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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.

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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.

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

Test Repetition From The Viewpoint of Biological Variation

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ABSTRACT

Purpose: The present study was set out to investigate the effect of test repetition within the biological variation perspective by addressing reanalyzing an individual sample on total variation. This study also demonstrated to what extent a laboratory result of an individual reflects a homeostatic set-point.

Methods: The total variation values were determined for different coefficients of analytical variation (CVA) corresponding optimum (CVA = 0.25 x CVI), desirable (CVA = 0.5 x CVI), and minimum (CVA = 0.75 x CVI) limits of performance specifications for imprecision. The effect of a number of analytical measurements on the total variation for a single sample was simulated. Furthermore, the percentage of closeness to the true homeostatic setting point (D) was determined for commonly used 27 analytes.

Results: This study showed that the total variation reduction with reanalysis of an individual sample was lower than 19%, 10%, and 3% for the tests meeting the minimum, desirable and optimum level of specification limits, respectively. Furthermore, the reduction was only 9.4%, 5.1%, and 1.5% for duplicate analysis of an individual sample at the abovementioned limits.

Conclusion: This study demonstrated that test repetition has a negligible effect on the total variation, especially when analytical performance meets optimum and desirable performance specifications. D values reported in this study can guide laboratory professionals and clinicians about to what extent a result of an individual reflects homeostatic set-point.

Keywords: Clinical Laboratory Science, Intra-Individual Biological Variation, Quality Improvement

Biyolojik Varyasyon Açısından Test Tekrarı

ÖZET

Amaç: Bu çalışma, tek bir örneğin yeniden analiz edilmesini ele alarak biyolojik varyasyon perspektifinde test tekrarının toplam varyasyon üzerindeki etkisini araştırmak için düzenlenmiştir. Bu çalışma aynı zamanda bir bireyin laboratuvar sonucunun ne ölçüde bir homeostatik ayar noktasını yansıttığını da göstermiştir.

Yöntemler: İmpresizyon için performans spesifikasyonlarının optimum (CVA = 0.25 x CVI), istenen (CVA = 0.5 x CVI) ve minimum (CVA = 0.75 x CVI) sınırlarına karşılık gelen farklı analitik varyasyon katsayıları (CVA) için toplam varyasyon değerleri belirlendi. Toplam varyasyona tek bir numunenin analitik ölçüm sayısının etkisi simüle edildi. Ayrıca, yaygın olarak kullanılan 27 analit için gerçek homeostatik ayar noktasına (D) yakınlık yüzdesi belirlendi.

Sonuçlar: Bu çalışma, tek bir numunenin yeniden analizi ile toplam varyasyondaki azalmanın, minimum, istenen ve optimum spesifikasyon limitlerini karşılayan testler için sırasıyla %19, %10 ve %3'ten düşük olduğunu göstermiştir. Ayrıca, yukarıda belirtilen limitlerde tek bir numunenin çift analizi için azalma sadece %9,4, %5,1 ve %1,5 olmuştur.

Sonuç: Bu çalışma, özellikle analitik performansın optimum ve istenen performans özelliklerini karşıladığı durumlarda, test tekrarının toplam varyasyon üzerinde ihmal edilebilir bir etkiye sahip olduğunu göstermiştir. Bu çalışmada rapor edilen D değerleri, bir bireyin sonucunun homeostatik ayar noktasını ne ölçüde yansıttığı konusunda laboratuvar uzmanlarına ve klinisyenlere rehberlik edebilir.

Anahtar Kelimeler: Klinik Laboratuvar Bilimi, Birey İçi Biyolojik Varyasyon, Kalite İyileştirme

Variations determine to what extent a laboratory test result represents the real value of an analyte (1). Some sources of laboratory errors like the preparation of a patient, collection, transportation, and storage of samples constitute challenging but preventable causes of variations (2, 3).

Apart from the aforementioned pre-analytical issues, analytical variation and inherent biological variation constitute two critical components of variation (1). Analytical variation is assessed by some specification limits to keep it to be as good as needed to be fit for the purpose. One of the widely used specification limits is derived from the biological variation databases. Random analytical error, bias, and total error of clinical laboratories can easily be compared with these goals to ensure laboratories' compatibility (4). Random analytical error designated as imprecision defines the closeness of measured values obtained by repetitive measurements under specified conditions. Standard deviation and analytical coefficient of variation (CVA) are utilized to express imprecision (1). Furthermore, the analytical coefficient of variation gains various areas of usage in the clinical laboratory as calculating reference change value (RCV) (5) and measurement uncertainty (MU).

Daily, monthly and seasonal changes occur in the levels of some analytes of an individual. In addition to these changes, there is inherent random fluctuation around the instantaneous homeostatic setpoint, called within-subject biological variation (6).

A practical formula suggested previously is utilized to determine total short-term variation by taking into consideration the analytical variation and within-subject biological variation (1):

$CV_T=\sqrt{(CV_A^2 / n_1 + CV_I^2 / n_2)}$(Formula I)

CV_T: total variation

CV_A: analytical variation

CV_I: within-subject biological variation

n_1: total number of analytical measurements

n_2: number of samples taken from the individual

Test repetition, including reanalyzing an individual sample and resampling, can be considered when an erroneous result is suspected. These two approaches can be regarded within the biological variation perspective. The present study was set out to investigate the effect of test repetition within the biological variation perspective by addressing reanalyzing an individual sample on total variation. This study also demonstrated to what extent a laboratory result of an individual reflects a homeostatic set-point.

MATERIAL AND METHODS

The total variation values were determined for different CVAs corresponding optimum (CVA = 0.25 x CVI), desirable (CVA = 0.5 x CVI), and minimum (CVA = 0.75 x CVI) limits of performance specifications for imprecision according to Formula I (1) given below:

$CV_T=\sqrt{(CV_A^2 / n_1 + CV_I^2 / n_2)}$

CV_T: total variation

CV_A: analytical variation

CV_I: within-subject biological variation

n_1: total number of analytical measurements

n_2: number of samples taken from the individual

The effect of a number of analytical measurements (n1) on the total variation for a single sample (n2 = 1) was simulated using Formula I.

The number of samples (n) needed to get defined closeness (D) to the true homeostatic setting point assuming single analysis were calculated for 27 analytes including, alanine aminotransferase (ALT), aspartate aminotransferase (AST), gamma-glutamyl transferase (GGT), alkaline phosphatase (ALP), lactate dehydrogenase (LDH), creatinine kinase (CK), amylase (AMY), pancreatic amylase (PAMY), lipase (LIP), sodium (Na), potassium (K), chloride (Cl), magnesium (Mg), inorganic phosphorus (IP), total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL), non-high-density lipoprotein cholesterol (non-HDL), triglycerides, glucose, urea, uric acid, total protein, total bilirubin, direct bilirubin, and hemoglobin A1c (HbA1c) using the following Formula II (1):

$n=(Z \times \sqrt{[CV_A^2 + CV_I^2]} / D)^2$

CV_A and CV_I: as in formula I

D: The percentage of closeness to the true homeostatic setting point.

