "*I feel anxiety. Because everything is uncertain.*" (P 37).

1.3. Loneliness

All of the students participating this study stated that they did not have a social life during the pandemic process and explained this situation with the phenomenon of "loneliness". The students remarked that "*My social life is over. All my communication and sharing with my friends has decreased* (P 2).

1.4. Hopelessness

According to this phenomenon, 35.9% (n = 14) of the students stated that they felt hopeless for the future due to the uncertainty of the pandemic process. Students reported that *"I lost my hope for the future, I am unable to plan for the future. Because I could get sick and die at any moment."* (P 11), and *"Sometimes I feel like this process will never end. I am hopeless about the future."* (P 22).

1.5. Strengthening family ties

41% (n = 16) of the students stated that they had the opportunity to spend more time with their families due to the curfews during the pandemic process. This situation was labeled as the phenomenon of "strengthening in family ties". Students expressed that *"During the restrictions on going out, my loyalty to my family increased and our family ties became stronger."* (P 15).

Theme 2: The Effect of Distance Learning on Theoretical Courses

2.1. Positive effect

2.1.1. Avoid wasting time

According to this phenomenon, all of the students participating in the study stated that they saved time with distance learning. Students reported that *"In this process, I can easily access everything from home, without wasting time and without getting tired. All I have to do is turn on my computer and enter class."* (P 2).

2.1.2. Efficient and easy learning

One-fourth of the students (25.6%, n = 10) explained the distance learning in terms of theoretical courses with the phenomenon of "effective and easy learning". Students stated that *"Distance learning is efficient and effective for the theoretical courses"* (P 38).

2.2. Negative effect

2.2.1. Decrease in concentration

The majority of students participating in the study (74.4%, n = 29) explained distance learning with the phenomenon of "decrease in concentration". Students expressed their opinions as: *"In the distance learning process, you are not alone at home. My mother can enter the room suddenly during the lesson. My concentration on the lecture can get disrupted."* (P 10).

2.2.2. Withdrawal from education, perceived as if there is no education life

More than a quarter of the students (30.8%, n = 12) explained distance learning with the phenomenon of "withdrawal from education, perceived as if there is no educational life". Students stated that *"I feel like I don't have any education life with distance learning, as if I am not a university student at all."* (P 8).

Theme 3: The Effect of Distance Learning on Clinical/ Vocational Practice

3.1. Professional inadequacy

All of the nursing students and 35% (n = 7) of the health management students explained their inability to perform their clinical/vocational practices in the hospital with the "professional inadequacy" phenomenon: *"Right now I feel professionally inadequate. Because my profession is based on practice and I will actually learn in a hospital environment. We were not able to practice in clinics during this period, so I feel like I have forgotten even the clinical practices I have learned."* (P 3).

3.2. Decrease in self-confidence

Half (52.6%, n = 10) of the nursing students participating in the study and one fifth (20%, n = 4) of the health management students explained the situation of not being able to practice in hospitals with the phenomenon of "decrease in self-confidence". Students stated that *"In-person placement of clinical practice before the pandemic was a chance to gain a lot of experience. I had self-confidence. But now I have no self-esteem. I feel like a newborn baby."* (P 1).

3.3. Fear of harm and making mistakes

More than half of the nursing students (63.2%, n = 12) explained their inability of clinical practice during COVID-19 pandemic with the phenomenon of "fear of harm, making mistakes". None of the health management students mentioned this phenomenon. Nursing students stated that *"I think I will do more harm than good to the patient."* (Participant 6).

3.4. Distancing from profession

While, half of the nursing students (52.6%, n = 10) explained their inability of clinical practice during COVID-19 pandemic with the phenomenon of "distancing from the profession", none of the health management students mentioned this phenomenon. Nursing students expressed that *"Not being able to have clinical practices distanced me from my profession. I feel like I am not trained in this profession adequately."* (Participant 39)

Table 4: Interview texts	
Themes and subthemes	**Interview texts**
Theme 1 Emotional state	
1.1. Fear	*"I feel an intense fear. Will anything happen to my family? I am afraid that I will infect someone with a disease or how I will overcome this process."* (Participant 35)
1.2. Anxiety	*It is not clear when the pandemic will end, it is not clear when the schools will open, it is not clear whether I can do an internship or not."* (Participant 31)
1.3. Loneliness	*"I forgot what it feels like to socialize, how to behave outside, how to communicate. I can say I became lonely. I feel like I'm in jail"* (Participant 6) *"I continue my communication on social media, but I cannot convey my feelings, touch, hug. I feel that I am lonely."* (Participant 19)
1.4. Hopelessness	*"The prolongation and uncertainty of the pandemic increases my despair. Will the situation get worse, will I never see my friends again, never go to school again? My motivation also vanished. I want to do something, but I don't feel like doing anything."* (Participant 26)
1.5. Strengthening family ties	*"During this period, I had the opportunity to spend more time with my family. Our family relations were positively affected because we all had the chance to get away from work and school life and spend more time with each other."* (Participant 34).
Theme 2: The Effect of Distance Learning on Theoretical Courses	
2.1. Positive effect	
2.1.1. Avoid wasting time	*"My time was left for me during the distance learning process. The time it took to reach the school was left to me. I even got a chance to wake up 5 minutes before the lesson and join the lesson."* (Participant 14).
2.1.2. Efficient and easy learning	*"Distance learning should be continued in terms of theoretically taken courses."* (Participant 23).
2.2. Negative effect	
2.2.1. Decrease in concentration	*"The facial expressions, gestures and eye contact of the person lecturing the lesson are very important to me. Although I try to focus and understand the lesson by looking at the computer screen in distance learning, after a while my concentration on the lesson comes to an end. I can fall asleep in front of the computer."* (Participant 33). *"It is impossible to try to understand the lesson or to focus on the lesson by looking at the computer screen in distance learning. After a certain time, my concentration and motivation in the lesson disappears completely, I feel sleepy. I cannot feel myself in the school environment."* (Participant 20)
2.2.2. Withdrawal from education, perceived as if there is no education life	*"I do not feel that I am getting education with distance learning. I attend the class but I don't feel like I am at school. My family life and responsibilities are intertwined with my school life. I feel like I am withdrawal from education life."* (Participant 30) *"My family perceives distance learning as if I don't have an education life because I don't go to school."* (Participant 39)
Theme 3: The Effect of Distance Learning on Clinical/Vocational Practice	
3.1. Professional inadequacy	*"I feel both helpless and inadequate because my professional experience is not sufficient. How can I provide nursing care without clinical experience? I do not want to be on the field with this inadequacy. Nor do I think I can be effective due to lack of experience. I feel useless."* (Participant 19) *"Not being able to do clinical practice makes me feel like a fish out of the water and creates occupational inadequacy. Because I think that learning by training in a hospital environment is much more effective than the theoretical training I received."* (Participant 12) *"Not being able to practice at hospitals does not cause occupational inadequacy for me. Because I believe that an individual's professional competencies develop with his/her own individual effort rather than vocational practice courses."* (Participant 9)
3.2. Decrease in self-confidence	*"Not being able to practice in hospitals reduced my self-confidence. Because I am afraid. I'm afraid of not being sure what I'm doing is right or wrong."* (Participant 2) *"Staying away from the practice field caused my professional practices that I knew before to become blunt. My self-confidence has decreased."* (Participant 7)
3.3. Fear of harm and making mistakes	*"Not being able to practice in clinics causes a very high sense of harming the patient."* (Participant 4) *"We cannot practice in clinics. This makes me worry about professional inadequacy and harm to the patient. Even before the pandemic, I was afraid of harming someone else, which I feel more intensely now."* (Participant 33)
3.4. Distancing from profession	*"I feel like I'm still studying mathematics and physics like a high school student, not nursing. I feel that I am distanced from my profession and cannot integrate with my profession."* (Participant 5) *"I do not want to do the nursing profession with the feeling of inadequacy and insecurity, I do not want to be in the practice field. Although I love this job very much, the feeling of professional inadequacy and fear keeps me away from my job."* (Participant 20).
3.5. Decrease in motor skills	*Nursing is an applied profession, however, I was unable to have clinical practice and I did not have the opportunity to transition of my theoretical knowledge into the practice field, which led to a decrease in my hand skills"* (Participant 34).

3.5. Decrease in motor skills

One fourth of the nursing students participating in the study (26.3%, n = 5) explained their inability of clinical practice with the phenomenon of "decrease in motor skills". None of the health management students mentioned this phenomenon. Nursing students stated that *"I may have theoretical knowledge to communicate with the patient, but not being able to practice reduced my professional skills."* (P 38).

DISCUSSION

Theme 1: Emotional State

In order to prevent the high transmission rate of COVID-19, which affects the whole world and enters our lives suddenly, or the possibility of transmission from asymptomatic carriers, all countries in the world have implemented measures, such as social isolation, work from home and distance learning (4). In this process, many studies have reported that individuals experience anxieties such as fear of getting sick, fear of death, fear of losing their relatives, feeling lonely with social isolation, uncertainty of the future, stress, burnout and sleep disorders (5-7, 18). These studies support the finding of current study. It was also emphasized that it is important to support university students in health-related professions psychologically (19). According to the finding of the present study, on one hand the pandemic increases negative emotions such as fear, anxiety, loneliness and hopelessness in students, on the other hand it leads strengthening of family ties.

Theme 2: The Effect of Distance Learning on Theoretical Courses

Supporting the finding of current study, it was reported that many universities in the world preferred distance learning before the pandemic as an effective teaching method due to its ease of use and flexibility (9). For instance, in a study investigating the effectiveness of distance learning during the pandemic process, it was determined that the majority of university students prefer to learn face-to-face compared to distance learning and that students are not yet ready for distance learning. In addition, the study emphasized the importance of student-teacher interaction (10). Again, in another study, which is in line with the finding of present study, it was reported that during the COVID-19 pandemic, nursing students experienced lack of motivation, concentration impairment, forgetfulness, and had difficulty learning (11). In addition, Al-Rabiaah et al. (20) have indicated that the students in health-related professions frequently experience decreased psychomotor concentration and learning difficulties during this pandemic, and this situation negatively affects the academic success of students.

Theme 3: The Effect of Distance Learning on Clinical/ Vocational Practice

It has been stated that there are many challenges in the continuation of the education for applied professions, that directly touch the patient, at the universities (15, 21). It is also argued whether the clinical placement of students should be continued or cancelled (21). In line with the current study, in many studies, it is reported that university students in health-related departments feel lack of practical competencies during the COVID-19 pandemic (15, 22, 23). In the current study, in terms of clinical/vocational practices, nursing students felt more professional incompetence, fear of harm, fear of making mistakes, distancing from the profession, decrease in self-confidence and motor skills compared to health management students. Therefore, it can be inferred that the difference in perceptions and emotions about distance learning between nursing and health management students may arise from contacting the patient directly or indirectly.

Limitations

Conducting the study in a single country, city and institution prevents the results from being generalized. Therefore, the results can only be generalized to countries in a similar region and culture.

CONCLUSION

As a result of the study, it is found that nursing and health management students feel intensely fear during the pandemic process, anxiety and hopelessness, become socially isolated, but their family ties are strengthened. When the effect of distance learning on professional practice is evaluated, it is observed that, compared to health management students, the majority of nursing students feel a decrease in professional inadequacy and self-confidence. According to the results of this study, it is strongly recommended that:

- Psychological support for nursing and health management students' emotional states during the pandemic process,
- Using learning methods that will increase the effectiveness of theoretical education in the distance learning process,

- Completing the missing clinical practices of nursing students, especially those who directly touch the patients.

DECLARATIONS

Funding
The authors declare no conflicts of interest

Conflicts of Interest
The authors declare no conflict of interest.

Acknowledgements
We are thankful to the students who participated to this study.

Ethical Approval
Before collection the data, Social and Humanities Research and Publication Ethics Committee approval (Date: 27.10.2020, No: 2020/35) and institutional permission from the university where the study was planned (Number: 70734980-605-E.21851, Date: 30.11.2020) were obtained.

Author Contributions
Designed the study: RT, SS. Collected data: RT, SS. Analyzed data: RT, SS. Supervised the analysis: RT, SS. Contributed to interpretation of findings: RT, SS. Drafted the paper: RT, SS. Critical review providing important intellectual content: RT, SS. All authors have approved the final version of the paper.

Availability of Data and Materials
All data have deposited in a repository.

REFERENCES

1. Centers for Disease Control and Prevention. Coronavirus (COVID-19). Accessed on: 23.02.2021. https://www.cdc.gov/coronavirus/2019-ncov/index.html?CDC_AA_refVal=https %3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2Findex.html
2. World Health Organization. WHO Director-General's opening remarks at the media briefing on COVID-19. Accessed on: 23.02.21. https://www.who.int/dg/speeches/detail/whodirector-general-s-opening-remarks-at-the-media-briefing-on-covid-19—11-march-2020
3. World Health Organization, Coronavirus disease 2019 (COVID-19). Weekly Epidemiological Update. Accessed on: 23.02.21. https://www.who.int/publications/m/item/weekly-epidemiological-update---23-february-2021
4. Johnson HC, Gossner CM, Colzani E, et al. Potential scenarios for the progression of a COVID-19 epidemic in the European Union and the European Economic Area, March 2020. Euro Surveill. 2020;25(9):2000202. DOI: 10.2807/1560-7917.ES.2020.25.9.2000202
5. Banerjee D. The COVID-19 outbreak: crucial role the psychiatrists can play. Asian J Psychiatr. 2020;50:102014. DOI: 10.1016/j.ajp.2020.102014
6. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: Rapid review of the evidence. Lancet. 2020;395(10227):912–20. DOI: 10.1016/S0140-6736(20)30460-8
7. Fowler K, Wholeben M. COVID-19: Outcomes for trauma-impacted nurses and nursing students. Nurse Educ Today. 2020;93:104525. DOI: 10.1016/j.nedt.2020.104525
8. Cervera-Gasch Á, González-Chordá VM, Mena-Tudela D. COVID-19: Are Spanish medicine and nursing students prepared? Nurse Educ Today. 2020;92:104473. DOI: 10.1016/j.nedt.2020.104473
9. Vitoria L, Mislinawati M, Nurmasyitah N. Students' perceptions on the implementation of e-learning: Helpful or unhelpful? J Phys Conf Ser. 2018;1088(1):012058. DOI: 10.1088/1742-6596/1088/1/012058
10. Abbasi S, Ayoob T, Malik A, Memon SI. Perceptions of students regarding E-learning during Covid-19 at a private medical college. Pak J Med Sci. 2020;36:57-61. DOI: 10.12669/pjms.36.COVID19-S4.2766
11. Lovri´c R, Far˘ci´c N, Mikši´c Š, V˘cev A. Studying during the COVID-19 pandemic: a qualitative ınductive content analysis of nursing students' perceptions and experiences. Educ Sci. 2020;10:188. DOI: 10.3390/educsci10070188
12. Colorafi KJ, Evans B. Qualitative descriptive methods in health science research. HERD. 2016;9(4):16–25. DOI: 10.1177/1937586715614171
13. Marshall C, Rossman GB. Designing qualitative research. 5th ed. London, England: Sage; 2016.
14. Malterud K, Siersma VD, Guassora AD. Sample size in qualitative interview studies: Guided by information power. Qual Health Res. 2016;26:1753–60. DOI: 10.1177/1049732315617444
15. Collado-Boira EJ, Ruiz-Palomino E, Salas-Media P, Folch-Ayora A, Muriach M, Baliño P. "The COVID-19 outbreak"—An empirical phenomenological study on perceptions and psychosocial considerations surrounding the immediate incorporation of final-year Spanish nursing and medical students into the health system. Nurse Educ Today. 2020;92:104504. DOI: 10.1016/j.nedt.2020.104504
16. Levitt H, Motulsky S, Wertz F, Morrow S, Ponterotto J. Recommendations for designing and reviewing qualitative research in psychology: Promoting methodological integrity. Qual Psychol. 2017;4(1):2-22. DOI: 10.1037/qup0000082
17. Braun V, Clarke V. (Mis)conceptualising themes, thematic analysis, and other problems with Fugard and Potts' (2015) sample-size tool for thematic analysis. Int J Soc Res Methodol. 2016; 19(6): 739-43. DOI: 10.1080/13645579.2016.1195588
18. Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, Kaushal V. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. Asian J Psychiatr. 2020;51:102083. DOI: 10.1016/j.ajp.2020.102083
19. Shojaei SF, Masoumi R. The importance of mental health training for psychologists in COVID-19 outbreak. MEJRH. 2020;7(2):e102846. DOI: 10.5812/mejrh.102846.
20. Al-Rabiaah A, Temsah MH, Al-Eyadhy AA, et al. 2020. Middle East Respiratory Syndrome-Corona Virus (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. J Infect Public Health. 2020;13(5):687-91. DOI: 10.1016/j.jiph.2020.01.005
21. Dewart G, Corcoran L, Thirsk L, Petrovic K. Nursing education in a pandemic: Academic challenges in response to COVID-19. Nurse Educ Today. 2020;92:104471. DOI: 10.1016/j.nedt.2020.104471
22. Chen Q, Liang M, Li Y, et al. Mental health care for medical staff in China during the COVID-19 outbreak. Lancet Psychiatry 2020;7(4):e15-e6. DOI: 10.1016/S2215-0366(20)30078-X
23. Liang Y, Chen M, Zheng X, Liu J. Screening for Chinese medical staff mental health by SDS and SAS during the outbreak of COVID-19. J Psychosom Res. 2020;133:110102. DOI: 10.1016/j.jpsychores.2020.110102

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 279-286
https://doi.org/10.31067/acusaglik.1162789

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Impact of Domestic Accidents Training Given to Parents with Mentally Disabled Children

Gülsüme Satır[1], **Sevim Ulupınar**[2]

[1]Istanbul University-Cerrahpasa Graduate Education Institute, İstanbul, Turkey

[2]İstanbul Üniversitesi Cerrahpaşa Florence Nightingale Nursing Faculty, İstanbul, Turkey

Gülsüme SATIR

Sevim ULUPINAR

Correspondence: Gülsüme Satır
Istanbul University-Cerrahpasa Graduate Education Institute, Istanbul, Turkey
Phone: +905548302415
E-mail: gsatir@biruni.edu.tr

Received: 17 August 2022
Accepted: 26 December 2022

ABSTRACT

Purpose: The research is a semi-experimental study with a pre-post testing design that aims to assess the impact of domestic accidents training given to parents with mentally disabled children.

Methods: The sample of the study consists of 32 parents whose children were enrolled in a special education center. Data were collected using sociodemographic features, Diagnostic Scale Of Safety Measures For Domestic Accidents In Children Aged 0-6, and training assessment form. Percentiles, averages, standard deviation, Cronbach Alpha internal consistency analysis, t-test, Kruskal Wallis, variance analysis were used to analyze the data.

Results: 71.9% of parents had previously received training on domestic accidents, 59.4% of their children had previously had domestic accidents, and poisoning was experienced the most (63.2%). It was determined that one month after training, parents' attitude score on measures to protect them from domestic accidents increased compared to pre-training. There was no significant difference between the rate children had domestic accidents before and after the training. No significant differences were found between parents' behavior before and after the training in taking safety measures at home.

Conclusions: It is recommended that families be trained by health professionals at regular intervals to protect them from home accidents and also ensuring continuity and observing the effects of the training by making in-home visits.

Keywords: Parent, Accident, Mentally Disabled

Zihinsel Engelli Çocuğu Olan Ebeveynlere Verilen Ev Kazaları Eğitiminin Etkisi

ÖZET

Amaç: Araştırma, zihinsel engelli çocuğa sahip ebeveynlere verilen ev kazaları eğitiminin etkisini değerlendirmeyi amaçlayan ön-son test desenli yarı deneysel bir çalışmadır.

Yöntem: Araştırmanın örneklemini çocukları bir özel eğitim merkezine devam eden 32 ebeveyn oluşturmaktadır. Veriler, sosyodemografik özellikler, 0-6 Yaş Çocuklarda Ev Kazalarında Güvenlik Önlemlerini Tanılama Ölçeği ve eğitim değerlendirme formu formu kullanılarak toplanmıştır. Verilerin analizinde yüzdelikler, ortalamalar, standart sapma, Cronbach Alpha iç tutarlılık analizi, t-testi, Kruskal Wallis, varyans analizi kullanılmıştır.

Bulgular: Ebeveynlerin %71,9'u daha önce ev kazaları konusunda eğitim almış, çocuklarının %59,4'ü daha önce ev kazası geçirmiş ve en çok zehirlenme (%63,2) yaşadığı belirtildi. Eğitimden bir ay sonra ebeveynlerin ev kazalarından korunma önlemlerine yönelik tutum puanlarının eğitim öncesine göre arttığı belirlendi. Çocukların eğitim öncesi ve eğitim sonrası ev kazası geçirme oranları arasında anlamlı bir fark bulunmamaktadır. Anne babaların evde güvenlik önlemleri alma konusunda eğitim öncesi ve eğitim sonrası davranışları arasında anlamlı bir fark bulunmamıştır.

Sonuç: Ailelerin ev kazalarından korunmaları için düzenli aralıklarla sağlık profesyonelleri tarafından eğitim almaları, ayrıca ev ziyaretleri yapılarak eğitimlerin sürekliliğinin sağlanması ve etkilerinin gözlemlenmesi önerilmektedir.

Anahtar Kelimeler: Ebeveyn, Kaza, Zihinsel Engelli

An accident is an event that is not planned, unexpected, sudden, and can result in injury and be prevented. On the other hand, domestic accidents occur in the home or parts connected to the home (1). According to the World Health Organization (WHO), burns, falls, and getting poisoned are the most important causes of morbidity and mortality in domestic accidents (2). The individuals most at risk for home accidents are the elderly, children, individuals with physical, mental, and social disabilities (3). Accidental injuries are the fifth leading cause of death among infants, and they remain the leading cause of death among children aged 1-19 (4). The causes of children's accidents are related to parental characteristics, behavioral and environmental factors. Due to their developmental characteristics, children will inevitably encounter accidents (5). The continued development of children in terms of neuromotor, physical, sensory, cognitive and psychosocial deceptions are among the causes of accidents (6). Disability is also a major risk factor for accidents. Disability is defined as the restriction or inability to perform the roles expected of a person because of their gender, age, social and cultural factors due to incompetence or disability (7). Children with mental disabilities, in particular, are more likely to experience accidents in their daily lives, such as falls, burns, poisoning, suffocation, foreign body aspiration, more than healthy children (1). Physical and mental problems in children with intellectual disability; increases the risk of home accidents. In particular, it causes more fractures in hand-eye coordination due to falling and burn-type home accidents (1). To protect children from accidents and injuries, it is very important that their parents know about accident prevention, so providing training to families is not something (8).

When the literature is examined, there is no study with a pre-test and post-test designed by providing education to parents with mentally retarded children. It is thought that this study, which was carried out in a special education center, will contribute to the increase of awareness of the parents about the issue and to take precautions by providing training on the prevention of home accidents to parents with mentally retarded children. This study was planned as quasi-experimental to investigate the evaluation of the education given to parents with mentally retarded children on home accidents.

MATERIALS AND METHODS

Study Design

The research is a semi-experimental study with a pre-post testing design that aims to assess the impact of training given to parents with mentally disabled children on preventing domestic accidents.

Hypotheses Of the Study

Hypothesis 1: There will be a difference between the scores of parents trained to prevent domestic accidents safety measures for domestic accidents before training and one month after training.

Hypothesis 2: The rate of domestic accidents amongst the children of parents trained to prevent domestic accidents will have decreased one month after the training.

Hypothesis 3: Parents trained to prevent domestic accidents will take more safety measures for domestic accidents in their homes than before the training.

Population and Sample

The population of the study consisted of 76 parents with children attending a Special Education Center in Istanbul. The sample of the research; The universe was calculated using the formula for calculating the number of known samples and was found to be 58. Our study consisted of 54 parents who came to the center on the day of the training, participated in the training and lived in the same house with the mentally handicapped child. As 22 parents had to leave the center at the end of the training, the study was completed with 32 parents.

Data Collection Tools

Data in the study were collected using sociodemographic features, information form on domestic accidents, Diagnostic Scale Of Safety Measures For Domestic Accidents In Children Aged 0-6, training assessment form, and information form on domestic accidents applied 1 month after training. In an experimental study in which educational effectiveness was measured, we collected the data 1 month later because the data were collected 1 month later (9).

Information form: A form, which is created by researchers, consisting of 10 questions about the introduction of a parent and the mentally disabled individual, and domestic accidents. Questions include sociodemographic characteristics of the individual and parent, the type of mental disability that the child has, whether he or she has had a domestic accident before, what type of domestic accident he or she has had, and whether the parent had previously received training for domestic accidents or not (9, 10).