Z: Coverage factor set to 1.96 corresponding to a 5% false rejection rate

The Formula II was inversely modified to yield D as a function of n in the Formula III:

$D=(1.96 \times \sqrt{[CV_A^2 + CV_I^2]}) / \sqrt{n}$

The number 1.96 is the above-mentioned Z-score.

When there is no test repetition with an additional sample, n equals 1.

The percentage of closeness to the true homeostatic setting point (D) was determined for 27 analytes mentioned above.

Micorsoft Excel version 16.54 was used for reanalysis simulation.

RESULTS

Figure 1 shows simulation outcomes related to the effect of reanalyzing an individual sample on total variation. Reanalyzing an individual sample reduced the contribution of analytical variation to the total variation and eventually decreased overall total variation. The reduction in the total variation reached a steady-state level by the increasing number of reanalysis.

The variation reduction was ~3 % for CVA = 0.25 x CVI, ~10 % for CVA = 0.5 x CVI, and ~19 % for CVA = 0.75 x CVI at steady-state levels.

The number of samples needed to get defined closeness (D) to the true homeostatic setting point is given for 27 analytes in Table 1. While one sample is sufficient to achieve 10 % closeness to the homeostatic setting point for Na, K, Cl, Ca, Mg, IP, total cholesterol, glucose, total protein, ALP, LDH, and Hba1c, other analytes require more than one sample to achieve 10 % closeness. An analytical measurement of a sample results in different D values for each analyte. Interestingly, the D value is over 40 % for triglycerides, total, and direct bilirubin tests for a single measurement of a single sample (Table 1).

DISCUSSION

The effect of reanalysis on total variation was mainly dependent on imprecision. The reduction in the variation was lower for lower CVA (Figure 1). The true value of a measurand should be within "the analysis result ± D" when pre-analytical variation is reduced to an insignificant level. The present study deduced D values for 27 analytes.

The effects of test repetition on total variation were investigated in two studies. Firstly, Peterson showed that repeating tests with high individuality indexes can decrease false-positive test results (7). Then, Fraser elucidated this issue by proposing the aforementioned useful formula (Formula I). This formula has shown that reanalyzing an individual sample and resampling decrease contributions of analytical variation and intraindividual biological variation (1).

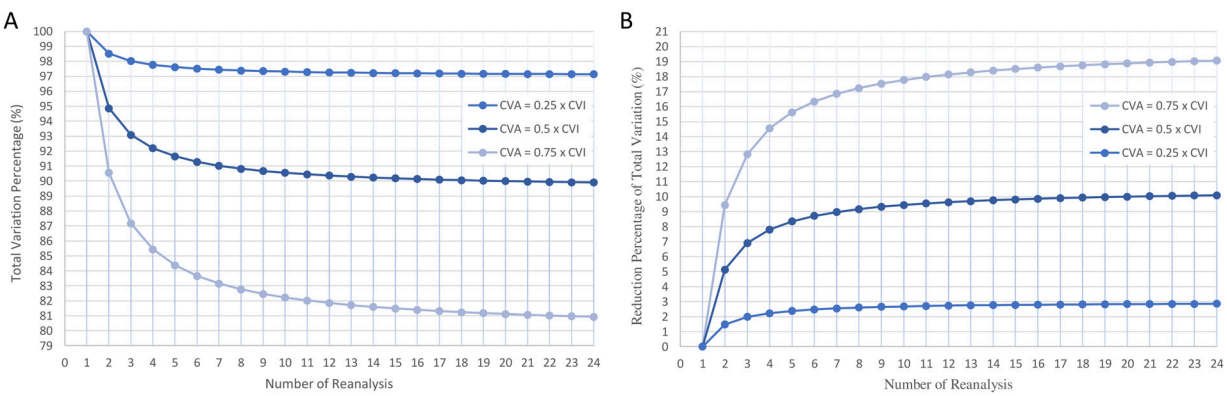

Figure 1: Relationship between number of reanalysis and total variation for different thresholds of CVA, A: The change of total variation with increasing number of reanalysis, B: Reduction percentage of total variation with increasing number of reanalysis.

A desirable analytical variation should be lower than half of the within-subject biological variation (4). When the test performance complies with these specification limits, the contribution of analytical variation to total variation will be significantly lower than within-subject biological variation (1). In the same way, the present study showed that the total variation reduction with reanalysis of an individual sample was lower than 19%, 10%, and 3% for the tests meeting the minimum, desirable and optimum level of specification limits, respectively (Figure 1). Furthermore, the reduction was only 9.4%, 5.1%, and 1.5% for duplicate analysis of an individual sample at the abovementioned limits. These findings have shown that reanalyzing an individual sample does not substantially reduce the total variation, especially for the tests meeting desirable and optimum specification limits.

In terms of resampling, Formula II could be considered (1) for calculating the number of samples (n) needed to get defined closeness (D) to the true homeostatic set-point assuming a single analysis conducted. Fraser questioned resampling numbers proposed by some guidelines in 2004 (1). However, biological variation data have been updated since 2004. Moreover, within-subject biological variation values were reduced to some degree. Therefore, n has also been reduced. A novel example of the number of samples to reach 10% closeness to the true homeostatic set-point by using biological variation data (8-10), has been given in Table 1. It was postulated that test CVAs were at the desirable specification limits. This study showed that only one sample with a single analysis is sufficient for Na, K, Cl, Ca, Mg, IP, total cholesterol, glucose, total protein, ALP, LDH, and Hba1c to reach 10% closeness to the true homeostatic set-point (Table 1).