Diagnostic Scale Of Safety Measures For Domestic Accidents In Children Aged 0-6 (MFDA): The scale was developed by Çınar in 1999 to define the attitudes of

mothers, with children 0-6 years of age measures to protect their children from domestic accidents. It is noted that the scale is suitable for use in all age groups. The 5-type Likert scale (1=Never, 2=rarely, 3=Sometimes, 4=Often, and 5=Always) consists of 40 expressions, 34 of which are positive, 6 of which are negative. Negative statements are scored by reversing. The total score that can be obtained from the scale ranges between 40-200. A high score shows that mothers took measures to protect their children from domestic accidents at the highest level. In Çınar's study, the Cronbach alpha internal consistency coefficient of the scale was determined as 0.82 (8). In this study, the Cronbach alpha internal consistency coefficient of the scale was found to as 0.80.

Training Assessment Form: The form consists of 10 statements containing the views of parents about training (meeting expectations, comprehensibility, sufficient time, and are sufficient methods and tools, etc.) and the trainer (being in control, ensuring active participation, answering questions, using time effectively). Participants evaluate each expression based on 3 points (3 - Good, 2 - Medium, 1 - Should be Improved). At the end of the training, parents evaluated the training they received using the training assessment form. The total score received from the form was determined as 2.95+ 0.29.

Information Form On Domestic Accidents: The Form consists of two open-ended questions for data on whether the children have had a home accident after the training and whether parents took precautions in the home environment.

Data Collection Method

Data was collected three times: pre-training, at the end of the training, and one month after training. Before the training, parents were made the fill out information forms and Diagnostic Scale Of Safety Measures For Domestic Accidents through face-to-face interviews. Then, the Domestic Accident Prevention Training was given by one of the researchers. After the training, the participants' contact information was collected, and the training evaluation form was applied. One month after the training, participants were called by phone, and the information form on domestic accidents and the Diagnostic Scale Of Safety Measures For Domestic Accidents were applied.

Domestic Accident Prevention Training

Participants were parents of mentally disabled children who attended the Special Education Center, 10 were fathers, and 22 were mothers. The training, held in the Seminar Hall of the Special Education Center, lasted 45 minutes.

The training aims to raise awareness in the knowledge, attitudes, and behaviors of parents with mentally disabled children about domestic accidents and take measures to prevent domestic accidents. Definition and importance of domestic accidents, types of domestic accidents, and measures to be taken to prevent domestic accidents, etc. was included in this training. Lecturing, question-answer, brainstorming, discussion, card game, PowerPoint presentation, and domestic accident prevention brochure prepared by researchers were used as training methods and materials.

Performing the Training: Parents were introduced and taken into the seminar hall. After all, participants arrived, the aim of the training was announced. Subjects were explained with the active participation of the parents, and participants were observed to be interested in the training. Participants shared their experiences on domestic accidents. A brainstorming session was held on measures for domestic accidents. In order to assess at the end of the training, the card game method was used by distributing cards that had written questions and answers. Parents ' questions on the subject were answered. To increase the permanence of the training, brochures containing important points of the training were distributed, and then the training was finished. The training and the trainer participants were evaluated using the training evaluation form.

Data Analysis

The data were analyzed using percentile in SPSS-18 (Statistical Package For Social Sciences) package program, averages, standard deviation, Cronbach alpha coefficient calculation, t-test in independent groups, variance analysis, Pearson correlation, Kruskal Wallis test. The Kolmogorov-Smirnov normal distribution test was performed to determine whether the diagnostic levels of security measures showed normal distribution.

Ethical Consideration

Before the research, ethics committee approval (19.10.2016/77), permission from the Special Education Center, and permission for using the scale were obtained from the research that developed the Diagnostic Scale Of Safety Measures For Domestic Accidents Before collecting data, a written and oral announcement was made by the special education center to the parents of students to participate in the training for 1 Week. On the day of the training, parents were informed about the training, and it was stated that participation was voluntarily, the consent form was read to those who wanted to participate in the research, and their permission was obtained. The parents were told that the information they provided would be kept confidential, not used anywhere else and that they had the right to leave the study at any time.

FINDINGS

Sociodemographic characteristics of parents and children participating in the study are included in Table 1.

Table 1. Distribution of sociodemographic characteristics of parents and children (N = 32)

Sociodemographic characteristics	n	%
Parental learning level		
Primary school	6	18.8
Secondary school	7	21.9
High school	13	**40.6**
College and above	6	18.8
Degree of Relation to the Child		
Mother	22	**68.8**
Father	10	31.2
Child's Health Problem		
Autism	6	18.8
Down Syndrome	6	18.8
Mental Retardation	10	**31.2**
Russell Silver	10	**31.2**
Age	**Average (SD)**	**Min-Max**
Age of the Parent	49.37+5.74	41-65
Child's Age	20.75+5.36	10-30

As shown in Table 1, 40.6% of parents are high school graduates, and 68.8% are mothers. 31.2% of children have Mental Retardation and Russel Silver Syndrome. The average age of parents is 49.37±5 years, and the average age of children is 20.75±5 years.

Table 2. Distribution of data on domestic accidents (N = 32)

Has your child ever experienced a domestic accident?	n	%
Yes	19	59.4
No	13	40.6
Type of domestic accident your child has experienced		
Burns	1	5.3
Piercing/ Sharp tool injuries	6	31.6
Poisoning	12	63.1
Have you been trained in domestic accidents before?		
Yes	23	71.9
No	9	28.1
What sources of information did you use on domestic accidents*		
Internet	5	21.7
Book	10	43.5
Brochure	8	34.8
** Multiple answers were given.*		

59.4% of parents stated that their child had experienced a domestic accident before. Poisonings are in the first place in domestic accidents with 63.2%. 71.9% of parents said they had received education about domestic accidents, and 43.5% said they had inquired about domestic accidents from books. The findings of the 1st hypothesis of the study (there will be a difference between the scale scores of parents on safety measures for home accidents before and one month after training) are included in Table 3.

Table 3. Comparison of parents' MFDA scores before and after the training

	Pre-training		One month after training		t	p
	Average	SD	Average	SD		
MFDA	157,28	7.21	185.65	3.72	-20.69	0.00

There is a significant difference between the parents' average scores of safety measures scale before training and one month after training (t=-20.69; p=0.000). Parents' scores are higher after one month of training.

There was no significant difference between parents' MFDA scores one month after the training and their child having a domestic accident before the training (t=1.86 p=0.07), their child having a domestic accident after the training(t=-0.75 p=0.26), and making changes to prevent domestic accidents at home(t=-1,09 p=0.28). There is no statistically significant difference between the parent's age, level of education, child's illness, relation to the child (being a mother or father), knowledge of domestic accidents, and MFDA scores before and one month after the training (p>0.05).

Conclusions on the 2nd hypothesis of the research (the frequency of domestic accidents in children of parents trained to prevent domestic accidents will decrease in one month after the training) and the 3rd hypothesis (parents trained to prevent domestic accidents will take more safety measures for domestic accidents in their homes than before the training) are included in Table 4. There is no significant difference between the child's previous domestic accident experiences and his / her accident experiences after the training (p>0.05). There is no significant difference between the child having domestic accidents and making changes at home one month after training (p>0.05).

Table 4. Comparing having had domestic accidents previously and having domestic accidents after training and making changes at home

Previous domestic accidents	Having domestic accidents one month after training		
	Yes n (%)	No n (%)	x^2/ p
Yes	5 (71.4)	14 (56)	x^2=0.54 p = 0.38
No	2 (28.6)	11(44)	
Previous domestic accidents	**Making changes at home one month after the training**		
	Yes n (%)	No n (%)	x^2/ p
Yes	11(68.8)	8 (50)	x^2=1.16 p=0.23
No	5 (31.2)	8 (50)	

When Table 5 is examined; There was no statistically significant difference between the parents' knowledge about their child's disease, closeness to the child, education level, home accidents, and the ICSI scores before and 1 month after the education (p>0.05). There was no significant relationship between parental age and MFDA scores (p>0.05). There was a weak positive correlation between the age of the child and the MFDA score before education (r=0.38 p=0.03). As the child's age increases, the MFDA score increases.

Table 5. Comparison of sociodemographic and home accidents-related characteristics and MFDA scores

	N	MFDA Before training		MFDA one month after training	
Child's Health Problem		**Average**	**SD**	**Average**	**SD**
Autism	6	154	10,37	185,33	2,65
Down Syndrome	6	156,6	4,41	184,5	3,67
Mental Retardation	10	157,8	7,46	185,7	4,73
Russell Silver	10	159,1	6,45	186,5	3,47
	F= 0,63 p=0,60			F= 0,35 p=0,78	
Degree of Relation to the Child		**Average**	**SD**	**Average**	**SD**
Mother	22	154,63	6,57	185,63	4,042
Father	10	163,1	4,88	185,7	3,093
	t= -0,04 p=0,96			t= -0,25 p=0,80	
Parental learning level		**Average**	**SD**	**Average**	**SD**
Primary school	6	159	4,85	182,83	3,48
Secondary school	7	156,85	11,52	184,42	2,5
High school	13	158,38	5,91	186,76	3,49
College and above	6	153,66	5,78	187,5	4,23
	F= 0,70 p=0,55			F= 2,64 p=0,06	
Information about home accidents		**Average**	**SD**	**Average**	**SD**
Yes	23	158,30	6,94	185,6	3,62
No	9	154,66	7,64	185,77	4,17
	t= 1,29 p=0,20			t= -0,11 p=0,91	
Age of the Parent	r= 0,28 p= 0,11			r= -0,06 p= 0,71	
Age of the Child	r= 0,38* p= 0,03			r= -0,07 p= 0,67	

DISCUSSION

Mothers make up most of the parents involved in the study that evaluated the impact of the training given to parents on domestic accidents, and about half of them are high school graduates. The average age of the parents is about 50 years. The fact that participants are willing to participate in research and training suggests that they care about this issue.

Domestic accidents sometimes occur due to the recklessness of families and sometimes due to environmental reasons. Determining the frequency of domestic accidents helps to take protective measures to prevent accidents (11). In our research, it was found that 59.4% of the mentally disabled children had previously had a domestic accident, which is quite high. Mentally disabled children have late motor development, difficulty using information, and memory retention, making them risky in domestic accidents. The findings have been discussed with research on healthy children, as research on home accidents with mentally disabled children could not be found. Studies conducted with healthy children in the 0-6 age group (12-17), 1 - 6 age group (18), and children aged 0-5 years (20), indicate that there are fewer domestic accidents. The frequency of domestic accidents of children aged 0-5 years was 65.6% in only one study (20). Our research finding suggests that mentally disabled children are risk of domestic accidents. The fact that these children have a high frequency of domestic accidents indicates that parents should be more careful about this and shows the importance of training done to prevent domestic accidents.

The research found that domestic accidents suffered by children were poisoning, piercing-sharp tool injuries, and burning, respectively. Mentally disabled children are more likely to have a domestic accident of poisoning, which leads to the impression that parents do not take adequate measures to store medications or cleaning agents. In the same way, leaving piercing-sharp tools such as scissors, knives out in the open can cause injuries to mentally disabled children.

Such accidents can be reduced by taking the necessary precautions. In studies, it is stated that the most common household accident in children aged 0-6 years (12-17), is falling and falling and burning in children and adolescents aged 6-18 years (10). It is believed that falls are seen more frequently in research may be related to the characteristics of the 0-6 age group. The fact that mentally disabled children were less present in playgrounds than healthy children and spent more time at home may have made a difference in the type of accidents.

Most of the parents involved in the study stated that they had previously received training on domestic accidents and used books, the internet, and brochures. It is worth noting that although families are sensitive about this issue, they did not receive training from health professionals on domestic accidents. A study conducted with healthy children aged 0-6 showed that 6.4% of participants had previously received training for domestic accidents (12). In studies conducted with healthy children aged 1 to 4, 35.4% of mothers depended on their own experiences in preventing domestic accidents (21), 30% of families received information from various relatives, 24% from the media, and 17% from other people who had accidents (22). In the literature, family members and the media are the most frequently mentioned sources of information about child safety (23). Ablewhite et al. (2015) noted that mothers prefer to learn about home security measures from other parents rather than professionals (9). In other studies conducted, the insufficiency in families obtaining information from health professionals is also noted (10, 21). Based on our research finding and considering the accident rates, it can be said that parents of children with mental disabilities should be provided with more support and education by health professionals. In the study, the training provided to raise awareness of the prevention of domestic accidents was evaluated by parents, and it gave the impression that they were satisfied with the training. It has been observed that during training, parents are interested, ask questions on things they want to know and participate in activities.

Parents' attitude scores on safety measures to protect the household from domestic accidents before and one month after training were compared in the study. Given that the scale's maximum score is 200 points, it is possible to say that parents ' scores before and after education are quite high. This finding shows the sensitivity of families on this issue. The significant difference between the scale scores before and one month after training indicates that the training increased parents' awareness of safety measures to protect the household from domestic accidents. As a result of this finding, our first hypothesis (*There will be a difference between the scores of parents trained to prevent domestic accidents safety measures for domestic accidents before training and one month after training.*) appears to have been confirmed. In a study conducted by Çapık and Gürol with healthy children of 0-6 years, it was noted that there was a difference between the MFDA score before and after the training (24). According to our results and research, it can be said that it is useful to conduct domestic accident protection training.

The study determined that there was no significant difference between the MFDA score of parents one month after the training and the fact that their child had a domestic accident before and after the training, and making changes to prevent domestic accidents at home. This finding means that parents' awareness of security measures. However, this attitude has not yet been reflected in their behaviors. The parent's age, the level of education, the type of illness that their child has, whether they are a mother or father, or whether they are informed about domestic accidents do not affect the attitude score either. Due to the small number of samples, it is not possible to generalize this finding, so it is considered a result specific to our sample group.

In the study, the 2nd hypothesis (*the frequency of domestic accidents in children of parents trained to prevent domestic accidents will decrease after the training*) was not confirmed due to lack of significant differences between the child's accident experiences before and after the training. Changing behavior is a difficult process that takes a long time. Consistent and long-term training, the use of one-to-one training methods, and monitoring the effects of training can be more useful in changing behavior. In health education, for people's behavior to turn into habits, it is important to constantly monitor people who attended the training (25). Touching bases with parents in a longer process is planned. Although parents expressed satisfaction with the training in the study, the fact that the training was conducted in the form of a single session and the inability to observe the home conditions of the families may have affected the permanence of the training.

As a result of the lack of significant difference between parents making changes to the home to prevent home accidents before and after the training, the 3rd hypothesis of the study (*Parents trained to prevent domestic accidents will take more safety measures for domestic accidents*

in their homes than before the training) was not verified. This finding is also related to hypothesis 2, the occurrence of domestic accidents cannot be prevented due to the inability to take adequate precautions for accidents. It can be said that the positive attitude of families towards domestic accidents is not enough to make changes in the home. In addition, the fact that even the parents of children who have had accidents can not make changes in the house suggests that this may be associated with different factors other than individual factors. In phone calls that were made to collect data after the training, parents also said they were unable to make some changes due to financial deficiencies. It can be said that families need economic support in this regard. If parents' socioeconomic status were better, we would expect them to take preventive actions against home accidents, such as installing railings on windows, putting rails in front of stove heaters, and relocating electrical outlets higher.In the research of Durduran and Bodur (26). Difficulties in caring for a disabled child are stated as economic problems, inability to devote enough time, stress, fear of the future, inability to be an active member of society, and economic burden.

Limitations Of the Study

Conducting the training in the form of a single session, the inability of participants to observe domestic accidents in a home environment, and the oral statements of parents about domestic accidents being the basis of the study were considered the study's limited aspects.

CONCLUSION

The research aims to evaluate the effectiveness of the education provided to raise awareness of domestic accidents' knowledge, attitudes, and behaviors of parents with mentally disabled children. It has been observed that parents are satisfied with the training and were interested when participating in the training. Parents were sensitive to domestic accidents, with high scores for diagnosing safety measures for domestic accidents. An assessment conducted before and a month after training showed that the attitude of parents increased in a positive direction, but the training did not make a significant difference in the behaviors that affect domestic accidents and taking precautions at home. The training was conducted in a single session in the study, and families could not be visited in home settings. In line with the results from the research, continuous and regular training by health professionals to protect families from domestic accidents, use of one-to-one training and interactive training methods, assessment of the environment in which children live, by making home visits, in terms of domestic accidents and planning of safety measures that can be taken together with the family, and to conduct qualitative studies on the subject are recommended.

DECLARATIONS

Funding

There is no person or institution supporting the study.

Conflicts of Interest/Competing Interests

There is no conflict of interest between the authors.

Ethics Approval

Ethical approval was obtained from Okan University Ethics Committee on 19.10.2016, number 19.10.2016/77.

Availability of Data and Material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Authors' Contributions:

Gülsüme SATIR: Idea, research, design, writing, revision. Sevim Ulupınar: Consulting, design, revision.

Acknowledgements

This study was produced from the author's thesis. The author wishes to thank thesis advisor Sevim ULUPINAR.

REFERENCES

1. Baysal SU and Birinci A. Childhood injuries and injury control. Turk J Pediatr. 2006;2(2), 64-79.
2. World Health Organization (WHO). Injury Surveillance Guidelines 2001. [Internet] [cited 2017 May 18]. Available from: http://www.who.int/violence_injury_prevention/index.htm
3. Peden M, Oyegbite K and Smith J. Child injuries in context. In World report on child injury prevention. World Health Organization, 2008.
4. Weintrub PS. Deaths from unintentional injury are declining among US children. Int J Pediatr Adolesc Med. 2012
5. Barcelos RS, Del-Ponte B and Santos, IS. Interventions to reduce accidents in childhood: a systematic review. An Pediatr (Barc). 2018;94(4):351-367.
6. Çalışkan B and Balcı S. Determining the risks of domestic accidents and the measures taken by using the picturing method. DEUHFED. 2018;11(2):137-146Aslan M, Şeker S. Social perception and exclusion towards people with disabilities. Social Rights International Symposium. 2011;449-463.
7. Morrongiello BA, Ondejko L and Littlejohn A. Understanding toddlers' in-home injuries: II. Examining parental strategies and their efficacy for managing child injury risk. J Pediatr Psychol. 2004; 29(6):433–46.
8. Çınar, N. Development of the diagnostic scale of safety measures in mothers for preventing domestic accidents in children aged 0-6 and the impact of the training given to mothers in preventing accidents in children (dissertation). İstanbul:Istanbul Univ. 1999.

9.Çapık C and Gürol A. The effect of education on mothers' ability to diagnose safety measures for domestic accidents. Caucasian Journal of Medical Sciences. 2014; 4(3):87-94.

10. Yıldırım N and Kublay G. Effectiveness of domestic accident prevention program for children aged 1-4. Journal of Hacettepe University Faculty of Nursing. 2016;3(2):1-13.

11. Şekerci E and İnal S. Assessment of the information level and practices of mothers of hospitalized 0-6 age group children on domestic accidents. HSP. 2006;(3):160-172.

12. Kurt FY and Aytekin A. Home accidents in 0-6 age group Children. JHSM. 2015; 2:22-32.

13. Büyük ET, Cavusoglu F and Teker,E. Diagnosis of safety measures for domestic accidents of mothers with children in the ages between zero and six. J Du Health Sci Inst. 2015; 5(3):17-22.

14. Karatepe TU and Akış N. Frequency of domestic accidents and related factors in children aged 0-6. Uludağ Üniv Tıp Fak Derg. 2014; 39(3) 165-16.

15. Özmen D, Ergin D, Şen N, et al. Diagnosis of safety measures for domestic accidents of mothers with 0-6 age group children. Sosyal Politika Çalışmaları Dergisi. 2007;9:13–20.

16. Köse Ö and Bakırcı N. Domestic accidents amongst children, Sted. 2007;16(3):31-35.

17. Alasya E. Determining the incidence of domestic accidents in children aged 1-6 and the practices of mothers on domestic accidents (dissertation). Kıbrıs:Yakın Dogu Univ. 2012.

18. Kamal NN. Home unintentional non-fatal injury among children under five years of age in a rural area, El Minia Governorate, Egypt. J community health. 2013;38(5):873-879.

19. Balibey M, Polat S, Ertem İ, et al. Factors leading to domestic accidents in childhood. Sted. 2011;20(3):90.

20. Kelishadi R, Qorbani M, Motlagh ME, et al. Frequency, causes, and places of unintentional injuries in a nationally representative sample of Iranian children and adolescents: the CASPIAN-IV study. Int J Prev Med. 2014; 5(10):1224.

21. Kayaalp L, Odabasi G, Dogangun B, et al. Assessment of accident occurrence and family characteristics in children and adolescents who experienced corrosive burns requiring endoscopic monitoring. Turk Arch Pediatr. 2006;38(4); 233-234.

22. Bennett Murphy LM. Adolescent mothers' beliefs about parenting and injury prevention: results of a focus group. J Pediatr Health Care. 2001;15:194-9.

23. Ablewhite J, Kendrick D, Watson M, et al. The other side of the story - maternal perceptions of safety advice and information: a qualitative approach. Child Care Health Dev. 2015;41:1106–13.

24. Fişek, N. Health Education. 2nd ed. Ankara: Hacettepe University Faculty of Medicine Public Health USA publication. 1989.65 p.

25. Bodur S and Durduran Y. Expected Benefit of health services for disabled children in Konya. General Medical Journal. 2009;19(4):169-175.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 287-294
https://doi.org/10.31067/acusaglik.1145205

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Identifying the Levels of COVID-19 Fear, Perceived Stress, and Psychological Resilience of the University Students Enrolled at the Health Programs

Fatma Tok Yıldız[1] , İlknur Yıldız[2]

[1]Vocational School of Health Care Services, Sivas Cumhuriyet University, Sivas, Turkey

[2]Nursing Department, Faculty of Health Sciences, Sivas Cumhuriyet University, Sivas, Turkey

ABSTRACT

Purpose: All people especially students are affected psychosocially due to reasons such as distance education, uncertainty, loneliness during the COVID-19 pandemic. This study was performed to identify the levels of COVID-19 fear, perceived stress, and psychological resilience of the university students studying at health programs.

Methods: A total of 518 students participated in this descriptive study. The research data were collected using the Descriptive Characteristics Form, the Fear of COVID-19 Scale, the Perceived Stress Scale-10, and the Brief Resilience Scale.

Results: The participant students had medium-level COVID-19 fear, perceived stress, and psychological resilience. It was found that the gender, having a family member who had COVID-19, and not having a family member who died of COVID-19 affected the participant students' levels of COVID-19 fear, perceived stress, and psychological resilience.

Conclusions: The COVID-19 pandemic affected the health professional candidates' fear, stress, and psychological resilience. The initiatives can be planned to reduce the negative effects of the pandemic and enhancing coping skills of university students studying in health programs.

Keywords: COVID-19, fear, stress, psychological resilience, student

Fatma TOK YILDIZ
İlknur YILDIZ

Sağlık Programlarında Okuyan Üniversite Öğrencilerinin Covid-19 Korkusu, Algılanan Stres ve Psikolojik Sağlamlık Düzeylerinin Belirlenmesi

ÖZET

Amaç: COVID-19 pandemisi sürecinde uzaktan eğitim, belirsizlik, yalnızlık gibi nedenlerle öğrenciler başta olmak üzere tüm insanlar psikososyal olarak etkilenmektedir. Bu çalışma, sağlık programlarında okuyan üniversite öğrencilerinin Covid-19 korkusu, algılanan stres ve psikolojik sağlamlık düzeylerini belirlemek amacıyla yapılmıştır.

Yöntem: Tanımlayıcı tipteki çalışmaya 518 öğrenci katılmıştır. Araştırma verileri Tanıtıcı Özellikler Formu, Covid-19 Korkusu Ölçeği, Algılanan Stres Ölçeği-10 (ASÖ-10) ve Kısa Psikolojik Sağlamlık Ölçeği (KPSÖ) kullanılarak toplanmıştır.

Bulgular: Öğrencilerin Covid-19 korkusu, algıladıkları stres ve psikolojik sağlamlıkları orta düzeydedir. Cinsiyet, ailesinde Covid-19 hastası olması ve Covid-19 nedeni ile ölüm olmamasının, Covid-19 korkusu, algıladıkları stres ve psikolojik sağlamlık düzeylerini etkilediği belirlenmiştir.

Sonuçlar: Covid-19 pandemisi, sağlık profesyoneli adaylarının korku, stres ve psikolojik sağlamlıklarını etkilemiştir. Sağlık programlarında okuyan öğrencilerde pandeminin negatif etkilerini azaltmaya ve baş etme becerilerini artırmaya yönelik girişimler planlanabilir.

Anahtar kelimeler: Covid-19, korku, stres, psikolojik sağlamlık, öğrenci

Correspondence: Fatma Tok Yıldız
Vocational School of Health Care Services, Sivas Cumhuriyet University, Sivas, Turkey
Phone: +903464871983
E-mail: fatmatok@yahoo.com

Received: 18 July 2022
Accepted: 22 February 2023

The COVID-19 disease that emerged in China in December 2019 took hold of the entire world in a short period of time, and, on 11 March 2020, it was declared that the disease turned to be a pandemic (1). Along with the identification of COVID-19 cases in Turkey, to prevent the pandemic from spreading, certain restrictions that affected daily life were implemented by taking several measures across the country. It was stated that the sudden change in life due to the pandemic and the measures taken alongside the pandemic caused the individuals and societies to have psychological problems such as fear, worry, and stress (2, 3). The feeling of fear experienced due to the pandemic had moderate and severe psychological effects on people (4- 7). The feeling of fear that emerges as a response to a real or perceived threat is one of the most prevalent consequences of the COVID-19 pandemic (8). It is considered that psychological resilience played a significant role in coping with this stressful process caused by the pandemic (3, 9). To control the spread of the pandemic, the distance education model was implemented instead of face-to-face instruction in Turkey as of 23 March 2020 (10). In this process, university students are faced with certain restrictions related to the change in their daily lives, distance education, academic delays, and social life (4, 11). In the relevant literature, it was identified that the university students felt fear, intolerance for uncertainty (12, 13), stress (14) anxiety (11), and loneliness (15) in association with the COVID-19 pandemic.

In Turkey, the vocational school of health services affiliated with the universities offers two-year associate programs in the field of health (16). To continue both forms of education during the process of the pandemic, theoretical courses and occupational practices were presented online in the spring and fall semesters of 2020. It is considered that the university students who were simultaneously faced with online education and pandemic for the first time could feel fear, stress, and anxiety and, in association with this situation, their psychological resilience would be undermined. It is predicted that the university students enrolled at the health programs can have these feelings more intensely as they are prospective health workers and their clinical practices are affected by the pandemic. Therefore, this study was performed for identifying the levels of COVID-19 fear, perceived stress, and psychological resilience of the university students enrolled at the health programs.

METHODS

Design

This research was designed as a descriptive study for identifying the levels of COVID-19 fear, perceived stress, and psychological resilience of the students enrolled at the Vocational School of Health Services of a University in Turkey.

Sampling and Participants

The population of this research was comprised of all students (n=3436) enrolled at the Vocational School of Health Services of a University in the fall semester of the academic year of 2019-2020. The research sample was made up of 518 students who attended the school via online education between 5 January 2021- 20 January 2021 and volunteered to take part in the research. The research sample was selected through the simple random sampling method that was a non-probability sampling technique. As a result of post-hoc analysis with G*Power (3.1.9.7 version), the power of the study was found to be 99% at 95% confidence interval. In this method, the researchers can easily perform the sample selection and the selected sample group is assumed to be ready for the application (17). This is the most preferred method in cases when the participation in the research is on a voluntary basis (18).

Measurements

The research data were collected by using the Descriptive Characteristics Form, the Fear of COVID-19 Scale, the Perceived Stress Scale-10, and the Brief Resilience Scale.

Descriptive Characteristics Form: In the form, there are questions about the participant students' descriptive characteristics (eight questions) and COVID-19 (three questions).

Fear of COVID-19 Scale (FCV-19S): The scale was developed by Ahorsu, et al (2020), and Satıcı, et al (19) adapted the scale to Turkish and performed the validity and reliability test for it. The scale items are scored through a 5-point Likert scale from one to five points (1- I absolutely disagree, 5- I absolutely agree). The scale has no reverse-scored item. The minimum and maximum scores to be obtained from the scale are respectively 7 and 35 points. A high score to be obtained from the scale indicates that the level of COVID-19 pandemic fear is 'high'. In the validity and reliability test performed for the scale in Turkish, the Cronbach alpha coefficient was found as 0.82. In this study, the Cronbach alpha coefficient was calculated as 0.80 for the scale.

Perceived Stress Scale-10 (PSS-10): The scale that was developed by Cohen, et al (20) and originally called 'Perceived Stress Scale' was adapted to Turkish by Eskin, et al (21) The scale has three different versions composed of 14, 10, and 4 items. In this study, the version composed of 10 items (PSS-10) was used, and the Cronbach alpha coefficient calculated for this version was 0.82. The scale was developed for measuring how unpredictable, uncontrollable, or overburdened the person perceived his/her life. It is a 5-point Likert-type scale (1- never, 2- almost never, 3-sometimes, 4- frequently, 5- very frequently), and its four items are reverse-scored (items 4, 5, 7, and 8) while its six items are straight-scored (items 1, 2, 3, 6, 9, and 10). The minimum and maximum scores to be obtained from the scale are successively 0 and 40 points. A high overall score to be obtained from the scale demonstrates that the respondent has high-level perceived stress (21). The Cronbach alpha coefficient was calculated as 0.77 for the scale under this study.

Brief Resilience Scale (BRS): The scale was developed by Smith, et al (22) for measuring the individuals' potential to pull themselves together and their psychological resilience levels. The validity and reliability test for the scale was performed in Turkish by Doğan (23). It is a self-report tool designed as a 5-point Likert-type scale composed of six items that are scored from one to five points (1- absolutely inappropriate, 5- absolutely appropriate). Items 2, 4, and 6 are reverse-scored under the scale. A high score to be obtained from the scale indicates that the respondent has high-level psychological resilience. In the study by Doğan (23), the Cronbach alpha coefficient was calculated as 0.83 for the scale. In the current study, Cronbach's α coefficient of the scale was calculated as 0.83, too.

Statistical Analysis

The data obtained from the research were evaluated through SPSS 22.0. In the statistical evaluation of the research data, numbers, percentages, and means were utilized. Whether the research data had normal distribution was analyzed through the Kolmogorov-Smirnov test. As the research data did not meet the parametric conditions, the Mann-Whitney U test was used for the two independent groups whilst the Kruskal-Wallis test was utilized for more than two independent groups. Spearman's correlation coefficient was used in the identification of the associations between the variables. Statistical significance was identified if the P-value was lower than 0.05 ($p<0.05$)

Ethical Approval

Before the research, the ethical endorsement was obtained from Research Ethics Committee of a University (Sivas Cumhuriyet University; Decision No:2020-12/04; Date:16.12.2020), and also the permission to conduct the research was received from the relevant institution. Subsequently, the online survey form and the survey link to be shared were created by the researchers through Google. This link was shared with the students by e-mail. The students expressed their consent to participate in the research via the online form. Information about the survey was also given in the introductory explanation in the online survey form.

RESULTS

The mean age of the participant students is 20.40±2.42 years (Min=18, Max=40), and 77.2% of them are female and 51% of them are first-year students. 62.0% of the participants live in the city. The participants' fathers of 58.9% and mothers of 71.0% are primary-secondary school graduates. Of all participant students, 79.7% have an internet connection at home, and 95.2% have a smartphone, computer, or tablet at home (Table 1). It was found that 'internet' was ranked by 79.5% of the participant students at the top among the sources of information about COVID-19 (Figure 1). It was ascertained that 24.9% of the participant students enrolled at the university-level health programs had a family member who had COVID-19 (Figure 2), and 6% of these individuals who had COVID-19 died (Figure 3).

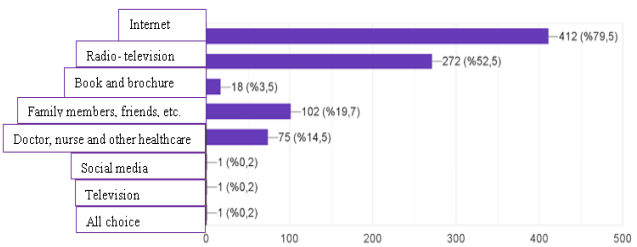

Figure 1. Distribution of students according to sources of information on Covid-19

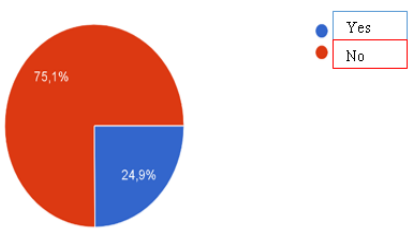

Figure 2. Distribution of students by family having Covid-19

Table 1. The descriptive characteristics of students' (n=518)	
Age Ẋ : 20.40±2.42 (Min=18, Max=40)	**n (%)**
Gender	
Female	400 (77.2)
Male	118(22.8)
Grade	
First-year students	254 (49.0)
Second-year students	264(51.0)
Where she/he lives	
City	321(62.0)
Town	123(23.7)
Village	74(14.3)
Father's educational status	
Illiterate	7 (1.4)
Literate with no formal degree	7 (1.4)
Primary-secondary school	305(58.9)
High school	138(26.6)
University	61 (11.8)
Mother's educational status	
Illiterate	46(8.9)
Literate with no formal degree	26(5.0)
Primary-secondary school	368(71.0)
High school	67(12.9)
University	11(2.1)
Having internet at home	
Yes	413(79.7)
No	105(20.3)
Having a smartphone, computer or tablet at home	
Yes	493(95.2)
No	25(4.8)

It was discerned that the participant students enrolled at the university-level health programs obtained medium-level mean scores from the FCV-19S, PSS-10, and the BRS (Table 2). It was identified that there were statistically significant differences in the means of participant students' FCV-19S, PSS-10, and BRS scores as per some of their descriptive characteristics. It was found that the female students had higher means of FCV-19S, PSS-10, and BRS scores than the male students and these differences were statistically significant ($p<0.05$). It was discerned that the participant students having a family member who had COVID-19 had a lower mean of FCV-19S scores than those having no family member who had COVID-19 and this difference was statistically significant ($p<0.05$). Moreover, It was identified that the participant students having no family member who died of COVID-19 had a higher mean of PSS-10 scores than those having a family member who died of COVID-19 and this difference was statistically significant ($p<0.05$) (Table 3).

Table 2. Mean Scores of Fear of COVID-19 Scale, Perceived Stress Scale-10 and Brief Resilience Scale				
		X±SD	**Min**	**Max**
Scales	**FCV-19S**	17.12±4.98	8	29
	PSS-10	23.48±6.31	0	40
	BRS	17.98±5.32	6	30

Abbreviations: FCV-19S, Fear of COVID-19; PSS-10, Perceived Stress Scale-10; BRS, Brief Resilience Scale

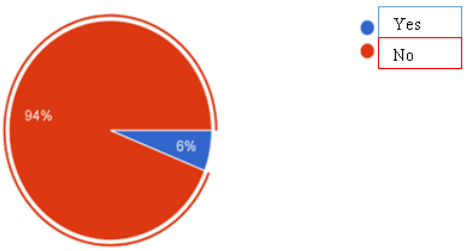

Figure 3. Distribution of students by death due to Covid-19 in the family

It was found that there was a highly statistically significant weak positive association between the means of the participant students' FCV-19S and PSS-10 scores ($p<0.001$). Also, there was a highly statistically significant weak negative association between the means of the participant students' FCV-19S and BRS scores ($p<0.001$). Moreover, there was a highly statistically significant medium-level negative association between the means of the participant students' PSS-10 and BRS scores ($p<0.001$) (Table 4).

Table 3. Comparison of Students' Introductory Features and Fear of COVID-19 Scale, Perceived Stress Scale-10, Brief Resilience Scale Average Scores (n=518)

Scales / Descriptive Characteristics	FCV-19S		PSS-10		BRS	
	Mean Rank	Test	Mean Rank	Test	Mean Rank	Test
Gender						
Woman	276.17	Z=16932.500 p=0.001	268.78	Z=19888.000 p=0.009	249.12	U=19449.000 p=0.004
Man	203.00		228.04		294.68	
Covid-19 status in the family						
Yes	218.60	Z=19814.500 p=0.001	273.28	Z=23313.500 p=0.227	283.27	Z=22024.000 p=0.37
No	273.06		254.93		251.62	
Death due to Covid-19 in the family						
Yes	212.16	Z=6081.000 p=0.069	314.60	Z=5840.500 p=0.034	262.58	Z=7453.000 p=0.906
No	262.51		255.99		259.30	

Abbreviations: Z, Mann Whitney-U; FCV-19S, Fear of COVID-19 Scale; PSS-10, Perceived Stress Scale-10; BRS, Brief Resilience Scale

Table 4. Fear of COVID-19 Scale, Perceived Stress Scale-10, Brief Resilience Scale Spearman Correlations Analysis Results

	FCV-19S	PSS-10	BRS
FCV-19S			
r	1000		
p	-		
PSS-10			
r	,264*	1000	
p	0.000	-	
BRS			
r	-,267*	-,459*	1000
p	0.000	0.000	-

Abbreviations: FCV-19S, Fear of COVID-19 Scale; PSS-10, Perceived Stress Scale-10; BRS, Brief Resilience Scale; r, Spearman's correlation analysis;
**p<0.001*

DISCUSSION

This study was performed for identifying the levels of COVID-19 fear, perceived stress, and psychological resilience of the university students enrolled at the health programs. The findings obtained under this study were discussed in light of the relevant literature. In this study, it was ascertained that 79.5% of the participant students acquired information about COVID-19 from the internet. In another study performed on the university students, it was found that 34.1% of the students referred to social media, TV, family, and acquaintances as the main source to get information about COVID-19 (13). Also, in the study conducted by Artan, et al (24) on the individuals aged 15-72 years, it is discerned that almost all participants obtained information about COVID-19 via the internet. To prevent the spread of COVID-19 across the world and in Turkey, restrictions are imposed in all areas. As well as the duration of their stay at home, these restrictions increase the use of the internet by almost all age groups. In this regard, it is an expected outcome that the students that took part in this current study obtained information about COVID-19 from the internet.

One of the psychological effects of the COVID-19 pandemic is fear. The psychological problems (2-3, 7) and the fear experienced alongside COVID-19 can be more harmful than its fast spread from human to human (8, 25). In this current study, the participant students had medium-level fear of COVID-19. In the study performed by Duman (12) on the university students, it was identified that the students had medium-level fear of COVID-19. Likewise, as per a study carried out in Turkey on the individuals aged 18-65 years, the participants had medium-level fear of COVID-19 (26). On the other hand, in a study performed on the nursing students, it was ascertained that the students were afraid of being infected with COVID-19 and dying of it (13).

The students taking part in this current research had medium-level perceived stress that stemmed from COVID-19. Likewise, in the studies conducted on the nursing students and individuals, it was found that they had medium-level perceived stress associated with COVID-19 (14, 27-28). These results indicate that COVID-19 is a situation that creates stress in society (29).

The concept of psychological resilience was derived from the Latin verb 'resilire'. Resilient means to be flexible and elastic (30). In this current research, the participant students had medium-level psychological resilience. In different studies that analyzed the psychological resilience of individuals in Turkey during the COVID-19 pandemic, it was ascertained that the participants' psychological resilience was affected by the pandemic at different levels (24, 26, 31- 33). In this context, it can be asserted that the students included in this current study have the potential to pull themselves together during the COVID-19 pandemic.

In this current study, the female students had higher levels of COVID-19 fear than the male students did ($p<0.001$). In a study that was performed on the students, it was found that the women had higher levels of COVID-19 fear than the men did (34). Also, in the study by Memiş Doğan and Düzel (35), the men had higher levels of COVID-19 fear than the women did. In light of these results, it can be put forward that the female students taking part in this current study feared COVID-19 more than the male participant students.

It was identified that the female students had higher perceived stress levels than the male students did ($p<0.05$) in this study. As per the studies performed on the nursing students during the COVID-19 pandemic, the female students had higher perceived stress levels than the male students did (14, 27). All these results demonstrate that COVID-19 gave rise to stress in society at varying degrees.

In this current study, it is discerned that the male students had higher levels of psychological resilience than the female participants did ($p<0.05$). Likewise, in the studies by Artan, et al (24), Kımter (2), Kul, et al (36), Yazıcı Çelebi (37) those were identified that the men had higher psychological resilience levels than the women did and this difference was statistically significant. It can be stated that this situation is associated with the fact that the women address the issues not with a result-oriented but a process-oriented approach and are also more emotional. In light of the research results asserting that the men are more optimistic, optimism is also acknowledged as a component of psychological resilience

Due to COVID-19 and the process of the pandemic, psychological issues such as worry, fear, anxiety, and stress were observed in people at different levels (38). According to the study by Cao, et al (11), the students who had a kinsperson who was infected with COVID-19 had statistically significant higher anxiety levels. Unlike the relevant literature, in this current study, it was identified that having a family member who had COVID-19 reduced the participant students' levels of COVID-19 fear. This result can be associated with the likelihood that the students having a family member who had COVID-19 would get over the disease process more easily.

It is discerned that having no family member who died of COVID-19 reduced the stress levels of the students enrolled at the university-level health programs. COVID-19 gives rise to different psychological effects on individuals. The presence of death is also a crucial factor that amplifies these effects (39). In this current study, it is perceived as an expected result that having no family member who died of COVID-19 lowers the participant students' stress levels.

FCV-19S, PSS-10, and BRS were used in several studies in the process of the pandemic, however, no study in which all these three measurement tools were used simultaneously was found in the relevant literature. According to this current study, there was a weak positive association between the participant students' fear of COVID-19 and perceived stress. It was also identified that there was a weak negative association between the participant students' fear of COVID-19 and psychological resilience. Likewise, in the study by Tutal and Efe (26), it was stated that there was a weak negative association between psychological resilience and the fear of COVID-19. Moreover, in this current study, it is discerned that there was a medium-level negative association between the participant students' perceived stress and psychological resilience. Similarly, in a study that analyzed the effect of the process of the pandemic on psychological resilience, it was ascertained that there was a medium-level negative association between psychological resilience and stress (9). In light of these results, it is considered that exploring the associations between the three measurement tools used in this current study will contribute to the relevant literature.

CONCLUSION AND RECOMMENDATIONS

The participant students have medium-level COVID-19 fear, perceived stress, and psychological resilience. As per this study, the female participant students have higher levels of COVID-19 fear and perceived stress than the male participant students do. Besides, it is discerned that the male participant students had higher levels of psychological resilience than the female participant students did. It was ascertained that the participant students having a family member who had COVID-19 had lower levels of

COVID-19 fear. Moreover, the students having no family member who died of COVID-19 had lower stress levels. In light of these results, under current circumstances, online panels about the effects of the pandemic and coping with the pandemic can be organized for the students enrolled at the health programs. In the long-run, policies with a lasting impact can be created by developing curricula aimed at the effects of the pandemic.

DECLARATIONS

Funding

Authors did not receive grant from any funding acency for the study.

Conflict of Interest

The authors declare that there is no conflict of interests.

Ethical Approval

The approval and permission (Sivas Cumhuriyet University; Decision No: 2020-12/04; Date: 16.12.2020) of the subjects, who participated in the study, were obtained prior to the initiation of our studies, as indicated in the manuscript itself. Our study does not violate the policies and/or procedures established by journal.

Author Contributions

Author Contributions: Concept – F.T.Y., I.Y.; Design – F.T.Y., I.Y.; Supervision –F.T.Y., I.Y.; Resources –F.T.Y.; Analysis and/or Interpretation –F.T.Y., I.Y.; Literature Search –F.T.Y.; Writing Manuscript – F.T.Y.; Review and editing- F.T.Y.; Critical Review – F.T.Y., I.Y

REFERENCES

1. WHO. Coronavirus disease (COVID-19) pandemic. (2021). (https://www.who.int/emergencies/diseases/novel-coronavirus-2019). Access date 29 January 2021.
2. Kımter N. Examining the Psychological Resilience Levels of Individuals in the Days of Covid-19 in Terms of Some Variables. IBAD Journal of Social Sciences (Special Issue). 2020; 574-605. (Doi: 10.21733/ibad.805481).
3. Kluge HP. Statement-physical and mental health key to resilience during COVID-19 pandemic. World Health Organization. 2020. (https://www.euro.who.int/en/media-centre/sections/statements/2020/statement-physical-and-mental-health-key-to-resilience-during-covid-19-pandemic). Access date 29 January 2021.
4. Bekaroğlu E, Yılmaz T. COVID-19 and psychological effects: A review in clinical psychology perspective. Nesne. 2020; 8(18): 573-584. (Doi: 10.7816/nesne-08-18-14).
5. Li S, Wang Y, Xue J, et al. The impact of COVID-19 epidemic declaration on psychological consequences: A study on active Weibo users. International Journal of Environmental Research and Public Health. 2020; 17(6):2032. (Doi: 10.3390/ijerph17062032).
6. Shigemura J, Ursano RJ, Morganstein JC, et al. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. Psychiatry and Clinical Neurosciences. 2020; 74(4): 281-282. (Doi:10.1111/pcn.12988).
7. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. International Journal of Environmental Research and Public Health. 2020; 17(5): 1729. (Doi: 10.3390/ijerph17051729).
8. Pakpour AH, Griffiths MD. The fear of COVID-19 and its role in preventive behaviors. Journal of Concurrent Disorders. 2020; 2(1): 58-63.
9. Bozdağ F. Psychological Resilience during Pandemic. Turkish Studies. 2020; 15(6): 247-257. (Doi: 10.7827/TurkishStudies.44890).
10. YÖK.COVID-19 Information. 2021. (https://covid19.yok.gov.tr/AnaSayfa) Access date 29 January 2021.
11. Cao W, Fang Z, Hou G, et al. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Research. 2020; 287: 112934. (Doi: 10.1016/j.psychres.2020.112934).
12. Duman N. Covid-19 fear and intolerance to uncertainty in university students. The Journal of Social Science. 2020; 4(8): 426-437. (Doi: 10.30520/tjsosci.748404).
13. Elsharkawy NB, Abdelaziz EM. Levels of fear and uncertainty regarding the spread of coronavirus disease (COVID-19) among university students. Perspectives in Psychiatric Care. 2020; 1-9. (Doi: 10.1111/ppc.12698).
14. Aslan H, Pekince H. Nursing students' views on the COVID-19 pandemic and their percieved stress levels. Perspectives in Psychiatric Care. 2020; 1-7. (Doi: 10.1111/ppc.12597).
15. Labrague LJ, De los Santos JAA, Falguera CC. Social and emotional loneliness among college students during the COVID-19 pandemic: The predictive role of coping behaviors, social support, and personal resilience. Perspectives in Psychiatric Care. 2021; 1–7. (Doi: 10.1111/ppc.12721).
16. Terzi D, Akalın R, Erdal B. The Effect of Covid-19 outbreak on education of health science students: Example of Tekirdağ Namik Kemal University Health Services Vocational. Namık Kemal Tıp Dergisi. 2020; 8(3): 279-287. (Doi:10.37696/nkmj.751961).
17. Karasar N. Bilimsel Araştırma Yöntemi Kavramlar İlkeler Teknikler. Ankara, Nobel; 2018.
18. Kish L. Survey Sampling. London, John Wiley & Sons, Inc.; 1995.
19. Satıcı B, Gocet-Tekin E, Deniz ME, et al. Adaptation of the Fear of COVID-19 Scale: Its association with psychological distress and life satisfaction in Turkey. International Journal of Mental Health and Addiction. 2020; 1-9. (Doi: 10.1007/s11469-020-00294-0).
20. Cohen S, Kamarck T, Mermelstein RA. Global measure of perceived stress. Journal of Health and Social Behavior. 1983; 24(4): 385–396. (Doi: 10.2307/2136404).
21. Eskin M, Harlak H, Demirkıran F, et al. The adaptation of the perceived stress scale Into Turkish: a reliability and validity analysis. New/Yeni Symposium Journal. 2013; 51(3): 132-140.
22. Smith B, Dalen J, Wiggins K, et al. The brief resilience scale: Assessing the ability to bounce back. International Journal of Behavioral Medicine. 2008; 15(3): 194–200. (Doi: 10.1080/10705500802222972).
23. Doğan T. Adaptation of the Brief Resilience Scale into Turkish: A validity and reliability study. The Journal of Happiness & Well-Being. 2015; 3(1): 93-102.
24. Artan T, Atak I, Karaman M, et al. Relationship between sociodemographic characteristics, psychological resilience and anxiety levels in the Coronavirus (COVID-19) outbreak. Turkish Studies. 2020; 15(6): 79-94. (Doi:10.7827/TurkishStudies.43882).

25. Özdin S, Bayrak-Özdin Ş. Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: the importance of gender. International Journal of Social Psychiatry. 2020; 66(5): 504-511. (Doi: 10.1177/0020764020927051).

26. Tutal V, Efe M. Examining individuals psychological resilience and Covid-19 fears according to various variables. The Journal of International Social Research. 2020; 13(74): 318-325.

27. Ersin F, Kartal M. The determination of the perceived stress levels and health-protective behaviors of nursing students during the COVID-19 pandemic. Perspectives in Psychiatric Care. 2020; 1-7. (Doi: 10.1111/ppc.12636).

28. Göksu Ö, Kumcağız H. Perceived stress level and anxiety levels in individuals in Covid-19 outbreak. Turkish Studies. 2020; 15(4): 463-479.