Table 1: Number of Samples Required to Reach D% Closeness to Homeostatic Set-point (n)

Analytes	% CV_I	% Desirable Imprecision	n (D = 10%)	%D (n=1)
ALT	9.3	4.7	4	20.4
AST	9.5	4.8	4	20.8
GGT	8.9	4.5	4	19.5
ALP	5.3	2.7	1	11.6
LDH	5.2	2.6	1	11.4
CK	14.5	7.3	10	31.8
AMY	6.8	3.4	2	14.9
PAMY	6.3	3.2	2	13.8
LIP	7.7	3.9	3	16.9
Na	0.53	0.3	1	1.2
K	3.92	2.0	1	8.6
Cl	0.98	0.5	1	2.2
Ca	1.81	0.9	1	3.9
Mg	2.88	1.4	1	6.3
IP	7.67	3.8	3	16.8
Total Cholesterol	5.18	2.6	1	11.4
HDL	5.67	2.8	2	12.4
LDL	8.46	4.2	3	18.5
non-HDL	6.88	3.4	2	15.1
Triglycerides	19.8	9.9	19	43.4
Glucose	4.7	2.4	1	10.3
Urea	14.1	7.1	10	30.9
Uric acid	8.32	4.2	3	18.2
Total protein	2.6	1.3	1	5.7
Total bilirubin	20.9	10.5	21	45.8
Direct bilirubin	20.9	10.5	21	45.8
Hba1c	1.2	0.6	1	2.6

Biological variation data of ALT,AST, GGT, ALP, LDH, CK, AMY, PAMY (pancreatic amylase),and LIP was taken from (8), Na, K, Cl, Mg, IP (inorganic phosphorus), total cholesterol, HDL, LDL, non-HDL, triglycerides, glucose, urea, uric acid, total protein, total bilirubin,and direct blirubin from (9), HbA1c from (10)
CV_I: intra-individual biological variation data

Inversely, Formula II was used to yield D as a function of n in the novel Formula III. Formula III can be used to interpret results near reference interval limits. The true value of a measurand should be within "the analysis result ± D" (for only one sample, the formula III becomes $1.96 \times \sqrt{(CV_A^2 + CV_I^2)}$) when pre-analytical variation is reduced to an insignificant level. Therefore, if a result ± D involves a reference limit, test repetition with an additional sample may change analyte level status. On the other hand, if the analysis result ± D does not include a reference limit, test repetition will not change analyte level status when there is no laboratory error. The laboratorians and clinicians should regard the aforementioned "grey zones" in this aspect.

The percentage of closeness (%D) to the true homeostatic set-point of a result achieved by only one sample with a single analysis is given in Table 1. This table can guide laboratorians and clinicians about to what extent a result of an individual reflects homeostatic set-point.

The present study is limited by representing the calculations (D and n values) reflecting the homeostatic set-point in only healthy individuals. Biological variation data can be affected by health status. Therefore, the n and D values should be interpreted with this caution.

CONCLUSION

This study demonstrated that test repetition has a negligible effect on the total variation, especially when analytical performance meets optimum and desirable performance specifications. Therefore, reanalyzing an individual sample should preferably be performed in case of analytical error and resampling when a pre-analytical error exists.

DECLARATIONS

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Conflicts of Interest

The author declares no conflict of interest.

Ethics Approval

Not applicable.

Availability of Data and Material

Not applicable.

Authors' Contributions

Hikmet Can ÇUBUKÇU conducted this study and wrote the article.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

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Evaluation of Feed Strategy for High Quality Biosimilar IgG Production in CHO Cell Fed-batch Process

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ABSTRACT

Purpose: Chinese Hamster Ovary (CHO) cells are currently the leading hosts for biosimilar Immunoglobulin G (IgG) production in the biopharmaceutical industry. Most eukaryotic proteins are glycosylated, and charge variants affect both the in vivo and in vitro properties of monoclonal antibodies (mAb). Adjusting the N-glycosylation patterns and charge variants while achieving high antibody titer is a production challenge. In this study, the effects of feed type and strategy on cell growth, product titer, glycosylation and charge variation were investigated using different CHO clones producing different IgG mAbs.

Methods: Cultivated CHO cells were supplemented with different feeding schemes, under fed-batch productions of 14 days. Screenings were conducted in spin-tubes and further investigated in 3L bioreactor systems.

Results: Change in feed strategy decreased productivities by 10.4% ($P < 0.05$), while it increased non-fucosylated glycoforms by 33.3% and enhanced galactosylation up to 3-folds. Basic variants were observed to increase 2.5 folds.

Conclusion: These remarkable alterations are of great importance in terms of mAb quality, in a manufacturing point of view, as they provide modulation of efficacy and safety. This reveals that feed strategy is a major driving force that significantly impacts culture longevity, galactosylated glycoforms, high-mannose glycan contents and charge variants.

Keywords: CHO, Biosimilar, Monoclonal Antibody, Feed Strategy, Process Development

CHO Hücrelerinin Kesikli Beslemeli Prosesinde Besleme Stratejisinin Yüksek Kalitede Biyobenzer IgG Üretimi Üzerine Etkisinin İncelenmesi

ÖZET

Amaç: Çin Hemstır Yumurtalık (CHO) hücreleri, günümüzde biyofarmasötik endüstrisinde biyobenzer İmmünoglobulin G (IgG) üretimi için tercih edilmektedir. Ökaryotlar tarafından sentezlenen proteinlerin çoğu glikozillenmiş halde olup yük varyantları, monoklonal antikorların (mAb) in vivo ve in vitro özelliklerini etkilemektedir. Yüksek antikor titresini sağlayayarak N-glikozil profilini ve yük varyantlarını ayarlamak, üretimde zorluk teşkil etmektedir. Bu çalışmada, farklı IgG mAb üreten farklı CHO klonları kullanılarak, besleme türünün ve stratejisinin hücre büyümesi, ürün titresi, glikozillenme ve yük varyantları üzerindeki etkileri araştırılmıştır.

Yöntem: Kültür edilen CHO hücreleri, 14 günlük kesikli-beslemeli üretimleri boyunca farklı besleme düzenleriyle takviye edilmiştir. Taramalar spin-tüplerde yapılıp ileri analizler 3L biyoreaktör sistemlerinde yürütülmüştür.

Bulgular: Besleme stratejisindeki değişim, fukozillenmemiş glikoyapıları 33.3% oranında, galaktozillenmeyi ise 3 kata kadar arttırırken, üretim verimliliğini 10.4% ($P<0.05$) düşürmüştür. Bazik varyantlar 2.5 kat artmıştır.

Sonuç: Bu değişimler, etkinlik ve güvenlik düzenlemelerini sağladıklarından, üretimde mAb'ların kalitesi açısından büyük önem taşımaktadır. Bu bulgular, besleme stratejisinin kültür ömrünü, galaktozillenmeyi, mannoz yapılarını ve yük varyantlarını önemli ölçüde etkilediğini göstermektedir.