29. Buheji M, Jahrami H, Dhahi AS. Minimising stress exposure during pandemics similar to COVID-19. International Journal of Psychology and Behavioral Sciences. 2020; 10(1): 9-16. (Doi:10.5923/j.ijpbs.20201001.02).

30. Masten AS, Gewirtz AH, Sapienza JK. Resilience in Development: The Importance of Early Childhood. In: Tremblay RE, Boivin M, Peters RDeV, eds. Masten AS, topic ed. Encyclopedia on Early Childhood Development. 2013. (http://www.child-encyclopedia.com/resilience/according-experts/resilience-development-importance early-childhood). Access date 27 2021.

31. Bilge Y, Bilge Y. Investigation of the effects of corona virus pandemic and social isolation on psychological symptoms in terms of psychological resilience and coping styles (tur). The Journal of Clinical Psychiatry. 2020; 23(1): 38-51. (Doi: 10.5505/kpd.2020.66934).

32. Kasapoğlu F. Examination of the relationship between anxiety with spirituality, resilience and intolerance of uncertainty in the COVID-19 outbreak process. Turkish Studies. 2020; 15(4): 599-614.

33. Kılınç T, Sis Çelik A. Relationship between the Social Support and Psychological Resilience Levels Perceived by Nurses during the COVID-19 Pandemic: A Study from Turkey. Perspectives in Psychiatric Care. 2020; 1-9. (Doi: 10.1111/ppc.12648).

34. Tekin Atay Ü, Dinçer NN, Uçan Yarkaç F, et al. Evaluation of Fear and Anxiety Levels of Postgraduate Students in Dentistry During Covid-19 Pandemic. Necmettin Erbakan University Dental Journal. 2020; 2(3): 86-93. (Doi: 10.51122/neudentj.2020.1.).

35. Memiş Doğan M, Düzel B. Fear-Anxiety Levels in Covid-19. Turkish Studies. 2020; 15(4): 739 752.

36. Kul A, Demir R, Katmer AN. Meaning of life and anxiety as predictors of psycholological resilience during the Covid-19 epidemic. Turkish Studies. 2020; 15(6): 695-719.

37. Yazıcı Çelebi G. Investigation of reactions to the Covid-19 outbreak in terms of psychological resilience. IBAD Journal of Social Sciences. 2020; 8: 471-483. (Doi:10.21733/ibad.737406).

38. Ahorsu DK, Lin CY, Imani V, et al. The Fear of COVID-19 Scale: Development and Initial Validation. International Journal of Mental Health and Addiction. 2020; 27: 1-9. (Doi: 10.1007/s11469-020-00270-8).

39. Yıldırım M, Güler A. Positivity explains how COVID-19 perceived risk increases death distress and reduces happiness. Personality and Individual Differences. 2021; 168: 110347. (Doi:10.1016/j.paid.2020.110347).

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 295-303
https://doi.org/10.31067/acusaglik.1098447

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Evaluation of Kinesiophobia and Fatigue Levels of Patients Who Have Undergone Open Heart Surgery

Demet Bal[1], **Dilek Çilingir**[1]

[1]Karadeniz Technical University Health Sciences Faculty, Trabzon, Turkey

ABSTRACT

Purpose: This study aimed to determine the kinesiophobia and fatigue levels of patients who underwent open heart surgery.

Methods: The study was conducted with 176 patients who underwent traditional open heart surgery in the cardiovascular surgery clinic of a hospital located in Trabzon, Turkey. The data were gathered using a personal information form, the Tampa Kinesiophobia Scale, and the Piper Fatigue Scale.

Result: It was determined that patients had high levels of kinesiophobia and moderate levels of fatigue. A statistically meaningful difference was found between mean total Tampa Kinesiophobia Scale scores and age and employment status and between the mean total Piper Fatigue Scale scores and subscale scores of patients according to gender, body mass index, and employment status. There was a statistically significant positive and moderate correlation between patients' Tampa Kinesiophobia Scale scores and the behavioral, affectivity, and sensory subscales and total score of the Piper Fatigue Scale while there was significant, positive, and weak correlation with the cognitive subscale of the Piper Fatigue Scale.

Conclusion: Considering the kinesiophobia and fatigue levels of patients undergoing open heart surgery in the nursing care process before and after surgery may be useful for the performance of physical activities that will contribute to recovery.

Keywords: Cardiovascular surgery, care, fatigue, kinesiophobia.

Demet BAL
Dilek ÇİLİNGİR

Açık Kalp Ameliyatı Geçiren Hastalarda Kinezyofobi ve Yorgunluk Düzeylerinin Değerlendirilmesi

ÖZET

TÜRKÇE ANAHTAR SÖZCÜKLER EKLEYİNİZ. Amaç: Bu çalışmada açık kalp ameliyatı geçiren hastaların kinezyofobi ve yorgunluk düzeylerinin belirlenmesi amaçlanmıştır.

Yöntemler: Çalışma Türkiye'de Trabzon ilinde bulunan bir hastanenin kalp ve damar cerrahisi kliniğinde geleneksel açık kalp ameliyatı geçirmiş 176 hasta ile gerçekleştirildi. Veriler Kişisel Bilgi Formu, Tampa Kinezyofobi Ölçeği ve Piper Yorgunluk Ölçeği kullanılarak toplandı.

Bulgular: Hastaların yüksek düzeyde kinezyofobi ve orta düzeyde yorgunluğa sahip olduğu tespit edildi. Hastaların toplam Tampa Kinezyofobi Ölçeği puan ortalamaları ile yaş ve çalışma durumu arasında, toplam Piper Yorgunluk Ölçeği puan ortalamaları ve alt boyut puan ortalamaları ile cinsiyet, beden kitle indeksi ve çalışma durumu arasında istatistiksel olarak anlamlı fark bulundu. Hastaların Tampa Kinezyofobi Ölçeği puanlarının Piper Yorgunluk Ölçeği'nin davranışsal, duygulanım, duysal alt maddeleri ve toplam puanı ile istatistiksel olarak anlamlı, pozitif yönde ve orta düzeyde korelasyona sahip olduğu ve Piper Yorgunluk Ölçeği'nin bilişsel alt maddesi ile Tampa Kinezyofobi Ölçeği puanı arasında ise istatistiksel olarak anlamlı, pozitif yönde ve zayıf düzeyde korelasyon olduğu bulundu.

Sonuç: Açık kalp ameliyatı geçiren hastaların kinezyofobi ve yorgunluk düzeylerinin ameliyat öncesi ve sonrası dönemde hemşirelik bakım sürecine dahil edilmesi, hastaların iyileşmesine katkı sağlayacak fiziksel aktiviteleri gerçekleştirmesinde faydalı olabilir.

Anahtar Sözcükler: Kardiyovasküler cerrahi, bakım, yorgunluk, kinezyofobi.

Correspondence: Demet Bal
Karadeniz Technical University Health Sciences Faculty, Trabzon, Turkey
Phone: +904622300476
E-mail: demetk@windowslive.com

Received: 05 April 2022
Accepted: 29 December 2022

According to the World Health Organization, cardiovascular diseases are the leading cause of death globally. It is estimated that, in 2019, there were 17.9 million deaths from cardiovascular diseases, representing 32% of all global deaths (1). In Turkey, cardiovascular diseases ranked first among all causes of death at a rate of 39.1% in 2019. Treating cardiovascular diseases, which account for a large percentage of global deaths, is important in reducing mortality rates (2).

The treatment of cardiovascular diseases entails lifestyle changes, pharmacological methods, angioplasty and stent applications, and surgical procedures. Surgical procedures include minimally invasive techniques with fewer incisions to reach the heart and traditional methods such as open heart surgery (3). Open heart surgeries are preferred in the treatment of coronary artery disease (CAD), valve diseases, and congenital heart diseases and in heart transplantation. While performing traditional open heart surgery, the extracorporeal circulation technique fulfills the functions of the heart and lungs temporarily outside the body during the surgery. In this way, the heart can be easily treated in a bloodless environment while at rest (4). Open heart surgeries can cause complications in the postoperative period as well as having life-saving features. Low cardiac output syndrome, postoperative bleeding and arrhythmia, respiratory dysfunction, postoperative renal dysfunction, cardiac tamponade, sternum infections, cerebrovascular events, anxiety, and depression are observed in the early postoperative period (5). During open heart surgery, the tissues and nerves in the chest are damaged due to the opening of the sternum and this can cause serious problems after surgery. On the other hand, coronary artery bypass graft (CABG) surgeries may cause leg pain after surgery due to vein grafts taken from the legs in addition to the sternum. In the postoperative period, the patient's chest tube, endotracheal aspiration, and exposure to interventions such as intubation increase the patient's pain level while reducing the power of the individual to cope with the problems (6). After open heart surgery, especially when pain is present, the patient shows behaviors of avoiding necessary activities. The avoidance phenomenon that develops in the context of cognitive-behavioral fear of pain is called kinesiophobia (7). For the incision area to heal, the patient needs to protect the wound area after surgery from the external environment and avoid sudden movements that may cause additional trauma. Patients who experience unpleasant sensations such as pain and who fear damage to the wound area, even while doing activities that they know are beneficial, may restrict their movements involuntarily due to the worry of making a wrong move. Due to kinesiophobia, the patient cannot properly perform activities such as respiration and coughing after surgery and this affects the recovery process negatively (8).

One of the most common situations after open heart surgery is fatigue. Determining the perceived fatigue by the patient is important for effective management of fatigue in the postoperative period. Although the term "fatigue" is generally used to mean perceived fatigue in the literature, perceived fatigue is in fact a subjective dimension of fatigue. Perceived fatigue, which is a subjective feeling that can be evaluated using scales based on the individual's self-report, is divided into physical fatigue and mental fatigue (9). Physical fatigue is the need for rest that occurs in order to ensure the excretion of lactic acid accumulated as a result of the movement of the muscles and oxygenation of the tissues (10). It is expressed as situations such as "feeling the strength of the muscles decreasing," "feeling weak," and "feeling weak and heavy." It is felt throughout the body and can also be expressed as general fatigue. On the other hand, mental fatigue is a subjective perception described by weakness, fatigue, and mood changes in the individual that greatly affects quality of life. Perceived fatigue is felt as a result of compulsive and prolonged cognitive activity and can cause impaired memory, decreased concentration, and emotional lability (11). Conditions related to surgical intervention such as immobility, decreased respiratory capacity, problems due to the effect of anesthesia, the use of analgesics and sedative drugs, infection, hunger, sleep changes, tissue damage, stress, and disease processes all cause fatigue after open heart surgery. Observing the fatigue symptoms of the patient during the postoperative period and investigating the patient's perception of fatigue is important in terms of the individual's participation in daily life activities and accelerating the recovery process (12).

It is important to evaluate kinesiophobia and fatigue and to support the patient with appropriate approaches during the process to aid in effective adaptation to the treatment after the surgery, improve the performance of physical activities, and contribute to the healing process. In this sense, the responsibility of the surgical nurse is to observe the symptoms of kinesiophobia and fatigue in patients who have undergone open heart surgery to ensure that patients maintain self-expression and to take a role in the nursing care with an appropriate therapeutic approach. Thus, the patient's fear of movement and fatigue level will be determined, the care of the patient will

be provided with a holistic approach, and the postoperative recovery process will be accelerated.

The aim of this study is to evaluate the levels of kinesiophobia and fatigue in patients who have undergone open heart surgery.

Research Questions

1. What is the level of kinesiophobia and fatigue of patients who underwent open heart surgery?

2. Is there a correlation between kinesiophobia and fatigue level?

MATERIALS and METHODS

Design

This study was a descriptive research.

Sample

The study was undertaken at a hospital in Trabzon between January 7 and September 4, 2019. The sample of the study comprised 176 patients who have undergone traditional open heart surgery - CABG and/or valve replacement - for the first time were recruited at the cardiovascular surgery clinic following their discharge from the intensive care unit. To determine the number of participants, power analysis was performed in the G Power program over the number of patients in one year (n=651). According to that analysis, at the 5% significance level with 0.5 effect size, the number of samples required to ensure that the strength of the study (1-β) be 0.95 was found to be at least 176 (13). In this context, 176 patients who met the admission criteria constituted the sample of the study.

The acceptance criteria for the study were as follows:

- Having open heart surgery for the first time
- Being aged ≥18 years old
- Be able to communicate verbally in Turkish language
- At least primary school graduate

The exclusion criteria were as follows:

- Having any additional disease that would affect movement after surgery
- Having hearing or speaking problems
- Having psychiatric illness or treatment

Data Collection

The data were gathered by the researcher. Patients were interviewed in the patient room in the cardiovascular surgery clinic at an appropriate time using the face-to-face interview technique within 1-7 days after transfer from the intensive care unit to cardiovascular surgery. The personal information form, TKS, and PFS were administered to the patients, respectively. Filling in the forms took about 20-30 minutes.

Data Collection Tools

The data were gathered using a personal information form, the Tampa Kinesiophobia Scale (TKS), and the Piper Fatigue Scale (PFS).

Personal Information Form: The personal information form was designed in two parts by the researcher in line with the relevant literature and observations, and it included a total of 20 questions. The first part of the form included nine questions that addressed patients' descriptive characteristics (age, sex, marital status, etc.). The second part of the form included eleven questions that addressed disease and surgery information (diagnosis, type of surgery performed, etc.).

Tampa Kinesiophobia Scale (TKS): The TKS is a scale developed by Miller, Kori, and Todd in 1991 to evaluate the fear of movement and reinjuries and avoidance behaviors associated with fear (14). Turkish validity and reliability tests of the scale were performed by Yılmaz et al. in 2011 (15). The scale consists of 17 questions. Likert scores ranging from 1 to 4 are used in the scale, where 1 = "strongly disagree," 2 = "disagree," 3 = "agree," and 4 = "fully agree." Total scores range between 17 and 68, and a high score indicates that the individual's kinesiophobia is high.

Piper Fatigue Scale (PFS): The PFS is a scale developed by Piper et al. in 1998 to evaluate fatigue subjectively (16). The scale consists of a total of 27 items. The behavioral subscale, which has four subjective dimensions of fatigue, consists of six items [2-7]; the affectivity subscale consists of five items [8-12]; the sensory subscale consists of five items [13-17]; and the cognitive subscale consists of six items [18-23]. Total and subscale fatigue scores are calculated with 22 specified items and five other items [1 and 24-27] are not included in the calculation. There are three open-ended questions about the cause of fatigue, methods that reduce fatigue, and developing symptoms.

Each item in the scale receives a value between 0 and 10 points. In order to calculate the total fatigue score, all points of the 22 items are summed and this sum is divided by the number of items, where 0 points indicates that there is no fatigue according to the average obtained score, 1-3 points indicate mild fatigue, 4-6 points medium fatigue, and 7-10 points severe fatigue. A higher score thus indicates that the perceived fatigue level is high.

Statistical Analysis

Data were analyzed using the software application program SPSS 22.0 for Windows. The study results were analyzed using percentages, means, standard deviations (SD), minimum and maximum values, the Mann-Whitney U test, Kruskal-Wallis variance analysis, and Spearman correlation analysis.

One-Sample Kolmogorov Smirnov test was performed to determine whether the TKS and PFS scores of the patients showed normal distribution. In independent groups, two groups with normal distribution were compared with the t-test and two groups that did not show normal distribution with the Mann-Whitney U test.

The comparison of three or more groups with a normal distribution using the Tukey-corrected Oneway ANOVA test and three or more groups with a non-normal distribution using the Kruskal-Wallis Analysis of Variance were made. Spearman Correlation test was applied to determine the relationship between kinesiophobia and fatigue. Data were evaluated at the 95% confidence interval, $p<0.05$, using percentile, standard deviation, minimum-maximum values, and mean.

Ethics

This study was approved by the Karadeniz Technical University Medical Faculty's Ethics Committee (Decision Date: 03/12/2018, Decision No: 24237859-759). Written informed consent was obtained from participants prior to data collection. They were also informed that participation was voluntary, and their confidentiality was assured.

RESULTS

It was determined that 59.1% of the patients were in the age range of 51-70 years, 65.3% were male, 81.8% were not employed, 40.9% had BMIs of 25.0-29.9 kg/m^2, 69.3% had a chronic disease, and 73.6% had received no education before the surgery. The total mean kinesiophobia score of the patients was 42.7±4.7, reflecting a high level, and the mean fatigue score was 5.3±1.5, which represents a moderate level.

The total mean scores of the TKS were statistically significant in terms of age (p=0.042), employment status (p=0.019), the presence of a chronic disease (p=0.026), and preoperative education (p=0.015). The age group of 30-50 years was found to have significantly lower scores than the age group of 51-70 and employed patients had significantly lower scores than the unemployed (Table 1).

Table 1. Mean total TKS scores of patients according to their some sociodemographic, disease and surgery characteristics (n=176)

Sociodemographic Characteristics		n(%)	$\dot{X}$±SD	Mean Rank	Statistical Analysis
Age	30-50	18 (10.2)	39.9±6.3	60.22	**p=0.042** χ^2=6.323
	51-70	104 (59.1)	43.0±4.3	92.71	
	≥71	54 (30.7)	43.0±4.5	89.82	
Employment Status	Employed	32 (18.2)	40.4±6.0	69.50	**p=0.019** Z=-2.338
	Nonemployed	144 (81.8)	43.2±4.2	92.72	
Presence of Chronic Illness	Yes*	122 (69.3)	43.3±4.4	94.18	**p=0.026** Z=-2.227
	No	54 (30.7)	41.4±5.0	75.68	
Preoperative Education	Yes**	46 (26.4)	41.2±4.7	72.12	**p=0.015** Z=-2.421
	No	128 (73.6)	43.0±4.6	93.03	

SD: Standart Deviation, χ^2: Kruskal Wallis Test, Z: Mann–Whitney U test, p<0.05
** Diabetes, hypertension.*
*** Surgery, mobilization, breathing-cough exercises, pain control, nutrition.*

There were statistically significant differences between the mean total PFS scores and subscale scores of the patients according to gender (p=0.0001), employment status (p=0.0001), BMI (p=0.016), presence of a chronic disease (p=0.003), and preoperative education status (p=0.0001). There was a statistically significant difference between the overweight (25.0-29.9 kg/m2) and obese (30-39.9 kg/m2) groups (p<0.05). It was found that the mean total and subscale scores of fatigue of the patients who were in the overweight group were significantly lower compared to the obese group. A statistically significant difference was found in the mean behavioral subdimension scores only for those receiving nutritional education before surgery (p=0.047) (Table 2 and Table 3).

Table 2. Mean total PFS and subscale scores of patients according to their some sociodemographic, disease and surgery characteristics (n=176)

Sociodemographic Characteristics		n (%)	PFS Subscales				Total Score Ẋ±SD
			Behavioral Ẋ±SD	Affectivity Ẋ±SD	Sensory Ẋ±SD	Cognitive Ẋ±SD	
Gender	Female	61 (34.7)	6.1±1.6	5.8±1.5	6.7±1.5	5.0±1.4	5.9±1.1
	Male	115 (65.3)	5.3±1.7	5.3±1.9	5.4±2.0	4.0±1.8	5.0±1.6
	Statistical analysis		**0.005** t=2.847	**0.031** t=2.178	**0.0001** Z=-3.772	**0.0001** t=3.769	**0.0001** t=4.217
Employment Status	Employed	32 (18.2)	4.7±1.9	4.9±2.2	4.6±2.3	3.7±1.6	4.4±1.7
	Nonemployed	144 (81.8)	5.8±1.6	5.6±1.7	6.1±1.8	4.5±1.7	5.5±1.4
	Statistical analysis		**0.003** Z=-2.982	0.093 t=-1.722	**0.001** Z=-3.472	**0.015** t=-2.449	**0.0001** t=-3.69
Body Mass Index	18.5-24.9 kg/m²	31 (17.6)	6.0±1.9	5.8±1.9	6.2±1.9	4.6±1.7	5.6±1.5
	25.0-29.9 kg/m²	72 (40.9)	5.3±1.7	5.0±1.8	5.3±2.0	4.0±1.6	4.9±1.5
	30-39.9 kg/m²	64 (36.4)	5.8±1.7	5.8±1.8	6.3±1.8	4.7±1.8	5.6±1.5
	≥40 kg/m²	9 (5.1)	5.6±1.6	5.1±0.7	5.5±1.5	3.9±1.3	5.0±0.8
	Statistical analysis		0.132 χ^2: =5.614	**0.048*** χ^2: =7.922	**0.022*** χ^2: =9.584	0.052 χ^2: =7.712	**0.016** F=3.527
Presence of Chronic Illness	Yes	122 (69.3)	5.8±1.7	5.5±1.7	6.2±1.8	4.6±1.7	5.5±1.4
	No	54 (30.7)	5.2±1.6	5.2±1.9	5.1±2.0	3.7±1.6	4.8±1.4
	Statistical analysis		0.061 t=1.885	0.325 t=0.986	**0.001** Z=-3.413	**0.002** t=3.198	**0.003** t=2.98
Preoperative Education	Yes	46 (26.4)	4.7±2.0	5.4±2.3	5.5±2.3	4.4±1.9	5.0±1.8
	No	128 (73.6)	5.9±1.5	5.5±1.6	6.0±1.8	4.3±1.6	5.4±1.3
	Statistical analysis		**0.0001** Z=-3.727	0.818 t=-0.231	0.325 Z=-0.984	0.738 t=0.336	0.146 t=-1.472

Z: Mann–Whitney U test, χ^2: Kruskal Wallis Test, t: Independent Samples t test, F: One Way ANOVA, p<0.05
** Statistically significant difference between overweight (25.0-29.9 kg/m²) and obese (30-39.9 kg/m²) group p<0.05*

Table 3. Mean rank scores of patients' PFS subscale according to their some sociodemographic, disease and surgery characteristics (n=176)

Sociodemographic Characteristics		PFS Subscales	Mean Rank
Gender	Female	Sensory	108.38
	Male		77.96
Employment Status	Employed	Behavioral	64,.22
	Nonemployed		93.90
	Employed	Sensory	60.23
	Nonemployed		94.78
Body Mass Index	18.5-24.9 kg/m²	Behavioral	101.94
	25.0-29.9 kg/m²		78,.47
	30-39.9 kg/m²		93.61
	≥40 kg/m²		86.11
	18.5-24.9 kg/m²	Affectivity	99.76
	25.0-29.9 kg/m²		76.93
	30-39.9 kg/m²		97.82
	≥40 kg/m²		76.00

Table 3. Mean rank scores of patients' PFS subscale according to their some sociodemographic, disease and surgery characteristics (n=176) (Continuation of Table 3)

Sociodemographic Characteristics		PFS Subscales	Mean Rank
Body Mass Index	18.5-24.9 kg/m²	Sensory	97.44
	25.0-29.9 kg/m²		75.85
	30-39.9 kg/m²		100.39
	≥40 kg/m²		74.39
	18.5-24.9 kg/m²	Cognitive	95.89
	25.0-29.9 kg/m²		77.36
	30-39.9 kg/m²		99.41
	≥40 kg/m²		74.56
Presence of Chronic Illness	Yes	Sensory	97.21
	No		68.81
Preoperative Education	Yes	Behavioral	63.77
	No		96.03
	Yes	Sensory	81.24
	No		89.75

PFS: Piper Fatigue Scale.

There was a statistically significant, positive, and moderate correlation between the TKS scores of the patients and the PFS behavioral, affectivity, and sensory subscales and total scores ($p<0.0001$) while there was a significant, positive, and weak correlation with the cognitive subscale of the PFS ($p<0.0001$) (Table 4).

DISCUSSION

In the literature, there are studies conducted to determine the levels of kinesiophobia and fatigue in different patient groups (7,12). Studies related to kinesiophobia are usually in the field of physical therapy and rehabilitation, while studies related to surgery address some fields such as orthopedics and neurosurgery. Although there are studies on kinesiophobia in coronary artery patients in the literature, there have not been any studies involving patients who have undergone open heart surgery. In this respect, our study is the first study with patients having had open heart surgery.

In our study, it was found that patients undergoing open heart surgery experienced a high level of kinesiophobia, and the level of kinesiophobia was affected by age, employment status, the presence of a chronic disease, and preoperative education. It was reported in previous studies that patients undergoing CABG had intense kinesiophobia and the treatment process was affected negatively by their decreased participation in physical activities (7,17). Accordingly, it is thought that kinesiophobia, which develops from the concern of causing more pain due to opening the incision area in patients who have undergone open heart surgery and making wrong movements during exercise, affects their physical activity levels negatively.

It was found the mean total kinesiophobia score of the patients who were in the age group of 30-50 years was significantly lower compared to the age group of 51-70; those who were ≥71 years old were found to have high levels of kinesiophobia, but there was no significant difference in the statistical evaluation. In a study conducted with older adults, it was stated that diseases such as cardiovascular and musculoskeletal diseases cause a decrease in the physical activity of patients over the age of 65 and this increases the level of kinesiophobia (18). In another study, it was stated that postoperative complications were more common in elderly patients who had CABG (19). It is thought the problems of the musculoskeletal and cardiovascular systems that develop due to aging and the changes in perception of health affect the patient's level of movement and beliefs.

It was determined that the mean total kinesiophobia score of the patients who were employed was lower than that of the unemployed and there was a statistically significant difference between them. Working individuals returning to work with awareness after recovery may be encouraged to perform more physical activities in the postoperative period. On the other hand, unlike the results of our study, another study reported that patients who underwent CABG were afraid of not being able to return to work after their sick leave during the postoperative recovery period, and this was related to their economic situations (20). When patients do not reach the level of mobility required by their jobs, anxieties about losing their jobs, not being able to financially manage, and not being able to support a family may increase the development of kinesiophobia.

Table 4. Relationship between patients' TKS and PFS scores

		TPS	PFS	Behavioral	Affectivity	Sensory	Cognitive
TPS	r	1	0.373*	0.320*	0.312*	0.379*	0.261*
	p		0.0001	0.0001	0.0001	0.0001	0.0001
PFS	r		1	0.820*	0.847*	0.823*	0.789*
	p			0.0001	0.0001	0.0001	0.0001
Behavioral	r			1	0.614*	0.609*	0.484*
	p				0.0001	0.0001	0.0001
Affectivity	r				1	0.655*	0.590*
	p					0.0001	0.0001
Sensory	r					1	0.518*
	p						0.0001
Cognitive	r						1
	p						

**Spearman Correlation, p<0.0001*
***Tampa Kinesiophobia Scale*
****Piper Fatigue Scale*

It was found that the mean total kinesiophobia score of the patients with chronic diseases was higher than that of those who had no chronic disease and there was a statistically significant difference between them. Kocjan stated that patients with hypertension had a high level of kinesiophobia (21). Patients having difficulties in the preoperative period due to the symptoms of chronic diseases may develop a fear of movement due to their belief that they will experience similar situations while performing physical activities in the postoperative period. In addition, chronic diseases such as hypertension and diabetes can affect system functions in the healing process and cause systemic complications.

It was determined that the mean total kinesiophobia score of the patients who received preoperative education was lower than that of those who did not receive such education and there was a statistically significant difference between them. Studies show that training before open heart surgery enables patients to cope with pain better in the postoperative period and positively affects the healing process (22). It can be thought that the education received in the preoperative period is effective in developing a positive approach toward postoperative kinesiophobia. Informing the patient about pain management, mobilization, nutrition, surgical intervention, breathing and cough exercises, and activities that are objectionable after the operation may provide better preparation for the operation and better adaptation in the postoperative period.

In our study, it was found there was moderate fatigue in patients undergoing open heart surgery, and this was influenced by gender, employment status, BMI, the presence of chronic diseases, and preoperative education. Similar to our study, individuals who underwent CABG surgery were reported to experience fatigue in the postoperative period (23,24). Patients who have undergone open heart surgery are exposed to equipment such as drains, mechanical ventilators, and intravascular catheters, as well as painful procedures related to treatment and maintenance applications; they have secondary incisions in the extremities in addition to the chest incision according to the type of surgery, and they have sleep and comfort problems due to avoiding certain lying/sitting positions to prevent the opening of the incision area. Finally, trying to perform activities such as walking, breathing, and coughing in this process may cause the patient to feel tired.

It was determined that the mean total and subscale scores of fatigue of men were lower compared to those of women and there was a statistically significant difference between them. Ekman and Ehrenberg reported that women stated that they were mostly involved in physical activity due to their active role in the care of the household in their studies on fatigue in women and men with chronic heart failure (25). In another study, it was stated that, unlike men, women have menstrual cycles and also have more than one responsibility, such as home and work life, making women feel more tired (26). Reasons such as the expectations of multiple roles (e.g., employee, spouse, and parent) and performing these roles successfully, frequent exposure to hormonal changes, problems with the muscular and bone system due to menopause, and feeling the effects of emotional stress as physical complaints can cause fatigue in women more frequently than men.

It was found that the mean total fatigue score of the employed patients undergoing open heart surgery was significantly lower than that of the unemployed. There was a statistically significant difference between the mean total fatigue score and the behavioral, sensory, and cognitive subscale scores in terms of working status. Studies showed that returning to work after surgery is related to the preoperative work. It is difficult for patients working in jobs that require physical strength (athletes, long-hour jobs, long-distance drivers, construction workers, etc.) to return to their previous work life in the postoperative period, while patients working in non-exhausting desk jobs can return to work earlier (27). On the other hand, working patients being physically active, the idea of regaining their previous work routine after recovery, and maintaining their lives and the expectation of earning a livelihood can make it easier to cope with fatigue.

It was found that the mean total and subscale scores of fatigue of the patients who were in the overweight group (25.0-29.9 kg/m^2) were significantly lower compared to the obese group (30-39.9 kg/m^2) and there was a statistically significant difference between the mean total score and the affectivity and sensory subscale scores of fatigue. Studies have shown that high BMI is associated with fatigue, and obesity affects the postoperative recovery process, leading to a prolonged hospital stay (28). Obesity can make it difficult to perform mobilization, walking, breathing, and cough exercises that need to be done regarding the healing process in the postoperative period by affecting the patient's physical performance.

It may be difficult for the patient to perform daily life activities due to delays in wound healing due to excessive adipose tissue. In addition, the dysfunctions caused by the fat accumulation in the vessels and organs in the future may affect the body oxygenation and performance, causing the individual to feel weak and tired.

In this study, it was found that the mean total fatigue score of the patients with chronic diseases was significantly higher than that of those without chronic disease. In terms of the presence of chronic disease, there was a statistically significant difference between the total scores of fatigue and sensory and cognitive subscale scores. In some studies in the literature, it was stated that fatigue is frequently experienced in individuals with chronic diseases and affects the maintenance of daily living activities (29). Chronic diseases such as hypertension and diabetes can cause symptoms such as deterioration in tissue oxygenation, deformation in the vascular structure, respiratory complications, and associated fatigue. Patients may try to restrict the activities that they perform in order to cope with fatigue because of long-term symptoms associated with chronic diseases that affect their daily lives.

In was determined, it was determined that the mean fatigue score of the patients who received preoperative education was significantly lower than the mean score of those who did not receive education, while there was a statistically significant difference only between behavioral subdimension mean scores. A statistically significant difference was found in the behavioral subdimension mean scores only for those receiving nutritional education before surgery. It was reported in the study of Robinson et al. that a significant decrease was found in the level of fatigue after surgery in the patient group with regulated nutrition (30). Preoperative fasting, hormonal changes caused by surgical stress, catabolism in tissues, and inappetence experienced in the postoperative period may affect the nutrition level of patients and cause fatigue. The patient's fatigue can be reduced by accelerating wound healing with proper nutrition, regular excretion, and reaching a sufficient energy level to perform physical activities. In addition, it is thought that patients who receive preoperative information about issues related to the surgery will adapt to the postoperative period and manage the healing process better by displaying a more informed approach to the tiring activities they encounter.

It was found there was a statistically significant, positive, and moderate correlation between the kinesiophobia scores of the patients and the behavioral, affectivity, and sensory subscales and total scores of fatigue. In addition, there was a statistically significant, positive, and weak correlation between the cognitive subscale of fatigue and kinesiophobia scores. Yümin et al. reported there was a significant relationship between kinesiophobia and fatigue in their study with patients with CAD and that fatigue caused kinesiophobia (7). Patients decreasing their physical activity levels due to fatigue may have their fear of movement be strengthened. A patient experiencing fatigue due to the operation process may be reluctant to act postoperatively due to previous negative physical activity experiences. Patients can show fear avoidance behaviors by further reinforcing their kinesiophobia in activities that they failed to complete due to fatigue.

CONCLUSIONS

In conclusion, patients who underwent open heart surgery had high levels of kinesiophobia and moderate levels of fatigue. A positive and moderate correlation was found between kinesiophobia and fatigue. The presence of kinesiophobia should be investigated by the primary responsible nurse before and after surgery in patients undergoing open heart surgery. The fear of movement of patients should be measured by the nurse using kinesophobia scales and patients should be educated about the recovery process in the preoperative period and their fears about physical activity should be eliminated.

Kinesiophobia should be reduced by determining the main problem causing it with a multidisciplinary approach using the appropriate cognitive behavioral therapy method and exercise supports. Since studies on kinesiophobia and fatigue in patients with open heart surgery are limited. However, further studies are needed in this field.

DECLARATIONS

Limitations

Since this study was undertaken in one hospital with patients who had undergone open heart surgery and who agreed to take part in the study, the results can only be generalized to the cardiovascular surgery clinics of the hospital where the study was performed. These findings may not be valid for all cardiovascular surgery patients.

Conflict of Interest

The authors have no conflicts of interest to disclose.

Funding

The research no supported by funding.

Ethical Approval

The study was approved by The Ethics Committee of Karadeniz Technical University School of Medicine (Number: 2018/275).

REFERENCES

1. World Health Organization. Cardiovascular diseases (CVDs), (2021). Retrieved from https://www.who.int/en/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds) Accessed 25 December 2022.
2. Public Health Institution of Turkey, (2021). Turkey heart and vascular diseases prevention and control program 2021-2026. Retrieved from https://hsgm.saglik.gov.tr/depo/birimler/kronik-hastaliklar-engelli-db/hastaliklar/kalpvedamar/kitap_ve_makale/KalpDamarEylemPlani_2021-2026.pdf Accessed 25 December 2022.
3. Dimeling G, Bakaeen L, Khatri J, Bakaeen FG. CABG: When, why, and how? Cleve Clin J Med. 2021;3;88(5):295-303.
4. Academy of Medical-Surgical Nurses. Scope and Standards of Medical-Surgical Nursing Practice (6th ed.). Pitman, NJ. 2018.
5. Mavili I, Sahutoğlu C, Pestilci Z, Kocabas S, Askar F. Etiological factors concerning the early complications that occur following coronary artery bypass graft surgery. Journal of Society of Throracic Cardiovascular Anaesthesia and Intensive Care. 2016;22:16-23.
6. Cevik K, Zaybak A. The effect of exercises on pain after open heart surgery. Journal of Anatolia Nursing and Health Sciences. 2011;14:54-59.
7. Yumin ET, Ozel A, Saltan A, Sertel M, Ankaralı H, Simsek TT. Effects of pain, dyspnea, and kinesiophobia on quality of life in patients with coronary artery disease. Anatolian Clinic Journal of Medical Sciences. 2017;22:75-84.
8. Yolcu S, Akın, S, Durna Z. The evaluation of mobility levels of postoperative patients and associated factors. Journal of Education and Research in Nursing. 2016;13(2):129-138.
9. Torres-Harding, S, Jason LA. What is fatigue? History and epidemiology. In J. DeLuca (Ed.). Fatigue as a window to the brain. The MIT Press, Cambridge; 2005.
10. Sayın A, Candansayar S. Concept of fatigue and clinical approach to patients with fatigue. Gazi Medical Journal. 2007;18:1-8.
11. Kluger BM, Krupp LB, Enoka RM. Fatigue and fatigability in neurologic illnesses: proposal for a unified taxonomy. Neurology. 2013;80(4):409-16.
12. Kaya S, Senturan L. The investigation of fatigue of the patients undergoing coronary artery by-pass graft surgery. Journal of Academic Research in Nursing. 2016;2:59-67.
13. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. Behavior Research Methods. 2009;41:1149-1160.
14. Kori SH, Miller RP, Todd DD. Kinesiophobia: a new view of chronic pain behavior. Pain Management. 1990;3:35-43.
15. Yılmaz OT, Yakut Y, Uygur F, Ulug N. Turkish version of the Tampa Scale for Kinesiophobia and its test-retest reliability. Turkish Journal of Physiotherapy and Rehabilitation. 2011;22:44-49.
16. Piper BF, Dibble SL, Dodd MJ, Weiss MC, Slaughter RE, Paul SM. The revised Piper Fatigue Scale: psychometric evaluation in women with breast cancer. Oncol Nurs Forum. 1998;25:677-684.
17. Kocjan J, Knapik A. Barriers of physical activity (kinesiophobia) in patients subjected to cardiac rehabilitation. Baltic Journal of Health and Physical Activity. 2014;6:291-297.
18. Ahangari A, Abdolrahmani M. Kinesiophobia dilemma for older adults: a systematic review. Geriatric Care. 2020;6(3):56-59.
19. Lemaire A, Soto C, Salgueiro L, Ikegami H, Russo MJ, Lee LY. The impact of age on outcomes of coronary artery bypass grafting. Journal of Cardiothoracic Surgery. 2020;15(1):158.
20. Koivula M, Paunonen-Ilmonen M, Tarkka MT, Tarkka M, Laippala P. Fear and anxiety in patients awaiting coronary artery bypass grafting. Heart & Lung. 2001;30(4):302-11.
21. Kocjan J. Impact of kinesiophobia (fear before movement) to physical activity level in patients with artery hypertension. Journal of Education, Health and Sport, 2015;5(4):309-318.
22. Ramesh C, Nayak BS, Pai VB, Patil NT, George A, George LS, Sanatombi E. Effect of preoperative education on postoperative outcomes among patients undergoing cardiac surgery: a systematic review and meta-analysis. Journal of PeriAnesthesia Nursing, 2017;32(6):518–529.
23. Barnason S, Zimmerman L, Nieveen J, Schulz P, Miller C, Hertzog M, Rasmussen D. The relationships between fatigue and early postoperative recovery outcomes over time in elderly coronary artery bypass graft (CABG) surgery patients. Heart & Lung. 2008;37(4), 245-256.
24. Cebeci F, Celik SS. Discharge training and counselling increase self-care ability and reduce postdischarge problems in CABG patients. J Clin Nurs. 2008;17:412-420.
25. Ekman I, Ehrenberg A. Fatigue in chronic heart failure-does gender make a difference? European Journal of Cardiovascular Nursing. 2002;1:77–82.
26. Aaronson LS, Pallikkathayil L, Crighton F. A qualitative investigation of fatigue among healthy working adults. West J Nurs Res. 2003;25(4):419-433.
27. Hlatky MA, Horine S, Brooks MM, Pitt B, Smith H, Wiens R. Employment after coronary angioplasty or coronary bypass surgery in patients employed at the time of revascularization. Annals of Internal Medicine. 1998;129:543-547.
28. Kuduvalli M, Grayson AD, Oo AY, Fabri BM, Rashid A. Risk of morbidity and in-hospital mortality in obese patients undergoing coronary artery bypass surgery. European Journal of Cardio-Thoracic Surgery. 2002;22:787-793.
29. Robinson S, Vollmer C, Hermes B. A program to reduce fatigue in convalescing elderly adults. Journal of Gerontological Nursing. 2003;29(5):47-53.
30. Swain MG. Fatigue in chronic disease. Clinical Science. 2000:99:1-8.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 304-309
https://doi.org/10.31067/acusaglik.1094751

ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Relationship between Stress Coping and Religious Attitudes of Patients' Relatives in Intensive Care Unit

Leyla Gündüz[1], Afife Yurttaş[2]

[1]Mardin Provincial Health Directorate, Mardin, Turkey

[2]Atatürk University Faculty of Nursing Erzurum, Turkey

ABSTRACT

Purpose: The aim of this study is to investigate the relationship between stress coping and religious attitudes of patients' relatives in Intensive Care Unit (ICU).

Methods: This cross-sectional study was conducted with 104 relatives who agreed to participate in the study. Data were obtained using Personal Information Form, Stress Coping Attitude Scale, and Ok -Religious Attitude Scale.

Result: The relatives' Ok-Religious Attitude Scale mean score was found 4.27 ± 0.712 (high level) and Stress Coping Coping Attitude Scale was found 2.25 ± 0.459 (moderate level). It was found that there was a weak correlation in a positive way between the mean scores of religious attitudes and the mean score of stress coping ($p \leq 0.05$).

Conclusion: It is recommended that nurses should be aware of religious attitudes in stress manegement of patients' relatives in intensive care unit. It can also recommended that nurses should make arrangements toward their strategy for stress coping considering the religious attitudes and of patients' relatives.

Keywords: Stress, intensive care units, nurse's role, religion

Leyla GÜNDÜZ
Afife YURTTAŞ

Yoğun Bakım Ünitesindeki Hasta Yakınlarının Stresle Başetme ile Dini Tutumları Arasındaki İlişkinin İncelenmesi

ÖZET

Amaç: Bu çalışmanın amacı, yoğun bakım ünitesinde yatan hasta yakınlarının stres yönetimi ile dini tutumları arasındaki ilişkiyi araştırmaktır.

Yöntem: Bu kesitsel araştırma, araştırmaya katılmayı kabul eden 104 hasta yakını ile yürütülmüştür. Veriler Kişisel Bilgi Formu, Stres Yönetimi Tutum Ölçeği ve Ok-Dini Tutum Ölçeği kullanılarak elde edilmiştir.

Bulgular: Hasta yakınlarının Ok-Dini Tutum Ölçeği puan ortalaması 4,27 ± 0,712 (yüksek düzey), Stresle Başetme Tutum Ölçeği 2,25 ± 0,459 (orta düzey) olarak bulunmuştur. Dini tutum puan ortalamaları ile stresle başa çıkma puan ortalamaları arasında pozitif yönde zayıf bir ilişki olduğu bulunmuştur ($p \leq 0,05$).

Sonuç: Yoğun bakım ünitesinde yatan hasta yakınlarının stres yönetiminde hemşirelerin dini tutumların farkında olmaları önerilmektedir. Ayrıca hemşirelerin stres yönetimi stratejilerine yönelik olarak dini tutumları ve hasta yakınlarının tutumlarını dikkate alarak düzenlemeler yapmaları önerilebilir.

Anahtar kelimeler: Stres, yoğun bakım üniteleri, hemşirenin rolü, din

Correspondence: Afife Yurttaş
Atatürk University Faculty of Nursing Erzurum, Turkey
Phone: +905332309911
E-mail: afife-72@hotmail.com

Received: 29 March 2022
Accepted: 28 December 2022

Intensive care unit (ICU) is a core component of comprehensive care for patients facing critical illness, regardless of age, diagnosis, or prognosis. The main domains of the intensive care unit include relieving perceived symptoms, effective communication of care goals, patient or family-focused decisionmaking, nearest outreach support, and continuity of care (1). ICU provide optimal protection for critically ill patients in terms of medical resources and technology (2).

The intensive care environment is seen as a source of stress for patients and their relatives (3). ICU, experienced by both patients and their relatives, have a frightening meaning for these people and often leave them alone with their concerns (4,5). Having a loved one in the ICU is a stressful experience, which may cause psychological distress for family members. Depression, anxiety and stress are the common forms of psychological distress associated with ICU patient's family members (6). The patient or their relatives' response to distress is related to the type, intensity and duration of triggering factors, for it leads to psychological chances, such as fear, anxiety, depression and post-traumatic syndrome, as well as physiological instabilities (7). The prevalence of anxiety varied from 15% to 24% in caregivers after discharge of their patients from the intensive care unit (8).

Spirituality is an efficient coping mechanism in stressful situations, especially in health-related problems. It controls the mind and gives meaning and hope. It helps people to find coping strategies and have a positive outlook on life after death (9). In the study by Barth et al., found that the stressors of greater impact according to the perception of the relatives in the study were the state of coma and difficulties in the communication between relative and patient. Such factors do not favor the interaction of families with the unconscious patient, and thus, it is impossible for the relative to stimulate the patient in his or her recovery (10). The findings of the another study indicate a very high level of anxiety and a high level of spiritual well-being and religious coping in relatives of CCU patients (11). In the study by Özdemir et all., found the stress perceived by the patient's relatives in the ICU is not related to religious attitude (12).

Consequently, the ICU environment can trigger behaviors and feelings such as doubt, helplessness, mental disorganization, inability to take action when faced with unexpected decisions (13). In stressful situations, people take refuge in a supreme power, prayer and worship, and receive support from their beliefs. Religious beliefs and practices contribute to the well-being of people, help them cope with stressful events, contribute positively to mental and physical health, and help the individual feel stronger with a tendency to show patience in the face of difficulties (14). People with higher level of spirituality are more resistant to illness and resilient to stress (15).

Spiritual care is believed to be a major part of the nurse's role (16). Additionally, nurses support patients' relatives with behaviors such as listening to problems and ensuring participation in patient care (17). Nursing care is among other things aimed at emotionaland spiritual support for patient and family because an ICU stay of a person can cause anxiety, depression and even posttraumatic stress disorder (18). It is becoming clearer that meeting spiritual needs for both caregivers and care receivers is important in developing more effective models of care (19). So, it is vital to improve the provision of spiritual care delivery; indeed the importance of assisting patients and relatives to meet their spiritual needs is recognised internationally (20).

This study intends investigating the relationship between stress coping and religious attitudes of patients' relatives in intensive care unit. The previously made considerations lead us to the following questions:

1. What is the relatives' stress coping level?
2. What is the relatives' religious attitudes level?
3. Is there a relationship between stress coping level and religious attitudes level of the relatives?

MATERIAL AND METHOD

The study was conducted as a descriptive cross-sectional design. The data of the study were collected in the general intensive care unit of a hospital in eastern Turkey. The universe of study consisted of 208 relatives and the study was performed. The sample of the study consisted of and sample of the study consisted of 104 relatives.

The inclusion criteria were as follows:

- Patients' relatives who were admitted the patient to the ICU at least one day between the dates of the study,

- Patients' relatives over the age of 18 years who admitted the patient to the ICU and voluntarily agreed to participate were included in the study.

Other inclusion criteria were having not an obstacle to reading and writing. The data were collected in a information room, which was designed for informing to the relatives by the researcher in face-to face interview method. It took approximately 20-25 minutes for relatives to complete data collection.

Data Collection Tools

The Information Form: The form consists of 8 questions about the age, gender, marital status, day of hospitalization, education level, occupation, income level, place of residence and religious education.

The Ok-Religious Attitude Scale: The Ok Religious Attitude Scale was developed by Ok (2016) to measure the perception of religiosity. It is a 5-grade likert-type scale that consists of 8 items in total. Each item in the scale is evaluated by recognizing scores between 1 and 5. The total score is calculated by adding up the points obtained from each item. A high total score obtained from the scale indicates an excessively positive attitude towards religion, and a low total score indicates a negative attitude towards religion. In the original study, cronbach alfa was reported as 0.810 and 0.910 (21,22). In this study, cronbach alfa was found as 0.870.

The Stress Coping Attidue Inventory: The inventory of the attitudes of coping with stress is the scale of coping with stress that was originally developed by Özbay aiming at foreign students studying at a university in the United States of America. The inventory was adapted to Turkish by Özbay and Şahin. At the process of adapting to Turkish, as a result of factor analysis, 43 expressions from 56 items of the original coping inventory were grouped into six factors. Inventory was developed by using with 5-point likert-type scale and participants were asked to read all the items and mark one of the options: never, occasionally, sometimes, often, always. Subjects were also asked to choose and mark the most appropriate choice for themselves for each item. 5 point likert type scale has 43 items and six sub-dimensions. The scale is scored between 0-4 points. These scores are 0: very low, 1: low, 2: medium, 3: high and 4: very high. These are inclining towards religion, looking for outside help, active planning, escape-isolation (emotional-operational), escape-isolation (biochemical) and acceptance-cognitive. In the original study, cronbach alfa was reported as 0.810 (23,24). In this study, cronbach alfa was found as 0.830.

Ethical Committee

The study was approved by The Ethics Committee of Atatürk University Faculty of Nursing (Number: 2015/19). Verbal and written consent was obtained from the relatives who met the criteria for being included in the research sample and agreed to relatives in the research. The relatives who accepted to participate in the study were informed about the study, and their written consent was obtained. The study was conducted in accordance with the Declaration of Helsinki.

Statistical Analysis

SPSS (Windows 22.0) software was used for data analysis. Descriptive statistical methods (mean, standard deviation, mode, median, frequency, minimum and maximum) were used for statistical analysis. Chi-Square tests were calculated for determining the relationship between the descriptive tests and scale. All tests were conducted with using $p \leq 0.05$.

RESULTS

The sociodemographic characteristics of the relatives are shown in Table 1. Overall, 32.7% of the relatives were female and 56.7% of the relatives were female were married. Also, it was determined that 82.7% of the relatives lived in the Mardin province and 47.1% of them had religious education in both family and school (Table 1).

It was determined that 4.27 was the average of Ok-Religious attitude scale score average (Table 2).

The average score of Stress Coping Attidue Inventory Score was 2.25. It has been determined that intensive care patients relatives more prefer to inclining towards religion ($X = 2.75$) than escape-isolation (bio-chemical $X = 0.54$) in order to cope with stress (Table 3).

It was found that there was a weak relationship in a positive way between mean scores of religious attitude and mean scores of stress coping ($P < 0.05$) (Table 4).