Anahtar Kelimeler: CHO, biyobenzer, monoklonal antikor, besleme stratejisi, proses geliştirme

In recent years, monoclonal antibodies (mAbs) have shown to be promising therapeutics against autoimmune diseases, cancer, inflammation, and infectious diseases (1). Quality compliance and related approval of mAbs demand controlled glycosylation to meet the required characteristics, thus biosimilarity. The conformational changes that cause altered glycan compositions, in result, impact their binding affinity to the Fcγ receptors, which affect mAb immunogenicity, pharmacokinetics (PK), stability and safety (2). Glycoprotein processing happens from the endoplasmic reticulum (ER) towards the Golgi (3). As passing through the ER, the reducing ends of oligosaccharides with high mannose are cut by certain enzymes and the process continues in the Golgi (4). Culture conditions are reported to impact the localization and the activity of the proteins involved in glycosylation, and gene expressions of the Golgi resident proteins involved are variable during culture (4,5). Any nutritional limitation may have the potential to reduce nucleotide sugar concentrations within the Golgi, resulting in poor glycosylation (6).

Charge variants are also affected by protein structural modifications, culture media components and co-factor supplementations. They may alter mAb tissue penetration and distribution, binding properties and PK (7).

Since biosimilar development requires the comparability to the reference product, the major quality attributes should be investigated in detail.

Chinese hamster ovary (CHO) cells are known for producing highly similar structures of glycans to those naturally synthesized by humans, while showing reproducible growth that contributes to high mAb production, reducing biomanufacturing costs (8). As with all the expression systems, CHO presents possible drawbacks regarding stability to maintain product quality and uniformity that causes phenotypic drift (9,10). The current industry is rapidly investing on chemically defined media and feed developments that support clonal stability, aiming to boost titers while meeting the quality demands (11).

Clone and product specific media-feed screening requires an in-depth cell culture study, that would mimic the conditions of a production process. Fed-batch culture is a widely used strategy to screen for the optimum supplements regarding clone and product of interest.

Here, we emphasize the criticality of the feed choice and regimen, as the major driving forces compromising cell growth and longevity, production, glycosylation and mAb charge distribution. We performed a comparative study using different CHO clones cultured under varying feed regimens and concentrations. Two different CHO clones were used to investigate the clonal dependence of alterations in quality attributes related to feed strategy, such as titer, glycosylation and charge variance. Three chemically defined feeds, developed for CHO fed-batch cultures were investigated under two different feeding regimens, as Feed A – Feed B combination or solely Feed Y. Feed A is a supplement containing various nutrients with a glucose concentration of 80 g / L, designed to be used in combination with an amino acid supplement Feed B, to boost mAb production. Feed Y is a single part high nutritional supplement that contains 20 g / L glucose. Feed analysis under different Feed Y concentrations ensures that the outcomes are only related to the feed and supplementation schedule, minimizing the experimental errors related to nutrient shortage. We conducted a detailed screening study to analyze the effects of the stated parameters on cell growth, viability, lactate generation, culture pH, osmolality, mAb production and scrutinized the impact of feed selection on quality attributes, by conducting fed-batch bioreactor productions with the optimum supplementation. Titers were analyzed using HLPC, glycosylation and charge variations as key quality attributes were investigated with mass spectrometry and iCEF, respectively. The study clearly reveals the product related clonal dependency of feed supplementation.

MATERIALS AND METHODS

Cell lines

Two stable CHO-M clones, producing either an IgG1 (CHO-02 clone) or an IgG2-IgG4 (CHO-03 clone) hybrid mAb were sub-cultured in chemically defined media (BalanCD CHO Growth A, Irvine Scientific) supplemented with 6 mM L-glutamine (Gibco®, Life Technologies). Cells were cultivated in vent-cap shake flasks (Corning®, Sigma-Aldrich) under 37 °C, 5% CO_2, 80 - 85% RH, 150 rpm shaking conditions, in CO_2 -controlled incubator (Thermo Scientific).

Fed-batch culture

Cultured CHO cells were cultivated in vented spin tubes (Tubespin Bioreactor 50, TPP) with 15 mL working volume at 3 ($\pm$ 0.5) $\times$ 10^5 VC / mL inoculation density for fed-batch experiments of 14 days, at 37 °C, 5% CO_2, 80 - 85% RH, 300 rpm shaking conditions. Cells were fed with FeedA (HyClone Cell Boost 7a, Cytiva), FeedB (HyClone Cell Boost 7b, Cytiva) as control condition (C-1), and FeedY (BalanCD CHO Feed4, Irvine Scientific) for six experimental conditions (C-2 to C-7), as carbon and nitrogen sources (Table.1).

Table.1 Experimental design for fed-batch feed strategy screening of CHO-03 and CHO-02 clones in 50 mL vented spin tubes. All conditions were replicated (n=2)	
FS-1 (Standard Feed Strategy)	PD3, PD6, PD7, PD8, PD10 and PD12 (6 days)
FS-2 (Test Feed Strategy)	PD3, PD5, PD7, PD9, and PD11 (5 days)
Conditions (% v/v) for CHO-03 clone	
C-1 (Control)	FeedA (30%) + FeedB (2.5%) with FS-1 Strategy
C-2	FeedY (30%) - with FS-1 Strategy
C-3	FeedY (25%) - with FS-1 Strategy
C-4	FeedY (20%) - with FS-1 Strategy
C-5	FeedY (30%) - with FS-2 Strategy
C-6	FeedY (25%) - with FS-2 Strategy
C-7	FeedY (20%) – with FS-2 Strategy
Conditions (% v/v) for CHO-02 clone	
C-1 (Control)	FeedA (30%) + FeedB (2.5%) - with FS-1 Strategy
C-5	FeedY (30%) - with FS-2 Strategy

Bioreactor production

CHO-02 Fed-batch productions were conducted in 3L Single-Use Bioreactors (Mobius® Cell Ready), with a starting cell density of 3 (± 0.5) × 10^5 VC / mL , under FS-1 strategy either using FeedA (30% v/v) – FeedB (2.5% v/v) combination (BR-AB Bioreactor, Control) or using FeedY (30% v/v) (BR-Y Bioreactor). Productions were conducted at moderate pH of 6.9, 60% dissolved oxygen conditions. Temperature was shifted to 35 °C on PD5 and glucose concentrations were targeted to be 5 g / L starting from PD6. The control reactors represent our standard production.

Analyses

Samples were centrifuged at 200 × g, + 4 °C (Sigma 1-16K). Titers were analyzed using PA-HPLC (Waters Arc-Bio). Viability and viable cell density (VCD) were analyzed by Vi-CELL XR (Beckman Coulter). Metabolite and pH measurements were conducted using ABL90 FLEX (Radiometer). Osmolality measurements were done by Micro Osmometer 3320 (Advanced Instruments). Glycosylation and charge variant analyses were performed on supernatant samples after purification with Amicon® Pro Purification System (Merck).