Table 1. Sociodemographic characteristics of relatives (n = 104)		
Characteristics	**n=104**	**%**
Sex		
Female	34	32.7
Male	70	67.3
Marital Status		
Married	59	56.7
Single	45	43.3
Job		
Unemployed	17	16.3
Housewife	22	21.0
Retired	5	4.8
Officer	22	21.3
Student	9	8.7
Self employement	29	27.9
Income level		
High	18	17.3
Moderate	49	47.1
Low	37	35.6
Age groups		
18-24	24	23.0
25-34	47	45.2
35-59	32	30.8
60 and over	1	1.0
Education level		
Literate	4	3.8
Primary school	11	10.6
Junior High school	19	18.3
High school	34	32.7
College	34	32.7
Postgraduate	2	1.9
City		
Mardin	86	82.7
Şırnak	8	7.7
Diyarbakır	3	2.8
İstanbul	5	4.8
Mersin	1	1.0
Adıyaman	1	1.0
Religious Education Status		
No education	7	6.7
Mosque Chief	12	11.5
Family	16	15.4
Imam Hatip High school	1	1.0
Religious culture and ethics course	12	11.5
Quran course	6	5.8
Religious books	1	1.0
Family and religion culture and ethics	49	47.1
TOTAL	**104**	**100**

Table 2. Distribution of Ok-Religious attitude scale score average of relatives			
	n	**Min-Maks.**	**X ± SD**
Ok-Religious Attitude Scale Score Average	104	2-5	4.27±0.712

Table 3. Distribution of stress coping attidue inventory score average of relatives			
	n	**Min-Maks.**	**X ± SD**
Stress Coping Attidue Inventory	104	1.48-3.51	2.25±0.459
Active planning	104	1.30-6.40	2.62±0.742
Looking for outside help	104	0.44-4.00	2.44±0.652
Inclining towards religion	104	0.50-4.00	2.75±0.842
Escape-isolation (emotional-operational)	104	0.14-3.43	1.83±0.682
Escape-isolation (bio-chemical)	104	0.00-3.00	0.54±0.553
Acceptance–cognitive	104	0.43-3.71	2.35±0.662

Table 4. Comparison of relative attitude levels of stress coping and levels of religious attitude				
	n	**X ± SD**	**r**	**p**
Stress Coping Attidue Inventory	104	2.25 ± 0.459	0.218	**0.026**
Ok-Religious Attitude Scale	104	4.27± 0.712		

DISCUSSION

The intensive care units can be a source of stress both for the patients and their relatives due to having complex equipment inside, and visitation in certain hours (25). As a result of the literature review, it was determined that there are a limited number of studies examining the relationship between the perceived stress of the relatives of intensive care patients and their religious attitudes and behaviors (12, 26). Nurses should provide spiritel support in managing their stress and be aware of their religious attitudes (25).

Considering the questions formulated for this study, we highlight that relatives'religious attitue was high. In a study, individuals characterized by an affirmative religious attitude were found to have a significantly higher level (27). In the study conducted by Batman, the majority of

the participants stated that they prayed to cope with difficulties, while the other part stated that people should believe in religion. They stated that believing in religion makes it easier to overcome their problems (28). In his study, Kavas stated that there is a very weak relationship between the attitude of managing stress and religious attitude (14). In other a study was found parents' religious and secular coping was significant in relation to family relationship functioning (29). Sekhavatpour et al. stated that high spirituality reduces stress and improves quality of life (30). In our study, the high level of religious attitudes can be expressed that beliefs are used as a kind of coping attitude for people who react to stressful events. Otherwise, it can be thought that the religious attitude makes the companions stronger in looking at events positively and solving problems.

When the stress coping attitudes of the relatives of the patients were examined, it was seen that the total score of the scale was moderate. In the study conducted by Çabuk, there was a statistically significant difference in the level of anxiety, depression and quality of life of the attendanting mothers in the intensive care unit compared to those of the attendanting mothers (31). In the study of Özdemir et. al., was found that 60% of caregivers had low stress levels (12). In the study conducted with the mothers of premature neonates in the intensive care unit, the stress level of 30% of the mothers was found to be moderate (25). In another study; family members were at high levels of stress, which is harmful to their well-being and health (26).

The results of the study of Karale et al., showed that 3.33% relatives had severe stress, 73.33% relatives had moderate stress, and 23.34% relatives had mild stress (32).

Despite regional and sample differences in our study, intensive care may actually cause stress for people. In addition, it can be thought that these people have experienced stress in meeting their basic needs.

In current study, it is determined that there was a weak-positive correlation (p=0.026) between stress and positive religious coping. In a study, it found that there was a very weak relationship in a positive way (14). Also the relationship between stress coping and religious attitudes of patients' relatives has been examined in many studies (12, 25, 26, 29). There are many methods to reduce stress. The religion is one of them. The positive effect of religious belief on people's spiritual life is a well-known issue. Prayers and worship are religious practices that relieve the individual in adverse situations (33). In the cities where the research was conducted, the rate of religious orientation and practices is high. Religious attitudes and stress can affect each other positively or negatively in many situations and times. It can be thought that the religious attitudes and stress levels of the patient companions in the intensive care unit are evaluated in line with the physical conditions and facilities of the hospital where the research was conducted.

CONCLUSION

The nurses should not ignore religious and spiritual support of intensive care patients and their relatives. It is suggested that nurses should be aware of their beliefs, values and attitudes during spiritual care. The nurses should provide information about beliefs and attitudes of different religious groups. This study, which examines the stress and religious attitude of patients' relatives in intensive care, emphasizes the importance and necessity of holistic care and spiritual care. This research was limited to the province where the research was conducted. It may be recommended for future studies to conduct similar studies in other cities and countries.

DECLARATIONS

Acknowledgements

The authors importantly thank all the relatives involved in this study.

Conflict of Interest

The authors have declared that there is no conflict of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions

LA: Collected the data, contributed data or analysis tools, wrote the paper

AY:Conceived and designed the analysis, performed the analysis, wrote the paper, other contribution

Ethical Approval

The study was approved by The Ethics Committee of Atatürk University Faculty of Nursing (Number: 2015/19).

REFERENCES

1. Noome M, Dijkstra BM, Leeuwen EV, Vloet LCM. Exploring family experiences of nursing aspects of end-oflife care in the ICU: A qualitative study. Intensive and Critical Care Nursing. 2016;33:56-64. doi: 10.1016/j.iccn.2015.12.004
2. G.Gutierrez. Artificial intelligence in the intensive care unit. Critical Care. 2020; 24(1):2-9. doi.org/10.1186/s13054-020-2785-y
3. Yakubu Y. H, Esmaeili M, & Navab E. Family members' beliefs and attitudes towards visiting policy in the intensive care units of Ghana. Nursing Open. 2019; 6(2):526–534. doi.org/10.1002/ nop2.234
4. Willemse S, Smeets W, van Leeuwen E, Janssen L, & Foudraine N. Spiritual care in the ıcu: Perspectives of dutchintensivists, ICU nurses, and spiritual caregivers. Journal of Religion and Health. 2018;57(2):583–595. doi.org/10.1007/s10943-017-0457-2
5. Gaeeni M, Farahani M. A, Mohammadi N, Seyedfatemi N. Sources of hope: Perception of Iranian family members of patients in the Intensive Care Unit. Iranian Journal of Nursing And Midwifery Research. 2014;19(6):635–42.
6. Abdul Halain A, Tang L.Y, Chan Chong M, Airini Ibrahim N, Anaes M, Lim Abdullah K. Psychological distress among the family members of Intensive Care Unit (ICU) patients: A scoping review. Journal of Clinical Nursing. 2022;31(5-6):497-507.
7. Ullman AJ, Aitken LM, Rattray J, Kenardy J, Brocque R Le, MacGillivray S, et al. Intensive care diaries to promote recovery for patients and families after critical illness: A Cochrane Systematic Review. J Crit Care [Internet]. 2015;52(7):1243–1253.
8. van Beusekom I, Bakhshi-Raiez F, de Keizer NF, Dongelmans DA, van der Schaaf M. Reported burden on informal caregivers of ICU survivors: a literature review. Crit. Care. 2016; 20:16:2-8. doi 10.1186/s13054-016-1185-9
9. Choi PJ, Curlin FA, Cox CE. The patient is dying, please call the chaplain the activities of chaplains in one medical center's intensive care units. J Pain Symptom. 2015;50(4):501-6.
10. Angélica Adam Barth, Bruna Dorfey Weigel, Claus Dieter Dummer, Kelly Campara Machado, Taís Montagner Tisott. Stressors in the relatives of patients admitted to an intensive care unit Rev Bras Ter Intensiva. 2016;28(3):323-329.
11. Dehghanrad F, Mosallanejad M, Momennasab M. Anxiety in relatives of patients admitted to cardiac care units and its relationship with spiritual health and religious coping. Invest. Educ. Enferm. 2020; 38(3):1-11. doi: https://doi.org/10.17533/udea.iee.v38n3e10.
12. Ozdemir A, Kaplan Serin E, Savaş M. The relationship between the stress perceived by the intensive care patient's relatives with their religious attitudes and behaviors: Turkey Sample. Journal of Religion and Health. 2021; 60:752–763.
13. Prates TS, Stumm EMF, Loro MM, Ubessi LD. Relatives of coma patients in the intensive care unit: perceptions and behaviors. Cad Bras Saúde Mental. 2011;2(4-5):138-58.
14. Kavas, E. Stress Coping attitudes based on perceived religiousness and received religious education. Psychology. 2016;7:382-398. doi. org/10.4236/psych.2016.73041
15. Hedayati E, Hazrati M, Momen Nasab M, Shokoohi H, Afkari F. The relationship between spiritual well-being and anxiety of aged people admitted in coronary care units. Salmand: Iranian Journal of Ageing. 2016; 11(3): 432-439.
16. Caldeira S, Carvalho EC, Vieira M. Spiritual distress—Proposing a new definition and defining characteristics. Int J of Nurs Knowl. 2013;24(2):77-84.
17. Ateş E, Bilgili N. Coping with stress and social support in caregivers of individuals with spinal cord injuries. Journal of Education and Research in Nursing. 2013;15(3):1-12.
18. Davidson JE, Jones C, Bienvenu J. Family response to critical illness: postintensive care syndrome-family. Crit Care Med. 2012;40:618-24.
19. Wanda Lott Collins & Sharon Bowland Spiritual Practices for Caregivers and Care Receivers, Journal of Religion, Spirituality & Aging. 2012; 24:3;235-248.
20. Paal P, Leget C, Goodhead A. Spiritual care education: results from an EAPC survey. Eur J Palliat Care. 2015;1(22): 91-5.
21. Ok Ü. Religious attitude scale: Scale development and validity study. International Journal of Human Sciences. 2011;8(2):528-549.
22. Ok Ü. The Ok-Religious Attitude Scale (Islam): introducing an instrument originated in Turkish for international use. Journal of Beliefs&Values. 2016;37(1):55-67.
23. Özbay Y. An Investigation of the relationship between adaptational coping process and self-perceived negative feelings on international students. [dissertation on the internet]. Texas Tech University;1993.
24. Özbay Y, Şahin B. Inventory of coping with stress attitudes: validity and solidity study. The National Psychological Information and Guidance Conference. Ankara: 1-3 September. 1997.
25. Sharifnia, M., Hasanzadeh, M. H., Asadi Kakhaki, S. M., Mazlom, S. R., Karbandi, S. The impact of praying on stress and anxiety in mothers with premature neonates admitted to NICU. Iranian Journal of Neonatology. 2016;7(4):15–22. doi.org/https://doi.org/10.22038/ijn.2016.7866
26. Zanetti,T. G, Stumm E. M. F & Ubessi L. D. Stress and coping in families of patients in an intensive care unit. Revista de Pesquisa: Cuidado é Fundamental Online. 2013;5(2):608-3619. https://nbn-resolving.org/urn:nbn:de:0168ssoar-55138-3
27. Krok D. Religiousness, spirituality, and coping with stress among late adolescents: A meaning-making perspective. Journal of Adolescence. 2015;45:196-203. doi:10.1016/j.adolescence.2015.10.004
28. Aydın C. Evaluation of the faith of destiny in terms of the defense mechanism and the religious way of coping. Journal of Divinity Faculty of Hitit University. 2019;1(35):101-122. doi.org/10.14395/hititilahiyat.469645
29. Brelsford G.M, Ramirez J, Veneman V, Doheny K, K. Religious and secular coping and family relationships in the neonatal intensive care unit. Adv Neonatal Care. 2016; 16(4):315-322. doi:10.1097/ANC.0000000000000263
30. Sekhavatpour Z, Reyhani T, Heidarzade M, Moosavi S. M, Mazlom S. R, Dastoorpoor, M., et al. The effect of spiritual self-care training on the quality of life of mothers of preterm infants: A randomized controlled trial. Journal of Religion and Health. 2021;60:752-763. doi.org/10.1007/s1094 3-018-0620-4.
31. Çabuk B. Analysing Anxiety, Depression and Qualıty of Life at Attendant Mothers in Pediatric Intensive Care Unit. Bezmialem Vakıf Unıversity Institute of Health Sciences Department of Physiotherapy and Rehabilitation. Master Thesis. İstanbul 2017.
32. Karale R.B, Hiremath P, Mohite V.R, Naregal P, Karale B. The level of stress among the relatives of clients admitted ın ıntensive care unit at tertiary care hospital - Krishna Hospital, Karad, India. International Journal of Health Sciences and Research. 2016;6(4):272-276.
33. Aydın Ö. The Role Of Religious Belief As A Reason For Living. Doctoral Thesis. Ankara University. Social Sciences Institute, Ankara, 2011.

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 310-317
https://doi.org/10.31067/acusaglik.1191705

The Effect of Secondary Traumatic Stress Level on Psychological Resilience of Midwives

Dönüş Yalçın[1], Fadime Bayrı Bingöl[2]

[1]Marmara University, Research And Education Hospital, Pendik, Istanbul, Türkiye

[2]Marmara University, Health Sciences Faculty, Midwifery Department, Istanbul, Türkiye

Dönüş YALÇIN

Fadime BAYRI BİNGÖL

Correspondence: Fadime Bayrı Bingöl
Marmara University, Health Sciences Faculty, Midwifery Department, Istanbul, Türkiye
Phone: +902167775700
E-mail: fadimebayri@gmail.com

Received: 19 October 2022
Accepted: 10 January 2023

ABSTRACT

Purpose: Case load in working setting, excessive working hours, encountering with traumatic incidents frequently, concern of being sued might increase the level of stress for midwives and affect their psychological resilience negatively. The present study was conducted to identify the effect of secondary traumatic stress level of midwives on psychological resilience.

Methods: The present study was a descriptive one carried out between the dates of June 2019- June 2020. The sample of the study consisted of midwives working in the delivery rooms of all Public Hospitals in Istanbul. The data were collected through face to face interviews with 213 midwives. The data were collected using Infromation Form, Secondary Traumatic Stress Scale and Psychological Resilience Scale for Adults. The statistical analysis of the data were realized by SPSS programme.

Results: Every one out of three midwives was identified to meet all the criteria regarding Post-Traumatic Stress Disorder. It was also identified that those midwives who are single (41.05±12.12), experiencing dissatisfaction in their profession (51.14±14.04), having more working shifts monthly (40.60±12.08) had higher secondary traumatic stress scores ($p<0.05$). Psychological resilience of those midwives working at clinics with higher numbers of delivery (135.62±10.82) was determined to have higher level of psychological resilience ($p<0.05$). It was also stated that as the secondary traumatic stress level scores of midwives increased, their psycological resilience scores decreased accordingly.

Conclusion: Every one out of three midwives meets the criteria for Post Traumatic Stress Disorder. Midwives, in the risky group in terms of traumatic stress and psychological resilience, should be followed closely and supported in advance.

Keywords: Midwifery, compassion fatigue; psychological resilience

Ebelerde İkincil Travmatik Stres Düzeyinin Psikolojik Dayanıklılığa Etkisi

ÖZET

Amaç: Çalışma ortamında vaka yükü, yoğun çalışma saatleri, travmatik olaylarla sık karşılaşma, yetersiz yönetim desteği, dava edilme kaygısı gibi nedenler ebelerin stres düzeyini artırabilmekte ve psikolojik dayanıklılığını olumsuz etkileyebilmektedir. Bu çalışma ebelerde ikincil travmatik stres düzeyinin psikolojik dayanıklılığa etkisini belirlemek amacıyla yürütülmüştür.

Yöntem: Bu araştırma, Haziran 2019- Haziran 2020 tarihleri arasında İstanbul'da Kamu Hastanelerinde Doğumhane Kliniği'nde görev yapan ebelerle yürütülen, tanımlayıcı bir araştırmadır. Veriler, Genel Bilgi Formu, İkincil Travmatik Stres Ölçeği ve Yetişkinler İçin Psikolojik Dayanıklılık Ölçeği ile toplanmıştır. Veriler SPSS programında analiz edilmiştir.

Bulgular: Her üç ebeden birinin Travma Sonrası Stres Bozukluğu açısından tüm travma kriterlerini karşıladığı belirlendi. Genç yaş, bekar olmak, ebe olmaktan memnuniyetsizlik, aylık çalışma saati ve nöbet sayısı fazla olan ebelerin ikincil travmatik stres puanlarının daha yüksek olduğu belirlendi ($p<0,05$). Doğum sayısı ve ebe sayısı yüksek olan kliniklerde görev yapan ebelerin psikolojik dayanıklılıklarının da arttığı saptandı ($p<0,05$). Ebelerin ikincil travmatik stres puanları arttıkça psikolojik dayanıklılık puanlarının azaldığı belirlendi.

Sonuç: Her üç ebeden birinin Travma Sonrası Stres Bozukluğu açısından tüm travma kriterlerini karşılıyor olması yüksek bir orandır. Travmatik stres ve psikolojik dayanıklılık açısından riskli grupta yer alan ebeler daha yakından izlenmeli, sorunlar ilerlemeden desteklenmelidir.

Anahtar Sözcükler: Ebe, İkincil travmatik stres, Psikolojik dayanıklılık

Even though giving birth evokes positive emotions, it is a subjective experience for each of the women and hard and stressful time as well (1). Perception of giving birth differs from woman to woman even in each delivery for the same woman. Many factors such as not coping with birth pain, feeling of loss of control and various complications may turn the delivery process into a stressful and traumatic experience (2). A traumatic event is defined as one that poses a threat of serious injury or death to oneself or others, and elicits feelings of intense fear, helplessness, or horror. Traumatic birth experience is the woman's perception of the birth as a serious threat of dead or injury for the baby or for herself and her defining the moment of delivery as fear, desperate and horror. Traumatic birth experience affects not only the woman, the baby and the family negatively but also the midwives providing the closest and permament care to the women in delivery process that causes secondary traumatic stress for them (3,4).

Secondary trauma is defined as indirect exposure to trauma through a firsthand account or narrative of a traumatic event (3). The symptoms of secondary traumatic stress are as well as Post Traumatic Stress Disorder (PTSD) symptoms, excessive agitation, loss of concentration, insomnia, fatigue, nightmares, startle response, feeling deja vu and avoidance behaviours (4). The most significant risk factors are emphaty and exposure due to sharing of emotional burden of the trauma. Resulting for frequent exposure to women experiencing traumatic stress, traumatic stress poses an occupational hazard for midwives providing permanent care to them (2). It affects mental health and care providing skills of midwives negatively. Midwives experience emotional burnout, desensitisation, reluctant to providing care as well as reducing performance and resilience, problems in focusing and decision making processes (5).

Secondary traumatic stress is affected from case load, experience in profession, competence in profession, age and gender characteristics of health care provider, former trauma history, setting of a heathy emphaty, Professional supervision support together with organizational support, long shifts without adequate intervals, medical complications, mistakes, anxiety of being sued and climate of fear (6). It was stated that various direct or indirect risk factors such as midwives' competencies in profession, skills of using emotions and support from collegues or health care team being insufficient; not having positive expectations for the future or emotional readiness requried by the profession might affect their physical and psychological well being negatively that leads to burnout, psychological problems, reducing professional satisfaction even to resigning or intent to resign (7). Psycological resilience, defined as standing robust in certain conditions impacts people's biopsychosocial health negatively, is a crucial factor ensuring the coping with undesired conditions, reducing the impacts of the stress and adjusting to new conditions. It was pointed out that psychological resilience is rather significant to avoid secondary stress in work settings. Psycological resilience is a dynamic process by which a biopsychosocial system returns to the previous level of functioning, following a perturbation caused by a stressor. The individual realizes such a condition with social support, using efficient coping strategies, optimism and restructuring the positive thoughts (8).

Since midwives are at the forefront of health service delivery in the health system, they are faced with many occupational problems and dangers that pave the way for physical and psychological stress every day. Difficult events such as the death of the mother or baby and irreversible complications may predispose midwives to psycho-emotional disorders such as burnout, fatigue, and secondary traumatic stress (2-4). This situation may negatively affect the psychological resilience of midwives. In line with this information, this study was conducted to determine whether secondary traumatic stress has an effect on the psychological resilience of midwives.

METHODS

Aims

The aim of the study was to determining the state of midwives in terms of protecting and developing their health and to identify the effect of secondary traumatic stress on psychological resilience for midwives in order to contribute for the finding of necessary solutions.

Design and Study Setting

The present study was a descriptive one carried out with midwives assigned at delivery rooms of 7 State hospitals (Zeynep Kamil Gynecology and Pediatrics Training and Research Hospital, Kartal Dr. Lütfi Kırdar City Hospital, Ümraniye Training and Research Hospital, Goztepe Prof. Dr. Süleyman Yalçın City Hospital, Tuzla State Hospital, Marmara University Pendik Training and Research Hospital, Sancaktepe Prof.Dr. Ilhan Varank Training and Research Hospital) in Anatolian side of Istanbul province between the dates of June 2019- June 2020.

Sample

The sample of the research is G*Power.3.1.9. Calculated using the program (G*Power; university; Düsseldorf; Germany). Type-1 error amount in the study α.=0.05; When the targeted power of the test was calculated as 1-β,=0.95, it was determined that at least 176 midwives should be included in the study. The sample of the study consisted of midwives working in the delivery rooms of all Public Hospitals in Istanbul. All midwives who met the inclusion criteria and agreed to participate in the study were included in the study without selecting a sample. All volunteer midwives who have been working in the delivery room for at least 6 months were invited to the study. Midwives with a history of post-traumatic stress disorder or another psychiatric illness were excluded from the study. The data were collected through face to face interviews with 213 midwives. 13 participants who submitted data collection forms incompletely excluded from the study. The study was completed with 200 midwives.

Data Collection: The required data were collected using General Infromation Request Form, Secondary Traumatic Stress Scale and Psychological Resilience Scale for Adults.

General Infromation Request Form: The Information Request form utilized in the study was prepared in line with the literature (2,4,6). From consisted of 12 items related with participants' socio-demographic characteristics (age, education, income), working conditions, professional characteristics, trauma history and occupational trauma history.

Secondary Traumatic Stress Scale (STSS): The scale was developed by Bride et al. (2004). The Turkish validity and reliability study of the scale was conducted by Yildirim, Kidak, & Yurdabakan, (2018). The main purpose of the scale is to assess stress symptoms of health care providers within last seven days at post secondary trauma process. This five-point Likert type scale includes 17 items and has three sub-dimensions as emotional negligence, avoidance and alertness. The responses "Never" and "Rarely" do not mean the presence of post traumatic stress symptoms however, the responses "sometimes", "often" and "very often" do mean the presence of post traumatic stress symptoms. Furthermore; in order to mention about the presence of PTSD diagnosis indications, at least one of the items measuring the emotional neglience; at least three of the items measuring avoidance symptoms and at least two of the items measuring alertness are needed to be pointed as "sometimes" or higher stress symtoms. Those three measurements being together mean the risk of PTSD diagnosis. The score obtained from the scale ranged between 17 and 85 and higher scores indicate higher level of impact. Cronbach's alpha value for the scale was determined as .89.

Resilience Scale for Adults (RSA): The scale was developed by Friborg et al. (2003). The scale's Turkish validity and reliability study was carried out by Basım and Çetin (2011). This five-point-Likert type scale consisted of 33 items and its "structural style" and "future perception" had 4 items for each; "family harmony", "perception of self" and "social competence" had 6 items for each and "social resources" had 7 items. The assessment of items of the scale was set free as in the original scale. Five point Likert type format was utilized for responses in the scale in order to avoid acquaintance prejudice by placing positive and negative characteristics to different sides. When the higher scores were desired to mean higher higher level of psychological resilience, responses should be pointed as 1,2,3,4,5 from left to right. Cronbach's alpha reliability value was identified as .88 at present study.