Glycosylation

Rapi-Flour-MSTM (RFMS) kit (Waters, Milford) was used for N-Glycan analysis regarding the manufacturer's instructions. Released N-glycans were injected to Acquity H-class Bio UPLC with FLR detector coupled to XEVO G2-XS QToF-MS. BEH Amide column (2.1 × 150 mm, 1.7 mm particle size, 130 Å pore size) (Waters, Milford) was used for HILIC separation. N-glycans were identified and quantified by utilizing calibration curve derived from RFMS labeled dextran ladder. Mass confirmation was achieved with Q-ToF MS data, via UNIFI software v1.8 (Waters, Milford).

Charge variants

The iCE3 detector with PrinCE autosampler (Protein Simple, San Jose, CA) and flouro-carbon coated (FC-coated) capillary (100 µm ID X 50 mm, Protein Simple) was used for imaged capillary isoelectric focusing analysis (icIEF). Methyl cellulose (MC) solutions, pI markers, anolyte and catholyte solutions were obtained from ProteinSimple. Ampholite mixture consisting of Servalyte 7-9 (Serva) and Pharmalyte 3-10 (GE Healthcare Life Sciences) at 3 : 1 ratio respectively, was used for sample preparation. IEF was performed with 0.08 M phosphoric acid in 0.1% MC as anolyte and 0.1 M sodium hydroxide in 0.1% MC as catholyte. Electropherograms were captured at 280 nm with iCE 21 CFR Software (Protein Simple). Data were analyzed with Empower 3 Software (Waters, Milford).

Statistical analysis

Significance of the CHO-03 screening results were evaluated using either one-way (titer) or two-way variance (VCD and viability) analysis (one-way ANOVA, two-way ANOVA), with ± 95% confidence interval. CHO-02 bioreactor production results were evaluated using t-test ($P < 0.05$). GraphPad Prism 9.0.0 software was used for all the statistical analyses.

Results and discussion

Feed strategy, cell growth and metabolism

The effect of feed type on the production clone is highly dependent on the feeding strategy. Supplementation of 30% feed using FeedA+B versus FeedY, either with FS-1 or FS-2 strategies significantly impacted clonal performance in terms of VCD, viability and titer ($P < 0.05$). C-1 (control) cultures of CHO-03 clone reached a peak VCD of 42.91 × 10^6 cells / mL, while it remained at 38.60 × 10^6 cells / mL and 34.76 × 10^6 cells / mL for C-2 and C-5 cultures, respectively (Fig.1a). C-2 cultures could not survive, with culture termination on PD13 (48.9% viability) (Fig.1b). Actually, none of the cultures supplemented with FeedY under FS-1 strategy managed to survive and were all terminated on PD13. Cultures supplied with FeedY only survived under FS-2 strategy.

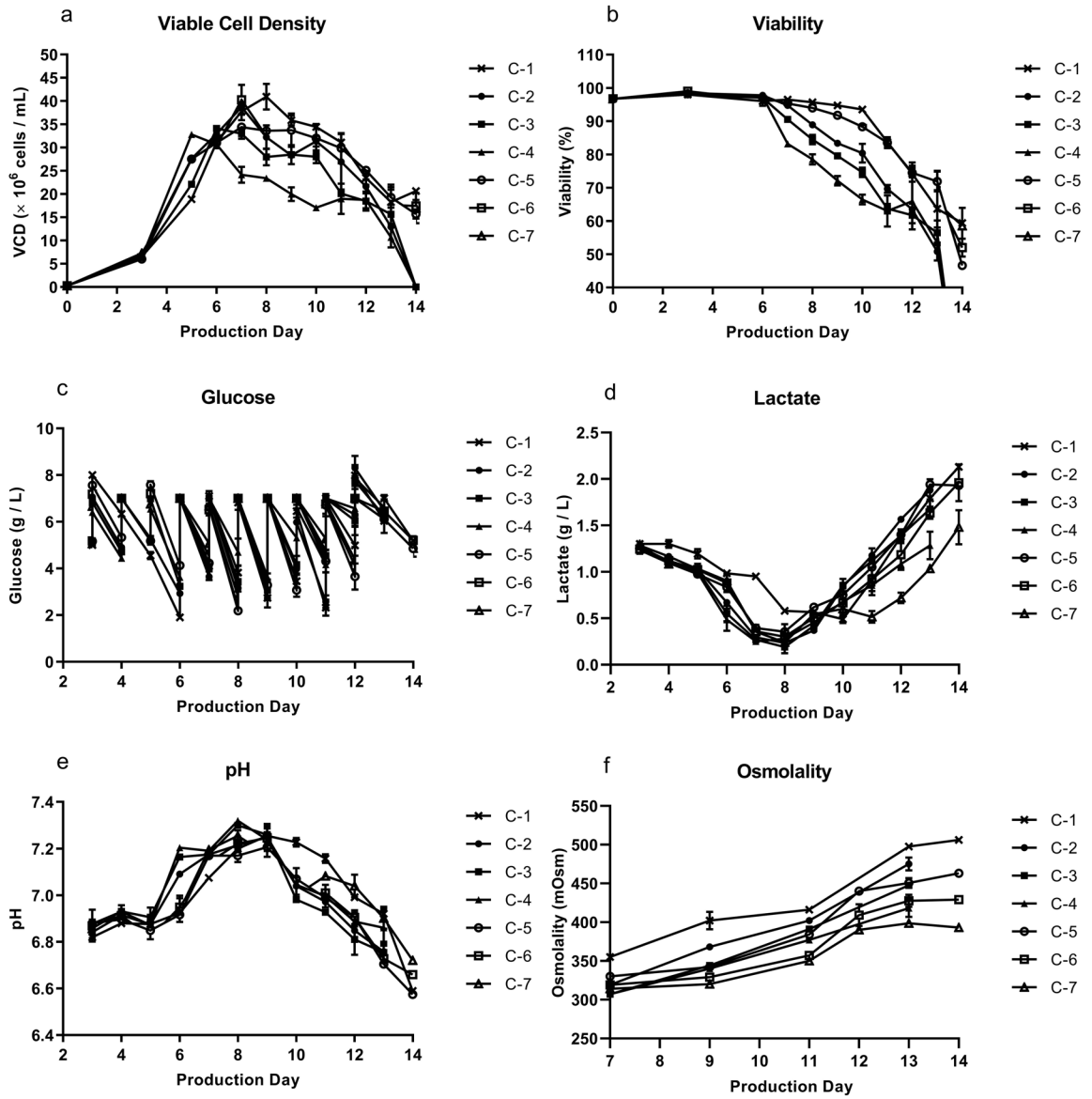


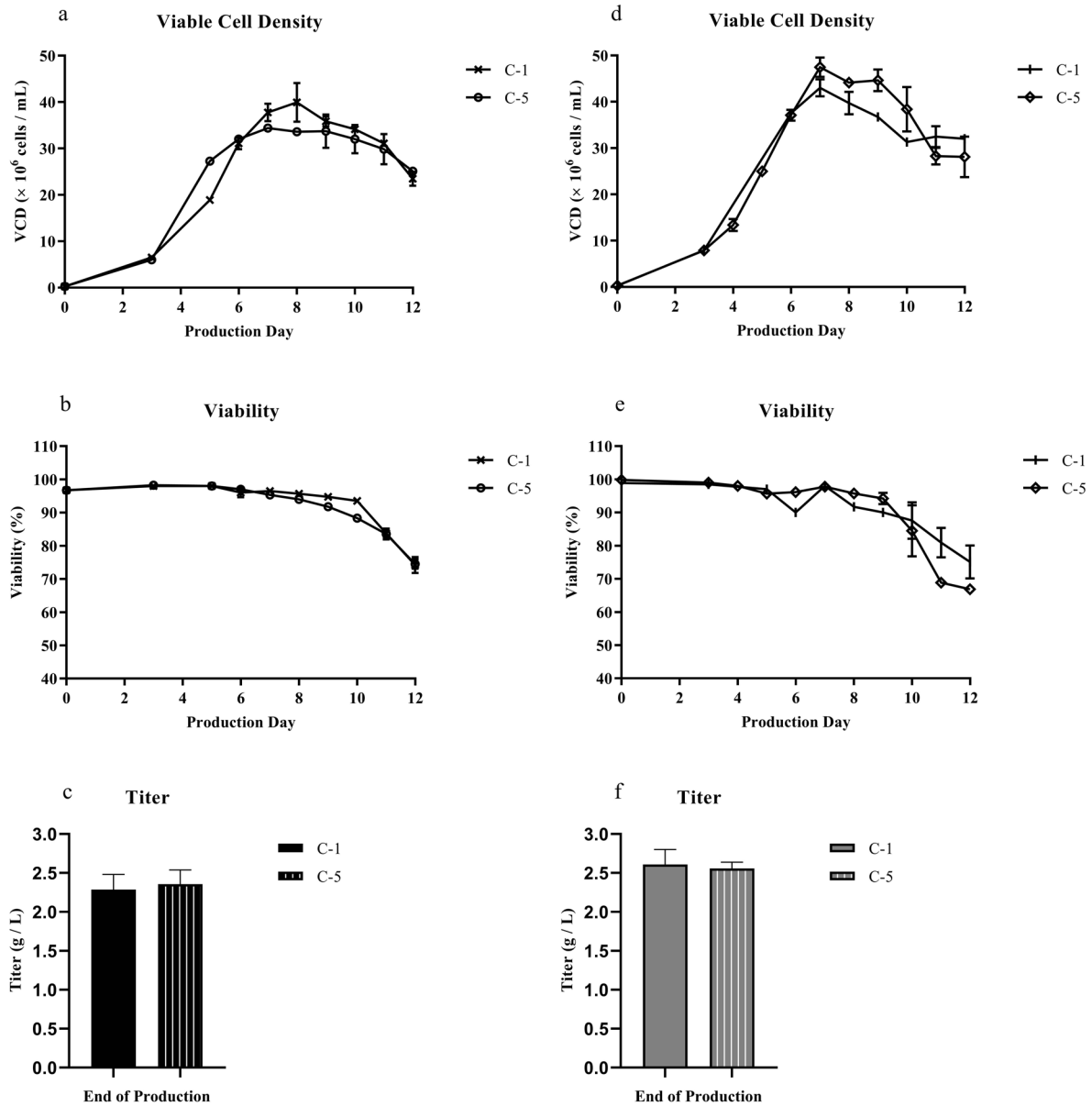
Fig.1 Influence of the seven different feed strategies on CHO-03 cultures monitored during 14 days of fed-batch productions (Fig. 1a – Fig. 1f). The results are presented according to their respective production day measurements. All results are expressed as the mean value ± standard deviation (SD) of two independent samples and error bars are based on ± 5% analytical accuracy of measurement

A study conducted by Rekena et al. in 2019 shows that viable cell densities and viabilities are dependent on feed compositions, regardless of glucose concentrations (12). Different outcomes were observed between FS-1 and FS-2 strategies, which can indicate that feeding regimen is also critical for the proper delivery of nutrients, at required stages of culture growth, maintenance and production (Fig.1c).

CHO-02 spin tube productions had similar VCD, viability and titer with CHO-03 from C-1 to C-5 (data not shown). The best clonal performances were observed with C-1 and C-5, represented in Supplementary Information. The production results showed comparable performance in terms of cell growth and viability, under both feed strategies (Fig.3a, 3b), suggesting similar cellular responses to Feed A (30%) + Feed B (2.5 %) under FS-1 strategy, and to Feed Y (30%) under FS-2 strategy. During the bioreactor

productions, peak VCD were observed on PD9 for both conditions, but BR-AB cells reached higher VCD of 39.18 × 10^6 cells / mL, compared to cells in BR-Y with 33.56 × 10^6 cells / mL. On the other hand, higher end-of-culture viability was observed with the BR-Y (79.9%), compared to the control bioreactor (72.4%).

Lactate productions in CHO-03 spin tube cultures (Fig.1d) were similar and remained below 2.2 g / L among different conditions, with C-4 and C-7 resulting with the lowest concentrations of 1.29 g / L and 1.48 g / L, respectively. This makes sense, since these were the conditions with lowest feed concentrations of 20% v/v. The highest generation of lactate was observed as 2.13 g / L under C-1 condition, resulting with the highest osmolality level of 506 mOsm (Fig.1f).



Supplementary Information Comparative VCD, viability and mAb production results of CHO-03 (left, a – c) and CHO-02 (right,d - f) clones under control condition (30% v/v FeedA + FeedB supplementation with FS-1) and test condition (30% v/v FeedY supplementation with FS-2) monitored during 12 days of fed-batch productions in spin tubes. The results a - f are expressed as the mean value ± standard deviation (SD) of two independent samples and error bars are based on ± 5% analytical accuracy of measurement

FeedY was very effective in lowering lactate generation in bioreactor productions with the CHO-02 clone (Fig.3d). Lactate concentrations were significantly lower with FeedY feeding under FS-2 strategy throughout the process and although they were low and harmless under both conditions, BR-Y production had 66.3% lower final lactate concentration of 0.35 g / L, while the control production was finalized with 1.04 g / L ($P < 0.05$). The osmolality levels observed in the bioreactors, with the set-point pH values successfully maintained, also demonstrates the differences in lactate generations (Fig.3c, 3e).