Data Analyses: The statistical analysis of the data were realized by SPSS programme. Continuous variables were expressed with avarage, Standard deviation and median and categorical variables were expressed by numbers and percentages as well. In order to identify the fitness to the normal distribution Shapiro-Wilk and KolmogorovSmirnov tests were used. In the comparison of independent groups differences; Independent T-test for dual-group assessments and One-WayAnovaTest for multiple group more than two comparisons were benefited. The differences between categorical variables was examined with Chi-square analysis. In order to identify whether the relation between Psychological resilience scale and its sub-groups and Secondart traumatic Stress Scale and its sub-groups significant or not, Pearson's Correlation analysis was used. The levels of significance used were $p<0.05$.

RESULTS

The mean age of the participants was 30.08±6.71. 27% (n=54)of the midwives stated that their expenses exceeded to their income. The mean duration in their profession was 2.68±1.13 years and the mean duration of their working in delivery clinics was 2.20±1.01 years. The mean monthly work-hour of the midwives 180.20±18.13 and the mean number of night-shifts 7.77±3.56 monthly and it was identified that 62% (n=124) of them had 6-10 night shifts monthly. The mean number of full-term of the participants was 203.23±174.30 and the mean number of caesarean in the clinic was determined as 125.74±93.95 monthly. The number of midwives assigned in the clinic was 17.80±7.43 (Table 1).

Table 1. Descriptive Characteristics and Clinical Practice Experiences of Midwives (n=200)

Characteristics		n	%
Marital status	Married	95	47.5
	Unmarried	105	52.5
Education	Vocational high School	8	4.0
	Associate Degree	8	4.0
	Bachelors degree	168	84.0
	MSc	16	8.0
Monthly working hours	150-175	82	41.0
	176-200	100	50.0
	201-250	18	9.0
Satisfaction with being a midwife	Yes	179	89.5
	No	21	10.5
Trauma History	No	178	89.0
	Yes	22	11.0
History of domestic violence against oneself	No	178	89.0
	Yes	22	11.0
Psychiatric diagnosis history	No	186	93,0
	Yes	14	7.0
Frequency of encountering traumatic birth	Very often	32	16.0
	Often	53	26.5
	Sometimes	93	46.5
	Rarely	22	11.0

As the ages of the midwives reduced (r=-.192, p=.006), the secondary traumatic stress level was identified to increased. Moreover, it was indicated that those midwives who were single, had 6-10 night shifts, experienced dissatisfaction in their profession, encountered traumatic deliveries frequently had higher level of secondary traumatic stress. In additon, it was put forth that increasing working hours led to higher level of secondary traumatic stress (r=.149, p=.035). At present study also it was found out that 48.8% of the midwives were affected by various reasons emerging from delivery room setting including the characteristics of care-related trauma (Table 2). It was also specified that increase in full-term delivery (r=.201 p=004), caesarean delivery (r=.161, p=.023) and the number of midwives in the clinic (r=.207, p=.003) led to increase in the level of psycological resilience (Table 3). Other characteristics of the midwives were determined not to affect scores obtained from the scales.

Table 2. Comparison of the Secondary Traumatic Stress Scale and Some Characteristics of the Participants (n=200)

Characteristics		n (%)	Mean±SD	p (test value)
Marital status	Married	95(47.5)	35.78±11.49	**p=0.002** *t=-3.140
	Unmarried	105(52.5)	41.05±12.12	
Number of night shifts per month	0	15(7.5)	35.07±11.13	**p=0.016** **F=3.531
	1-5	31(15.5)	33.97±12.04	
	6-10***	124(62.0)	40.60±12.08	
	11-15	30(15.0)	36.47±10.85	
Satisfaction with being a midwife	Yes	179(89.5)	37.06±10.92	**p=0.000** t=-5.415
	No	21(10.5)	51.14±14.04	
Frequency of encountering traumatic birth	Very often	32 (16.0)	43.09±13.33	**p=0.003** **F=4.903
	Often	53(26.5)	41.42±10.82	
	Sometimes	93(46.5)	36.47±11.72	
	Rarely***	22(11.0)	33.68±11.27	

***one way ANOVA test; *** Group that made the difference (based on LSD, Tukey test result); number; percent; mean standard deviation*

Table 3. Comparison of the Resilience Scale for Adults and Some Characteristics of the Participants (n=200)

Characteristics		n (%)	Mean±SD	p (test value)
Number of normal births in the clinic	1-200 **	130(65.0)	124.64±19.64	**p=0.006** *F=5.205
	201-400	41(20.5)	130.90±17.42	
	401-700	29(14.5)	135.62±10.82	
Number of midwives in the clinic	2-10	56(28.0)	122.21±18.33	**p=0.015** *F=4.283
	11-20	71(35.5)	127.39±19.91	
	21-30**	73(36.5)	131.71±16.47	

**one way ANOVA test; ** Group that made the difference (based on LSD, Tukey test result); number; percent; mean standard deviation*

The mean STSS score of the midwives was 38.54±12.05. When the secondary traumatic stress scores of them were examined, avoidance and fatigue scores were detected as higher. Thus; the midwives were observed to experience emotional neglience and alertness symptoms more than avoidance and fatigue. The mean RSA score of the midwives was 127.52±18.57. The midwives obtained the highest score from "social resources" in Psycological Resilience Scale. Then the "family harmony" and "perception of self" scores as lower and the lowest score was obtained from "structural style" sub-dimension. The rate of meeting all the PTSD criteria was founded as 32% (n=64) that meant every one out of three midwives met all the criteria for PTSD. The midwives' included in the study psycological resilience affected negatively as their traumatic stress scores increased (p=0.001) (Table 4).

Table 4. Comparison of Resilience Scale for Adults Scores of those who met all trauma criteria in terms of PTSD (n=200)

Scale		Resilience Scale for Adults		
		n (%)	Mean±SD	Statistics
Met all the trauma criteria for posttraumatic stress disorder according to the Secondary Traumatic Stress Scale	Yes	64 (32)	121.21±20.15	**p=0.001** *t=3.376
	No	136 (68)	130.48±17.06	
Emotional intrusion	Yes	124 (62)	125.22±18.69	**p=0.025** *t=2.254
	No	76 (38)	131.26±17.87	
Avoidance	Yes	97 (48.5)	123.27±19.79	**p=0.002** *t=3.206
	No	103 (51.5)	131.51±16.46	
Arousal	Yes	12 (6)	123.74±19.09	**p=0.000** *t=3.630
	No	80 (40)	133.18±16.28	

**Student t test*

DISCUSSION

When a traumatic delivery occured, particularly the midwife accompanying the woman, her husband, gynaecologist and students were affected indirectly and that causes to their experience PTSD symptoms. At present study, it was indicated that every one out of three midwives met all the criteria for PTSD. According to Toohill et al (2019), 93.6% of the midwives exposed to secondary trauma. Similarly, Beck and Gable (2012) reported mild and severe secondary trauma in 35% of the midwives. Cohen et al (2017) on the other hand reported the rate as 94.3% by stating that midwives might possibly be traumatised by improper interventions and delivery complications. Nightingale et al. (2018), Favrod et al. (2018) and Beck et al. (2015) also reported similar results with the rates of 20%, 26,9% and 36% respectively. Sheen et al. (2015), Leinweber et al. (2017) and Cohen et al. (2017) on the other hand reported lower rates contrary to our stude as 5%, 17% and 16% respectively. In a study carried out by Wahlberg et al. (2017) with a sample group including midwives and gynaecologists, it was reported that following a perineal traumatic incident, 15% of both of the professions showed signs addressing to PTSD and 7% of the gynaecologists and 5% of the midwives met the all the diagnosis criteria of PTSD. Following serious traumatic events occuring at a delivery clinic in Sweden, 15% of the midwives were reported symptoms addressing to PTSD and 55 of them met all the criteria of PTSD. The same study indicated that midwives' feeling of guilt and insufficient support from their friends increased the risk of PTSD for them (18). Roberson and Perry (2010) in their systematic review of health care providers determined a rate ranged between 0% and 29%. These differences in rates might be affected by health care services of the countries, characteristics of maternal care units as well as working conditions of midwives.

Schroder et al. (2016) set forth many midwives and gynaecologists experience stress symptoms and Toohill et al (2019) emphasised that 8% of the midwives experience high level fear during delivery management process. Leinweber et al (2017) stated that the possibility of showing fear during delivery is four times higher for midwives when they encouter with people uteerinf disrespectful words or swearing. It was also reported that such fear besides leading improper interventions, might impact attributes of midwives in the working setting that cause loss of motivation and decreasing of qulity of care by reducing the feeling of affection accordingly (4). Thus, noticing of secondary traumatic stress experienced by midwives is rather crucial in terms of preventing their psycological resilience which is needed to cope with negative effects of stress exposed by themselves. Potential risk factors regarding secondary traumatic were determined as frequency of exposure to traumatic events, traumatic experiences stories, setting emphaty with traumatised patients, heavy work-load, increasing interaction with patients and long working hours (21). Similarly, in our study a significant relation was detected between monthly working hours, having 6-10 night shifts and rarely experiencing tarumatic delivery.

At present study it was identified that as the age of midwvies reduced, secondary traumatic stress scores increased accordingly. Similarly in other study it was emphasised that being single and young was related with high level of burnout (22). At present study it was determined that as the number of midwives in clinics increased complied with case load, psychological resilience of them increased as well. When the relevant literature examined, it was obvious that using a midwifery model providing service in compliance with case load provides lower level of burnout compared with traditional models (22).

The main reason for that was stated as autonomy, continuity of the care, flexibility of the working Schedule (23). In their study conducted in Australia Paterson et al. (2010) reported the mean working hours of the midwives as 28.7 hours weekly. Wiegers et al., (2014) remarked in their study that the mean working hours for midwives, assigned at primary healthcare services, in Netherland was 32.6 hours weekly. In the same study the monthly working hours of midwives was identified as 180.20±18.13 hours and as the monthly working hours of the midwives increased, their secondary traumatic stress scores increased as well. Since we have the minimum 40 hours of working as a developing country and having higher birth rates, the risk for secondary traumatic stress gets higher for midwives in our country.

In current study secondary traumatic stress scores of midwives being dissatisfied with their profession was detected higher. Similarly, in a study carried out with midwifery students by Bayri Bingöl et al., (2021), it was deduced that the secondary traumatic stress of those being dissatisfied with midwifery education were higher than others. Midwives are accepted to experience profession-related psycological problems (2, 16). Exposure to high level of emphatic relation characterised with midwife-woman relation poses a certain risk for secondary traumatic stress development (26). In our study it was revealed that when the women perceived their delivery experience as a trauma, it increased the stress level of healthcare providers. In a qualitative study on the issue suggested that midwifery students internalized the disappointment experienced by the women and those emotions led to stress, insufficiency and feeling of failure afterwards (27).

At present study, it was found out that 48.8% of the midwives were affected by various reasons emerging from delivery room setting including the characteristics of care-related trauma. Other studies on the issue emphasised that more than two-third (67.2%) of the midwives might experience secondary traumatic stress and PTSD due to managing of traumatic deliveries and perineal incidents regularly (16, 17). Contrary to our study, more than 95% of the midwives reported that they never experienced a traumatic incident directly or indirectly at hospitals (16). In their study Dahlen and Caplice (2014) indicated that the main source of fears of midwives emerge from the death of the mother/infant, an emergency condition and undesired delivery experience. Thus, encountering a traumatic delivery or a perineatal incident even if rarely, poses a risk for secondary traumatic stress.

Literature suggested that social support was an important factor increasing psychological resilience (29). Social support has also a positive impact on the psycohological resilience of the family (30). Presence of a social support programme might contribute to the psychological resilience.

CONCLUSION

All the midwives included in the study were identified to every one out of three of them met the criteria regarding PTSD. The midwives who are not satisfied with their profession, young and with little experience were determined as the risk group in terms of traumatic stress. As the number of shifts and monthly working hours of midwives increase, their traumatic stress scores increase accordingly. As the number of births and midwives increase in the clinic, the level of psychological resilience also increases. Increasing age and professional experience decreased traumatic stress and increased psychological resilience. It was determined that as the level of traumatic stress increased, psychological resilience decreased. In order to reduce the traumatic stress of midwives and increase their psychological resilience, especially young and less experienced midwives in the risk group should be more supported by the management, psychosocial support groups should be established when they need it, and adequate support should be provided.

DECLARATIONS

Funding

The authors declared that this study received no financial support.

Conflicts of Interest

No conflict of interest was declared by the authors.

Ethical Considerations

Marmara University Health Sciences Institute Ethical Committee (10.09.2018; 180) approval and required permission from Directorate of Health of Istanbul province (16867222-604.01.01/21/05/2019). Midwives, accepting to participate in the study voluntarily, working as a midwife, having a delivery clinic experience for at least 6 months, were included in the study.

Data Availability Statement

Data are available on request from the authors.

Authorship Statement

The two authors meet the authorship criteria and that all authors are in agreement with the final version of the manuscript.

The corresponding author confirms that authors meet the authorship criteria and are in agreement with the content of the manuscript. Both authors designed the study, analysed data, and drafted and revised the final version for manuscript. D.Y. collected the data and approached the participants.

Acknowledgements

We thank the midwives who agreed to participate in this study and participated in the interviews.

REFERENCES

1- Ayers S. Birth trauma and post-traumatic stress disorder: the importance of risk and resilience. Journal of reproductive and infant psychology. 2017;35(5):427–430. doi:10.1080/02646838.2017.1386874

2- Hajiesmaello M, Hajian S, Riazi H, Majd HA, Yavarian R. Secondary traumatic stress in iranian midwives: stimuli factors, outcomes and risk management. BMC Psychiatry. 2022;22(1):56. doi:10.1186/s12888-022-03707-7

3- Yilmaz AN, Aksoy Derya Y, Altiparmak S, Güçlü Cihan E, Öztaş HG. Investigating the relationship between the depression levels of midwives and nurses and their emotional labor and secondary traumatic stress levels in the COVID-19 pandemic period with structural equation modelling. Arch Psychiatr Nurs. 2022;40:60-67. doi:10.1016/j.apnu.2022.04.002

4- Bayri Bingol F, Demirgoz Bal M, Aygun M, Bilgic E. Secondary traumatic stress among midwifery students. Perspectives in psychiatric care. 2021;7(3):1195–1201. doi:10.1111/ppc.12674

5- Potter P, Deshields T, Rodriguez S. Developing a systemic program for compassion fatigue. Nursing administration quarterly. 2013;37(4):326–332. doi:10.1097/NAQ.0b013e3182a2f9dd

6- Davies S. Caring for Future Midwives. AIMS Journal. 2016;28(1):6-8. https://www.aims.org.uk/journal/index/28/1

7- Hart PL, Brannan JD, De Chesnay M. Resilience in nurses: an integrative review. Journal of nursing management. 2014;22(6):720–734. doi:10.1111/j.1365-2834.2012.01485.x

8- Kavi E, Karakale B. Psychological resilience related to labor psychology. HAK-İŞ International Journal of Labour and Society. 2018;7(17):55-77. doi:10.31199/hakisderg.391826

9- Yildirim G, Kidak LB, Yurdabakan I. Secondary Traumatic Stress Scale: An adaptation study/Ikincil Travmatik Stres Olcegi: Bir uyarlama calismasi. Anadolu Psikiyatri Dergisi. 2018;19(1):45-52.

10- Basım HN. Çetin F. The reliability and validity of the Resilience Scale for Adults-Turkish Version. Turkish journal of psychiatry. 2011;22(2):104–114.

11- Toohill J, Fenwick J, Sidebotham M, Gamble J, Creedy DK. Trauma and fear in Australian midwives. Women and birth : journal of the Australian College of Midwives. 2019;32(1):64-71. doi:10.1016/j.wombi.2018.04.003

12- Cohen R, Leykin D, Golan-Hadari D, Lahad M. Exposure to traumatic events at work, posttraumatic symptoms and professional quality of life among midwives. Midwifery. 2017;50:1–8. doi:10.1016/j.midw.2017.03.009

13- Nightingale S, Spiby H, Sheen K, Slade P. Posttraumatic stress symptomatology following exposure to perceived traumatic perinatal events within the midwifery profession: The impact of trait emotional intelligence. Journal of advanced nursing. 2018; doi:10.1111/jan.13719

14- Favrod C, Jan du Chêne L, Martin Soelch C, Garthus-Niegel S, Tolsa JF, Legault F, Briet V, Horsch A. Mental Health Symptoms and Work-Related Stressors in Hospital Midwives and NICU Nurses: A Mixed Methods Study. Frontiers in psychiatry. 2018;9:364. doi:10.3389/fpsyt.2018.00364

15- Beck CT, LoGiudice J, Gable RK. A mixed-methods study of secondary traumatic stress in certified nurse-midwives: shaken belief in the birth process. Journal of midwifery & women's health. 2015;60(1):16–23. doi:10.1111/jmwh.12221

16- Sheen K, Spiby H, Slade P. Exposure to traumatic perinatal experiences and posttraumatic stress symptoms in midwives: prevalence and association with burnout. International journal of nursing studies. 2015;52(2):578–587. doi:10.1016/j.ijnurstu.2014.11.006

17- Leinweber J, Creedy DK, Rowe H, Gamble J. Responses to birth trauma and prevalence of posttraumatic stress among Australian midwives. Women and birth: journal of the Australian College of Midwives. 2017;30(1);40–45. doi:10.1016/j.wombi.2016.06.006

18- Wahlberg Å, Andreen Sachs M, Johannesson K, Hallberg G, Jonsson M, Skoog Svanberg A, Högberg U. Post-traumatic stress symptoms in Swedish obstetricians and midwives after severe obstetric events: a cross-sectional retrospective survey. BJOG: An international journal of obstetrics and gynaecology. 2017;124(8):1264–1271. doi:10.1111/1471-0528.14259

19- Robertson N, Perry A. Institutionally based health care workers' exposure to traumatogenic events: systematic review of PTSD presentation. Journal of traumatic stress. 2010;23(3);417–420. doi:10.1002/jts.20537

20- Schrøder K, Jørgensen JS, Lamont RF, Hvidt NC. Blame and guilt - a mixed methods study of obstetricians' and midwives' experiences and existential considerations after involvement in traumatic childbirth. Acta obstetricia et gynecologica Scandinavica. 2016;95(7):735–745. doi:10.1111/aogs.12897

21- Gates DM, Gillespie GL. Secondary traumatic stress in nurses who care for traumatized women. Journal of obstetric, gynecologic, and neonatal nursing: JOGNN. 2008;37(2):243–249. doi:10.1111/j.1552-6909.2008.00228.x

22- Fenwick J, Sidebotham M, Gamble J, Creedy DK. The emotional and professional wellbeing of Australian midwives: A comparison between those providing continuity of midwifery care and those not providing continuity. Women and birth:journal of the Australian College of Midwives, 2018;31(1):38–43. doi:10.1016/j.wombi.2017.06.013

23- Dixon L, Guilliland K, Pallant JF, Sidebotham M, Fenwick J, McAra-Couper J, Gilkison A. The emotional wellbeing of New Zealand midwives: Comparing responses for midwives in caseloading and shift work settings. 2017. doi:10.12784/NZCOMJNL53.2017.1.5-14

24- Paterson JL, Dorrian J, Pincombe J, Grech C, Dawson D. Mood change and perception of workload in Australian midwives. Industrial health. 2010;48(4):381–389. doi:10.2486/indhealth.mssw-01

25- Wiegers TA, Warmelink JC, Spelten ER, Klomp T, Hutton EK. Work and workload of Dutch primary care midwives in 2010. Midwifery. 2014:30(9);991-997.

26- Coldridge L, Davies S. "Am I too emotional for this job?" An exploration of student midwives' experiences of coping with traumatic events in the labour ward. Midwifery. 2017;45:1–6. doi:10.1016/j.midw.2016.11.008

27- Davies S, Coldridge L. 'No Man's Land': An exploration of the traumatic experiences of student midwives in practice. Midwifery. 2015;31(9):858–864. doi:10.1016/j.midw.2015.05.001

28- Dahlen HG, Caplice S. What do midwives fear? Women and birth: journal of the Australian College of Midwives. 2014;27(4):266–270. doi:10.1016/j.wombi.2014.06.008

29- He FX, Turnbull B, Kirshbaum MN, Phillips B, Klainin-Yobas P. Assessing stress, protective factors and psychological well-being among undergraduate nursing students. Nurse education today. 2018;68:4–12. doi:10.1016/j.nedt.2018.05.013

30- Hunter B, Warren L. Midwives' experiences of workplace resilience. Midwifery. 2014;30(8):926–934. doi:10.1016/j.midw.2014.03.010

Acıbadem Univ. Sağlık Bilim. Derg. 2023; 14 (2): 318-325
https://doi.org/10.31067/acusaglik.1178882

REVIEW / DERLEME

Radiology / Radyoloji

A Unique Model of Performance-Based Premium Pay System in the Radiology Departments

Özge Kovan[1], Berna Eren[2], M. Olcay Çizmeli[3]

[1]Acıbadem University, Vocational School of Health Services Medical Imaging Techniques Program, Istanbul, Turkey

[2]Acıbadem University, Faculty of Health Sciences Department of Health Management, Istanbul, Turkey

[3]Acıbadem University, Radiology (former), Vocational School of Health Services, Istanbul, Turkey

ABSTRACT

Pay-for-performance (P4P) programs offer financial incentives to healthcare providers to improve the quality of care and patient safety. Various modifications of P4P approaches have been thrust into almost all medical specialities, including radiology, despite being a referral speciality. This article introduces a performance-based premium pay system for radiology personnel implemented in the radiology departments of a private health group in Turkey. The main purpose of the system is to enable the radiology personnel (i.e. technicians, rapporteurs and supporting staff) to earn more in parallel with the increase in their workload, to eliminate the imbalance between wages, to increase the institutional loyalty and commitment of radiology personnel, to ensure ownership of their tasks and equipment, to build up a team awareness, to encourage further training and specialization, and consequently, to improve the overall quality of radiology services.

Keywords: Pay-for-performance, Radiology, Performance-based premium pay, Quality, Radiology technicians

Özge KOVAN

Berna EREN

M. Olcay ÇİZMELİ

Radyoloji Bölümlerinde Performansa Dayalı Özgün Bir Prim Ödeme Sistemi Modeli

ÖZET

Performansa dayalı ödeme programları, bakım kalitesinin ve hasta güvenliğinin iyileştirilmesi amacıyla sağlık hizmet sunucularına finansal teşvikler sağlamaktadır. Performansa dayalı ödeme yaklaşımlarının farklı uygulamaları, radyoloji de dahil olmak üzere tıbbın hemen tüm uzmanlık dallarında kullanılmaktadır. Bu makale, Türkiye'de özel bir sağlık grubunun radyoloji bölümlerinde radyoloji personeline yönelik olarak uygulanan performansa dayalı prim ödeme sistemini tanıtmaktadır. Sistemin temel amacı, radyoloji personelinin (teknisyen, raportör ve yardımcı personel) artan iş yüküne paralel olarak daha fazla kazanç elde etmelerini sağlamak, ücretler arasındaki dengesizliği gidermek, radyoloji personelinin kurumsal bağlılığını ve sadakatini artırmak, görevlerini ve ekipmanlarını sahiplenmelerini sağlamak, ekip bilinci oluşturmak, eğitim ve uzmanlaşmayı teşvik etmek ve sonuç olarak radyoloji hizmetlerinin genel kalitesini iyileştirmektir.

Anahtar Kelimeler: Performansa dayalı ödeme, Radyoloji, Performansa dayalı prim ödemesi, Kalite, Radyoloji teknisyenleri

Correspondence: Berna Eren
Acıbadem University, Faculty of Health Sciences Department of Health Management, Istanbul, Turkey
Phone: +905322530555
E-mail: berna.eren@acibadem.edu.tr

Received: 22 September 2022
Accepted: 25 December 2022

Performance refers to the ability or the level of efficiency and effectiveness of any organization, individual or group to achieve the targeted outcome(s) regarding both quality and quantity (1). It is universally recognized that qualified and motivated health personnel are essential to ensure efficient and equitable health service delivery. Poor performance of service providers stems from various reasons including low salaries, tough working conditions, and inappropriate training; and may hinder access to appropriate care and contribute to reduced health outcomes. Evidence-based approaches and interventions are required to improve workforce performance. These interventions could be grouped as job-related, support-system related and those that create an enabling work environment (2, 3).

In the health sector, the payments of health personnel could be grouped in two simple ways: a fixed payment based on a scheme mutually agreed by the employer and the employee so that both parties know up-front what they are willing to pay or expect to be paid, and an incentive-based payment which links payment to performance (4). At the turn of this century, the reports by the Institute of Medicine (IOM), particularly 'Crossing the Quality Chasm' which called for a shift from rewarding volume-based efforts to rewarding quality-driven health care, emphasized the quality of care and patient safety, and recommended the establishment of financial incentives to healthcare providers to achieve higher levels of quality (5-7).