Lactate accumulation is known to lower culture viability and protein production (13). However, in this study, the viability drops and culture terminations were not related to lactate accumulation, but to the interrelation of the feed type and feeding regimen, as the lactate concentrations did not reach the level to trigger any metabolic effect (14,15). Conditions C-1 and C-4 are supportive in this context (Fig.1a, 1b and 1d). While the viability trend of C-1 culture was the highest throughout the process, C-4 condition could not manage to survive until the end of production.

In a study conducted by Pan et al.(16) on mAb producing CHO cells, following transition from the growth phase to the stationary phase, specific amino acid consumption rates were different than that of glucose. They were decreased during the stationary phase, while the rate for glucose increased. So, for enhanced longevity and productivity, feeding regimen might also be changed during process, to meet the amino acid requirements. These findings also emphasize the importance of glucose addition separately from the feeds, as was done in our study.

Osmolality levels can be affirmative of pH changes during process. As enzymatic activities are dependent on pH, the effects of feed strategy on glycans observed in this study can be attributed to the potential alterations of glycosylation-related enzymes localized in Golgi, according to the results given in Fig.1e and Table.2 (17).

Feed strategy and productivity

Feed type had no significant impact on titers. The C-5 condition produced comparatively similar concentrations of mAb (2.36 g / L) as the control condition (2.29 g / L) with CHO-03 clone (Fig.2a). However, as culture viabilities and VCDs were affected by the feeding regimen, titers were also impacted. The delivery of certain nutrient components on particular production days to support in vitro cell metabolism is necessary to achieve mAb production (18). As FeedY supplementation under FS-1 strategy was not suitable for the cultures metabolically; conditions C-2, C-3, C-4 were terminated earlier in the production process, resulting in lower titers. This finding is supportive of the fact that the timing and concentration is critical, as feed supplements are more concentrated than basal media and that they can contain up to 10 - 15 times higher concentrations of nutrients, when compared to basal media (19). Cultures under C-5 condition exhibited 10.4% lower level of cell specific productivity with 6.9 pg/cell/day, compared to the C-1 condition (Fig.2b), with 7.7 pg/cell/day ($P < 0.05$). A study conducted by Fan et al. (20) on IgG1 producing CHO cells has demonstrated that a balanced amino acid concentration in culture is determinant for enhanced growth to promote IgG production.

Bioreactor production of the control condition yielded higher titer of 3.2 g / L compared to the production with FeedY as 2.8 g / L (Fig.3f).

Table.2 Results of major N-Glycan contents (%) of CHO-03 fed-batch cultures under different feed strategies

N-Glycan Structures	Content (%)							
	Originator (n=4) AVG ± 3SD	C-1	C-2	C-3	C-4	C-5	C-6	C-7
G0	0.15 - 0.27	0.54	1.45	1.32	1.36	1.99	1.54	1.42
G0F	59.10 – 76.60	63.09	59.01	57.51	57.52	59.85	61.45	62.21
G0-GN	0.35 – 1.59	1.19	0.51	0.42	0.37	0.74	0.55	0.40
G0F-GN	2.06 – 9.28	16.43	2.11	1.70	1.66	2.84	2.40	2.26
G1F	6.18 – 21.42	7.30	25.35	27.32	27.73	22.97	23.29	24.00
G2F	0 - 2.71	0.91	5.95	6.43	6.25	4.99	5.10	4.92
Man5	3.78 – 7.37	7.89	4.03	3.75	3.55	4.76	4.08	3.34
Man6	Not Detected	0.89	0.83	0.83	0.90	0.94	0.86	0.81

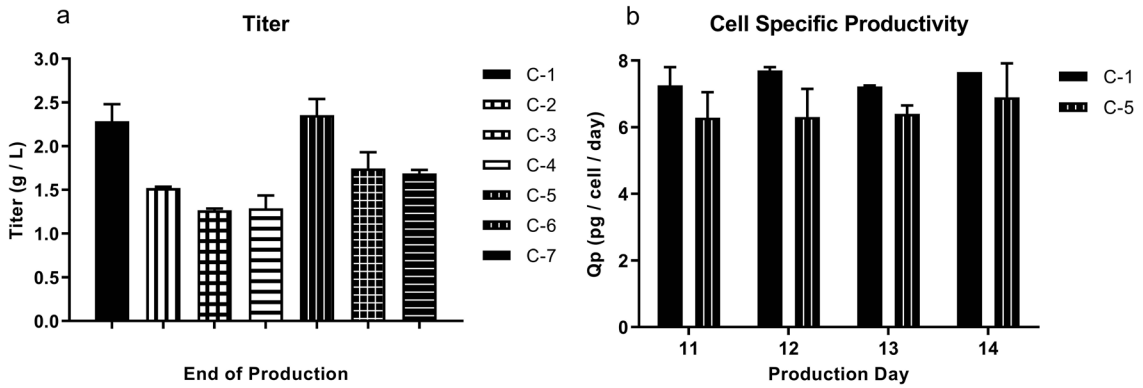


Fig.2 Influence of the different feed strategies on mAb production (left, Fig. 2a) and cell specific productivities (right, Fig. 2b) of CHO-03 cultures monitored during the 14 days of fed-batch productions. Produced mAb concentrations (g / L) are given for all conditions according to the end of production measurements, whereas cell specific productivities (pg / cell / day) are given only for the condition with the highest titer and the control condition, starting from the production day of 11. All results are expressed as the mean value ± standard deviation (SD) of two independent samples and error bars are based on ± 5% analytical accuracy of measurement