The system is known as pay-for-performance (P4P) and is used as "an umbrella term covering the initiatives aimed at improving the quality, efficiency, and overall value of healthcare" (8). It basically depends on payments linked to compliance with the safety and quality measures rather than fee-for-service (FFS), daily rates, fee schedules and capitation (9). P4P is founded on the concept that the quality of care will improve if physicians earn bonuses for providing high-quality care (10).

The P4P model has been widely accepted and implemented within the past two decades and new types of health care payment systems have been developed. Various aspects of care or results have been rewarded in different programs, such as using structure, process, outcome, or coordination of care measures with composite measures of quantity and quality (pay for quality); focusing on the validity and reliability of the quality measures and data collection procedures (pay for reporting); rewarding cost reduction or cost containment by using health care utilization measures (pay for efficiency), or rewarding providers for improving quality while keeping cost constant, or reducing cost while maintaining or improving quality (pay for value). The performance measures in P4P programs also vary, such as only clinical process measures of quality; structural measures of information technology investment, use of electronic medical records, and organization of care; outcome measures through patient satisfaction indicators; and cost or resource utilization measures are sometimes included through assessment of drug utilization, the annual cost per patient or per beneficiary, or cost per patient per month (5, 11).

The implementation of P4P programs, which mostly focus on disease management and hospital care, had been challenging for hospital-based radiology. Radiology represents an important segment of the process of care, however, is distant from eventual patient outcomes and rarely receives feedback regarding how imaging affected final patient outcomes, hence lacks observable measures of performance (5).

The current study focuses on a performance-based premium pay system implemented in the radiology departments of a private health group in Turkey. The health group, founded in 1991, currently owns 22 hospitals and 18 medical centres in five countries, offering diagnostic and treatment services in line with the requirements of JCI accreditation and certified health standards.

Overview of the Performance-based Premium Pay System in the Radiology Departments

The performance-based premium pay system was developed in 2006 by the Head of Radiology Department and launched following its approval by the senior management. The purpose is to enable the radiology personnel (i.e. technicians, rapporteurs and supporting staff) to earn more in parallel with the increase in their workload, to eliminate the imbalance between wages, to increase the institutional loyalty and commitment of radiology personnel, to ensure ownership of their work/tasks and equipment, to build up a team awareness, to encourage further training and specialization, and consequently, to improve the overall quality of radiology services.

The system is applied to the radiology personnel including (i) medical imaging technicians (also referred to as x-ray technicians), (ii) Magnetic Resonance Imaging (MRI) technicians, (iii) Computed Tomography (CT) technicians, (iv) angiography (DSA) technicians, (v) radiology nurses (also referred to as medical imaging nurses), (vi) rapporteurs, and (vii) Picture Archiving and Communication System (PACS) officer.

The monthly income of radiology personnel consists of two parts; a base salary and variable pay based on turnover. The base salary depends on the profession of the radiology personnel and is determined by a scale set on the criteria of seniority (i.e. when seniority levels up, the base salary also increases to that of the higher category) and specialization status. The annual increase rate within the hospital is reflected in the base salary. The transition time to the next seniority level differs between radiology technicians and MRI technicians for the first five years of employment, then it evens out. The radiology nurses receive a nurse's salary applied by the hospital, therefore no base salary is defined within this system. The technologist in charge earns the highest base salary (Table 1).

Table 1. The scale of base salary in radiology departments (2019 data)

Seniority within hospital	Base salary	Base points
Technician in charge	2.350	10
3+ years of MRI experience	2.225	10
5+ years of experience	2.225	10
1-3 years of MRI experience	1.900	10
3-5 years of experience	1.900	10
<1 years of MRI experience	1.850	10
1-3 years of experience	1.850	10
Radiology Technician	1.830	10
Radiology Nurse	-	3
Rapporteur	1.830	3
PACS Officer	1.830	3

The variable pay based on turnover (hereby called as premium) constitutes a significant part of the monthly wage and is calculated by using a transparent scoring system, which is communicated to all radiology personnel. Technicians are scored according to certain additional criteria including the years of experience during their employment at the hospital*, years of experience before their current employment, educational status, and responsibilities incurred. Educational status is scored between 1 to 8 points and Vocational School of Health Services graduates get the maximum points. In order to appraise their experience and competency when employed, radiology technicians and MRI technicians get 0.5 and one point respectively for each year of pre-hospital** experience. For each year of experience at the hospital, radiology technologists get one point and MRI technicians receive an additional one point for a maximum of five years. Additional points may be added depending on the personal evaluation by the Head of the Department.

The monthly income of radiology personnel is calculated automatically by using a dashboard as shown in Table 2. The upper left corner cell displays the current date when logged in. The seniority of the personnel and the increase in points in line with the seniority are calculated with the formulas placed in the excel file and change on a daily basis. The general score table consists of 13 columns. The first column shows the names of the radiology personnel. The seniority status of the personnel is calculated automatically in the second column based on the employment dates which are also shown in the third column. The fourth column shows the base points in relation to their job titles and seniority levels (refer to Table 1), and the points regarding their educational status are shown in the fifth column. The seniority within the hospital, as shown in the sixth column, automatically changes depending on the daily calculation in the second column; and the seventh and eighth columns show the pre-hospital experience and pre-hospital MRI experience points which are pre-defined and unvarying. The MRI seniority score in the ninth column increases by one point each year but is limited to a maximum of five. The tenth column is for the use of the Head of Department, where the points will be the result of a more personal evaluation. The points for technologist-in-charge are shown in the eleventh column. The last two columns show the total score and base salary of each employee (refer to Table 1). The resulting total scores on this scoring table form the basis for income sharing (Table 2).

* Hospital" refers to the hospitals of the private healthcare group.
** Pre-hospital" refers to the health institutions that the personnel were employed before

Table 2. The general score table of the radiology department

15.10.2019												
Name, Surname/	**Seniority**	**Employm. date**	**Base**	**Educat. status**	**Seniority within hospital**	**Pre-hospital exp.***	**MRI exp.**	**MRI Exp in Hosp.****	**Perf.**	**Tech in charge**	**Total**	**Base salary**
Tech in charge	20.02	01.09.1999	10	8	20	2,0		5		10	55,00	2.350
MRI Tech 1	15.01	27.09.2004	10	8	15	3,0	5	5			46,00	2225
MRI Tech 2	10.10	22.12.2008	10	8	10	2,0	4	4			38,00	2225
MRI Tekn 3	07.05	24.05.2012	10	8	7	3,0	5	1			34,00	2225
DSA Tech 1	08.04	01.07.2011	10	8	8	0,0		3			29,00	2225
DSA Tech 2	10.08	02.03.2009	10	8	10	5,5		3			36,50	1850
Rx Tech 1	15.07	05.04.2004	10	8	15	2,5					35,50	2225
Rx Tech 2	11.02	08.09.2008	10	8	11	4,0					33,00	1850
Rx Tech 3	07.03	25.07.2012	10	8	7	1,0	1	1			28,00	2225
Rx Tech 4	14.02	21.08.2005	10	8	14	0,5					32,50	2225
Rx Tech 5	04.08	11.03.2015	10	8	4						22,00	1900
Rx Tech 6	03.09	03.02.2016	10	8	3						21,00	1900
Rx Tech 7	02.08	02.03.2017	10	8	2	1,0					21,00	1850
Rx Tech 8	04.02	24.08.2015	10	8	4	7,0		5			34,00	1850
Rx Tech 9	09.01	01.10.2010	10	8	9						27,00	2225
Rx Tech 10	00.07	25.03.2019	10	8	0						18,00	1850
Rapporteur 1	01.08	18.02.2018	3	8	1						12,00	1830
Rapporteur 2	04.12	26.10.2014	3	8	4						15,00	1830
PACS Officer	01.08	14.03.2018	3	5	1						9,00	1830
Nurse 1	06.08	06.03.2013	3	8	6						17,00	
Nurse 2	02.05	15.06.2017	3	5	2						10,00	

*"Pre-hospital" refers to the health institutions that the personnel were employed before
**"Hospital" refers to the hospitals of the private healthcare group

Once the turnover of the radiology department is copied to the relevant field shown in Table 3 by the Head of the Department at the end of each month, the premium totals are reflected in columns on the right. As the radiology technicians do not perform USG, its revenues are not included.

Table 3. Simulated turnover and premium pool of radiology department

Premium pool							
	Revenues (TL)			**2,00**	**Premium (TL)**		
	Jan 19	Feb 19	Mar 19	%	Jan 19	Feb 19	Mar 19
CT Scan	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Direct Rx	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Indirect Rx	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
MRI	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Mammography	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Doppler US				0,00	0,00	0,00	0,00
US				0,00	0,00	0,00	0,00
Interventional Procedures	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Rad. Angiography	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Bone densitometer	100.000	90.000	95.000	2,00	2.000,00	1.800,00	1.900,00
Total Revenues	800.000	720.000	760.000		16.000	14.400	15.200

The total premium income data from the premium pool (shown in Table 3) is automatically allocated to each radiology personnel over the ratio of the individual points to the total points. The first column shows the names of the radiology personnel, the second column shows their scores, and the third column shows the percentage of their scores in the total score pool. The columns on the right show the base salaries and the monthly sum of the salaries and premiums (Table 4).

guide their efforts and commitment towards achieving organizational goals (12-14).

Initially, P4P programs were limited to general medical practitioners, and radiology had been ignored. One of the early studies revealed that a prototype P4P program in cervical cancer screening and mammography had a little overall gain in quality and selectively rewarded "high performance" physicians who merely maintained the status quo to receive bonus payments (15).

Table 4. The premiums and total incomes of radiology personnel

Name, Surname	Tech. Score	Premium Pool %	Premium			Base Salary	Premium + Salary		
			Jan 19	Feb 19	Mar 19		Jan 19	Feb 19	Mar 19
Tech in charge	55,0	9,6	1.534,4	1.381,0	1.457,7	2.350	3.884	3.731	3.808
MRI Tech 1	46,0	8,0	1.283,3	1.155,0	1.219,2	2.225	3.508	3.380	3.444
MRI Tech 2	38,0	6,6	1.060,2	954,1	1.007,1	2.225	3.285	3.179	3.232
MRI Tekn 3	34,0	5,9	948,6	853,7	901,1	2.225	3.174	3.079	3.126
DSA Tech 1	29,0	5,1	809,1	728,2	768,6	2.225	3.034	2.953	2.994
DSA Tech 2	36,5	6,4	1.018,3	916,5	967,4	1.850	2.868	2.766	2.817
Rx Tech 1	35,5	6,2	990,4	891,4	940,9	2.225	3.215	3.116	3.166
Rx Tech 2	33,0	5,8	920,7	828,6	874,6	1.850	2.771	2.679	2.725
Rx Tech 3	28,0	4,9	781,2	703,1	742,1	2.225	3.006	2.928	2.967
Rx Tech 4	32,5	5,7	906,7	816,0	861,4	2.225	3.132	3.041	3.086
Rx Tech 5	22,0	3,8	613,8	552,4	583,1	1.900	2.514	2.452	2.483
Rx Tech 6	21,0	3,7	585,9	527,3	556,6	1.900	2.486	2.427	2.457
Rx Tech 7	21,0	3,7	585,9	527,3	556,6	1.850	2.436	2.377	2.407
Rx Tech 8	34,0	5,9	948,6	853,7	901,1	1.850	2.799	2.704	2.751
Rx Tech 9	27,0	4,7	753,3	677,9	715,6	2.225	2.978	2.903	2.941
Rx Tech 10	18,0	3,1	502,2	452,0	477,1	1.850	2.352	2.302	2.327
Rapporteur 1	12,0	2,1	334,8	301,3	318,0	1.830	2.165	2.131	2.148
Rapporteur 2	15,0	2,6	418,5	376,6	397,6	1.830	2.248	2.207	2.228
PACS Officer	9,0	1,6	251,1	226,0	238,5	1.830	2.081	2.056	2.069
Nurse 1	17,0	3,0	474,3	426,9	450,6	0	474	427	451
Nurse 2	10,0	1,7	279,0	251,1	265,0	0	279	251	265
	573,50	100	16.000	14.400	15.200	38.690	54.690	53.090	53.890

DISCUSSION

P4P programs in the health sector aim to link payments to performance. Measuring performance provides an opportunity to improve quality, and when used with clear financial incentives, it is a great tool to reward and motivate health personnel as well as to provide feedback about their performance. The financial incentives, although varying by the situational and/or individual variables, determine the employees' positions within the organization, assist them in judging their success or failure on the job, and

Whether the P4P initiatives are relevant to radiology and radiologists has also been of debate and several studies discussed the validity of P4P programs in radiology, arguing about the barriers and obstacles to overcome and how implementation can easily be abused or mismanaged (16). Some departments have introduced utilization targets for selected imaging studies, and others have suggested patient outcome measures related to measurable improvements in radiologist behaviour regarding key quality and safety parameters, customer satisfaction surveys, peer-review programs, or measured radiologist report turn-around time (16, 17).

However, performance measures in radiology play an increasingly significant role in health care quality assessment and now form the basis for a variety of P4P programs (18). The Centers for Medicare & Medicaid Services, under its 2017 Quality Payment Program, offers clinicians a merit-based incentive payment system based on a composite performance score across four performance categories, i.e. quality, resource use, clinical practice improvement activities and advancing care information and prioritizes addressing specialities and professionals with a limited number of applicable measures including radiology (19, 20). As an attempt to use P4P to promote high-quality care, the American College of Radiology (ACR) also introduced the Imaging 3.0 initiative as a roadmap to move radiology practices from a volume-based fee-for-service care model to a value-based one (21-23).

The perceptions of employees regarding how payments are determined are vital to setting up a fair payment system. The lack of fairness is likely to lead to feelings of dissatisfaction and to perceptions of discrimination (24). The "sliding scale" approach of incentive-based payment, which ties payment to performance, may be regarded with scepticism due to concerns over how and by whom the payment will be calculated. Therefore, individual criteria such as the nature of the job, the required education, experience and expertise, and the working conditions as well as the performance criteria should be transparent and shared with all employees, and all employees within the organization should understand the relationship between performance and payments and that payments they receive may change depending on their performance (12).

Studies have shown that financial compensation has a significant impact on job satisfaction or dissatisfaction (25, 26). A meta-analysis in 2010 found that pay level is positively correlated with both overall job satisfaction and pay satisfaction; and the level of pay bears a positive, although modest, relationship to the job and pay satisfaction (27). However, it was also found that the rise in job satisfaction after a pay increase is only temporary and the effect fades out with time; job satisfaction increases further when an individual's pay increase is more than his/her peers over the same period, and individuals are more satisfied with their jobs by the mere expectation of it even before the effective pay increase. Additionally, it is suggested that pay increases can motivate employees in the long run if implemented under carefully designed conditions, such as if they are implemented in small but regular rather than higher but less frequent raises even if it adds up to an equivalent amount (28).

In order to implement successful and objective P4P programs with fair and equitable payments in radiology, the financial schemes should be designed/developed with a focus on well-defined structure, process and outcome measures. The measures should be phased in over time, uniform across all providers of imaging services, transparent to radiology personnel in terms of both the judging criteria and the data on which reimbursement decisions are made; and not overly burdensome. Performance measures should apply to all radiology personnel who perform and interpret imaging services, regardless of profession and they need to be owned by the personnel. The radiology or hospital administrator can produce a payment schedule for technicians that can prospectively tie specific productivity and quality measures to performance; and to ensure that they are perceived as acceptable, the payment schedule in question must be agreed upon by both parties, the quantitative and qualitative metrics used must be unambiguously defined and reproducible, and any subjective measures must be subject to validation by a "neutral" third party. The system should also be flexible enough to transition, and can also be used as a peer learning tool (4, 5, 23, 29, 30).

A recent cross-sectional study about the perceptions of radiology personnel who are the recipients of the above-mentioned performance-based premium pay system, shows that 52.5% of the participants have enough information regarding how the system works, 64.4% think that the system increases individual performance, 62.4% think that the system increases team performance, 65.3% believe that the system increases employees' sense of ownership of the department and the equipment, and 72.3% find the premium pay systems in general are useful for radiology personnel (31).

This article presents the unique performance-based premium pay system for radiology technicians working in the radiology departments of a private health group in Turkey. The relevance and implementation of P4P to radiology have been globally discussed in recent decades. However, most of the studies are either about the theory or focus on how P4P programs impact the outcomes (15-17, 23, 32). No similar studies regarding the performance-based payments for radiology technicians are found in the literature.

CONCLUSION

P4P programs use financial incentives to reward healthcare providers for achieving higher levels of quality, and have become a well-established part of many disciplines of medical practice, including radiology. Financial incentives need to be created for all radiology personnel, including the technicians, rapporteurs and supporting staff, who are currently reimbursed far less than the radiologists or not reimbursed at all. This unique model shows that an equitable payment system which reflects the individual performance differences in the pay can be successfully implemented in radiology departments, thus proposing a model for other radiology departments. The payment schedule must be linked to the education, seniority, specialization, workload, etc. and agreed upon by all relevant parties. Performance measures should be developed with the involvement of the radiology personnel and communicated clearly with all the stakeholders. The measures should be clearly defined and cover the entire radiology process, including all the individual steps and functions. A performance-based premium pay system that is fair, simple, yet flexible enough to transition, transparent, specific to the workload at the department, rewarding productivity with determining variables well-known and internalised by the radiology personnel, will be a great tool to enable the radiology personnel (i.e. technicians, rapporteurs and supporting staff) to earn more in parallel with the increase in their workload, to eliminate the imbalance between wages, to increase the institutional loyalty and commitment of radiology personnel, to improve motivation and satisfaction levels within the radiology department, to ensure ownership of their work/tasks as well as the equipment, to build up a team awareness, to encourage further training and specialization, and consequently will improve the overall quality of radiology services. A well-designed P4P program will improve the overall quality of radiology services through reimbursements in parallel with the workload, thus eliminating the imbalance between wages; by increasing loyalty and commitment to the department and organization, ensuring ownership of the tasks and equipment, and building up a team spirit.

DECLARATIONS

Funding

The authors declare that no funding was received during the conduct of the study.

Conflicts of Interest/Competing Interests

The authors declare no conflict of interest/Competing interests.

Ethics Approval

Not applicable.

Availability of Data and Material (Data Transparency)

The authors declare that they had full access to all of the data in this study and the authors take complete responsibility for the integrity of the data and the accuracy of the data analysis.

Authors' Contributions

The authors declare that they all meet the following criteria:

1. Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND

2. Drafting the work or revising it critically for important intellectual content; AND

3. Final approval of the version to be published; AND

4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Van Dooren W, Bouckaert G and Halligan J. Performance Management in the Public Sector. Abingdon, UK: Routledge; 2015.
2. Dieleman M and Harnmeijer JW. Improving health worker performance: in search of promising practices. Geneva: World Health Organization; 2006.
3. World Health Organization. The world health report 2006: Working together for health. Geneva: World Health Organization; 2006.
4. Reiner BI and Siegel EL. Pay for performance (P4P) in medical imaging: The time has (finally) come. Journal of digital imaging 2006;19(4):289–294. DOI: 10.1007/s10278-006-1053-2
5. Moser JW, Wilcox PA, Bjork SS, et al. Pay for performance in radiology: ACR white paper. J Am Coll Radiol. 2006;3:650-664.
6. Institute of Medicine, Committee on Quality of Health Care in America. Crossing the quality chasm: A new health system for the 21st century. Washington, District of Columbia: National Academy Press; 2001. DOI:10.17226/10027
7. Institute of Medicine, Committee on Quality of Health Care in America. To err is human: Building a safer health system. Washington, District of Columbia: National Academy Press; 2000. DOI: 10.17226/9728
8. James J. Health Policy Brief: Pay For Performance. Health Affairs Blog, October 11, 2012. DOI: 10.1377/hpb20121011.90233
9. Millenson ML. Pay for performance: The best worst choice. Qual Saf Health Care 2004;13:323–324. DOI: 10.1136/qshc.2004.011668
10. Pham H, Schrag D and O'Malley A. Care patterns in Medicare and their implications for pay for performance. N Engl J Med 2007;356(11):1130–9. DOI: 10.1056/NEJMsa063979

11. Cromwell J, Trisolini MG, Pope GC, Mitchell JB, Greenwald LM, eds. Pay for performance in health care: Methods and approaches. RTI Press; March 2011. DOI: 10.3768/rtipress.2011.bk.0002.1103
12. Thierry H. Payment: Which meanings are rewarding?. American Behavioral Scientist 1992;35(6):694-707. DOI: 10.1177/0002764292035006006
13. Rynes SL, Gerhart B and Minette KA. The importance of pay in employee motivation: Discrepancies between what people say and what they do. Human Resource Management 2004;43(4):381–394. DOI: 10.1002/hrm.20031
14. Burlacu M-I and Birsan A. The monthly salary as a motivational factor from the perpective of the degree of satisfaction and the quality of life. Proceedings of the 10th International Management Conference "Challenges of Modern Management", November3rd-4th, 2016, Bucharest, Romania. Available at: http://conferinta.management.ase.ro/archives/2016/PDF/4_12.pdf. Accessed May 2022.
15. Rosenthal MB, Frank RG, Li Z, et al. Early experience with pay-for-performance: From concept to practice. JAMA 2005;12:1788–1793. DOI: 10.1001/jama.294.14.1788
16. Boland GWL, Halpern EF and Gazelle GS. Radiologist report turnaround time: Impact of pay-for performance measures. AJR 2010;195:707–711. DOI: 10.2214/AJR.09.4164
17. Enamandram SS, Burk KS, Dang PA, et al. Radiology patient outcome measures: Impact of a departmental pay-for-performance initiative on key quality and safety measures. JACR 2021;18(7):969-981. DOI: 10.1016/j.jacr.2020.12.032
18. Shyu JY-L, Burleson J, Tallant C, et al. Performance measures in radiology. J Am Coll Radiol 2014;11:456-463. DOI: 10.1016/j.jacr.2013.11.019
19. Quality Payment Program Overview. Available at: https://qpp.cms.gov/about/qpp-overview. Accessed June 2022.
20. Centers for Medicare & Medicaid Services. CMS quality measure development plan: supporting the transition to the merit-based incentive payment system (MIPS) and alternative payment models (APMs). Baltimore, MD: Centers for Medicare & Medicaid Services; 2016. Available at: https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Value-Based-Programs/MACRA-MIPS-and-APMs/Final-MDP.pdf. Accessed June 2022.
21. Bolan C. Imaging 3.0: A blueprint for better care. Appl Radiol May 01, 2014. Available at: https://www.appliedradiology.com/articles/imaging-3-0-a-blueprint-for-better-care. Accessed May 2022.
22. American College of Radiology website. Imaging 3.0 initiative. Available at: https://www.acr.org/Practice-Management-Quality-Informatics/Imaging-3 Accessed June 2022.
23. Zhao AH, Burk KS, Enamandram SS, et al. Peer learning in radiology: Effect of a pay-for-performance initiative on clinical impact and usage. AJR 2021;216(6):1659-1667. DOI: 10.2214/AJR.20.23253
24. Jawahar IM and Stone TH. Fairness perceptions and satisfaction with components of pay satisfaction. J Manag Psychol 2011;26:297-312. DOI: 10.1108/02683941111124836
25. Vroom VH. Work and Motivation. New York: John Willey & Sons, 1964.
26. Myers SM. Who Are Your Motivated Workers?. In: Hampton DR., ed. Behavioral conceps in management, 2nd edition, Belmont, CA: Dickenson Pub. Com., Inc., 1972.
27. Judge TA, Piccolo RF, Podsakoff NP, et al. The relationship between pay and job satisfaction: A meta-analysis of the literature. Journal of Vocational Behavior 2010;77(2):157-67. DOI: 10.1016j.jvb.2010.04.002
28. Diriwaechter P and Shvartsman E. The anticipation and adaptation effects of intra- and interpersonal wage changes on job satisfaction, Journal of Economic Behavior & Organization 2018;146:116-140. DOI: 10.1016/j.jebo.2017.12.010
29. Smith PC, Mossialos E and Papanicolas I. Performance measurement for health system improvement: experiences, challenges and prospects. Background document for the WHO European Ministerial Conference on Health Systems: "Health Systems, Health and Wealth". Tallinn, Estonia: 25–27 June 2008. Available at: https://www.who.int/management/district/performance/PerformanceMeasurementHealthSystemImprovement2.pdf . Accessed May 2022.
30. Bisset GS, 3rd. An honest day's work: Pay for performance in a pediatric radiology department. Pediatric Radiology 2017;47(7):798-802. DOI: 10.1007/s00247-017-3824-y
31. Kovan O. The impact of performance based incentive payment system used in radiology department on employee satisfaction: Case of a private health group [dissertation]. Istanbul (TR): Acibadem University; 2020.
32. Andriole KP, Prevedello LM, Dufault A, et al. Augmenting the impact of technology adoption with financial incentive to improve radiology report signature times. J Am Coll Radiol 2010;7:198–204. DOI: 10.1016/j.jacr.2009.11.011