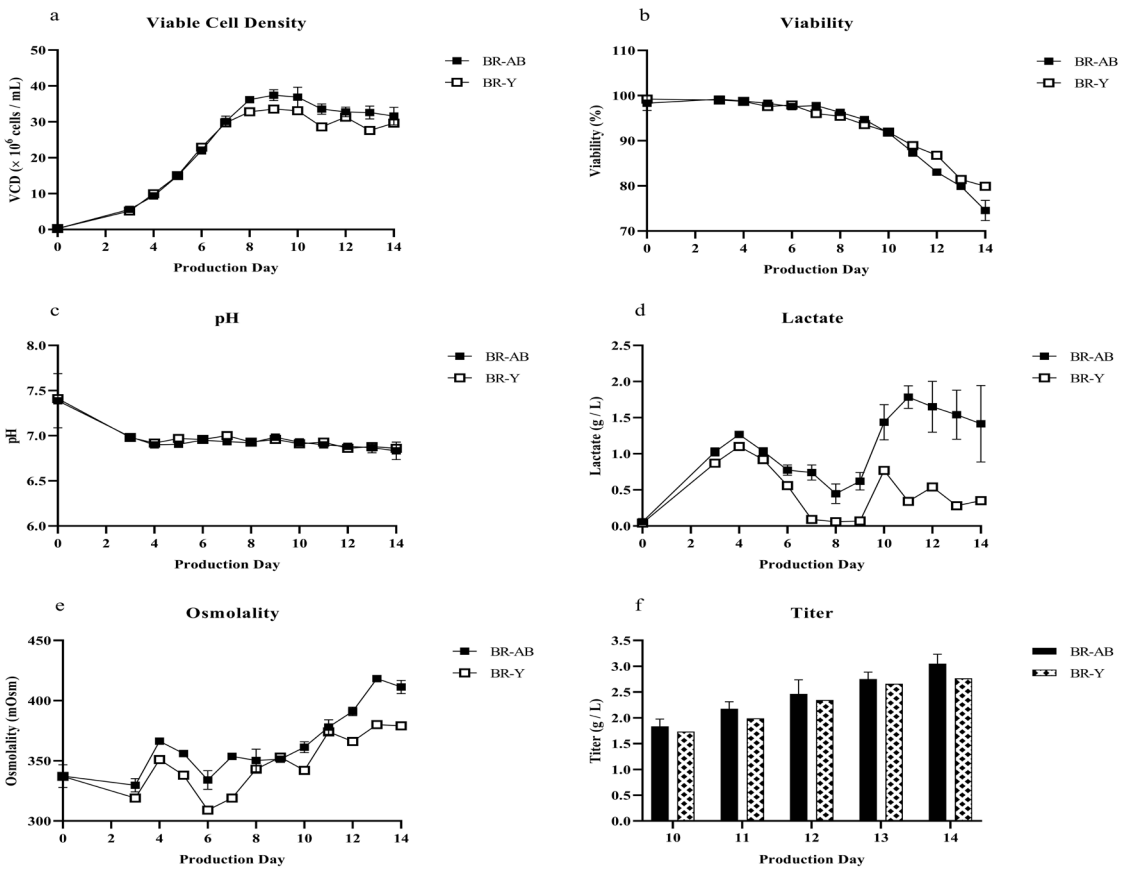


Fig.3 Comparative process monitoring (Fig. 3a – Fig. 3e) and mAb production results (Fig. 3f) of 14 days fed-batch bioreactor productions conducted with CHO-02 clone, under control condition (30% v/v FeedA + FeedB supplementation with FS-1) and test condition (30% v/v FeedY supplementation with FS-2). Statistical significance is based on t-test, with $P < 0.05$

Feed strategy and glycosylation

Feed type was found to impact glycosylation both alone and in correlation with the feeding regimen (Table.2). With the use of FeedY, G0 and galactosylated glycoform contents increased in spin tubes and bioreactor productions, for both clones. C-2 condition of spin tube CHO-03 culture resulted in 2.7-fold, 3.5-fold and 6.5-fold increases in G0, G1F and G2F contents, respectively compared to the control condition. These ratios were 3.7 - folds, 3.2 - folds and 5.5 - folds under FS-2 strategy (C-5). G0 contents were higher under FS-2 strategy and were observed to decline with reducing feed concentrations under this strategy. Galactosylated glycan contents were higher under FS-1 strategy and G1F levels were found to increase with reduced feed concentrations, under both feeding strategies. FeedY supplementation resulted in significant reduction of 39.7% - 57.7% in Man5 levels among the spin tube conditions. While reduced feed concentrations decreased Man5 contents under both feed strategies, the impact was more pronounced under C-7 condition, with a 57.7% reduction compared to the control condition.

The decrease in Man5 levels, together with increasing galactosylated glycan contents observed for C-3 and C-4 conditions with respect to C-2, and C-6 and C-7 conditions with respect to C-5, can be attributed to cell cycle arrest. In a study conducted with CHO cells, by targeting the G1-checkpoint of the cell-cycle, high mannose levels were reduced while galactosylated glycan levels increased (21). However, the reduction in Man5 levels was not observed in bioreactor productions conducted with CHO-02 clone (Table.3).

This finding supports that the key quality attributes of a given protein is highly dependent on process conditions that is specifically adjusted for a certain clone.

Non-fucosylated glycan contents were found to increase with the use of FeedY in bioreactor productions (Table.3). Although the levels exceed the originator ranges for this mAb, this feature can be beneficial for other mAb developments, since reduced fucosylation is one approach to enhance antibody-dependent cellular cytotoxicity (ADCC) activity, as it provides higher antibody efficacy (22). Thus, feed strategy is a successful tool for optimizing mAb glycosylation patterns.

Feed strategy and charge variation

FeedY increased both the acidic and the basic charge variants, the latter being more pronounced, while reducing the main fraction (Table.4). Among processes that contribute to charge heterogeneity such as deamidation, oxidation, sialylation, C-terminal lysine clipping, isomerization, N-terminal pyroglutamic acid and succinimide formation; lysine variants, are generally responsible for the increase in basic variants and may occur either due to product inhibitory effects of Arg and Lys on carboxypeptidase enzymes or due to temperature-dependence of these enzymes responsible for C-terminal lysine cleavage (23,24). Also, high proline amidation linked to high copper and reduced zinc concentrations result in increased lysine variants (25,26). Regarding the impact of temperature, both productions were down-shifted to 35 °C on PD5; however, BR-Y yielded higher basic peaks. Accordingly, the increase in basic variants can be attributed to the difference in amino acid and metal ion concentrations among feeds.

Table.3 Results of N-Glycan contents (%) and calculated structural compositions (%) of CHO-02 fed-batch production bioreactors

N-Glycan Structures	Content (%)					
	Originator (n=10)		3-L CellReady Single-Use Bioreactor			
	– 3 STD	+ 3 STD	BR-AB (control)			BR-Y
G0	0.95	1.93	1.63	1.9	1.81	2.9
G0F	80.69	89.39	77.71	75.93	77.28	68.47
G1F	1.18	13.8	6.69	6.23	6.9	18.97
G2F	0.05	1.34	0.5	0.47	0.52	2.57
G0-GN	0.06	0.39	0.75	0.91	0.74	0.54
G0F-GN	0.14	6.64	8.12	9.54	7.83	2.16
Man5	0.35	1.09	2.03	2.38	2.18	2.2
Man6	0	0.30	0.71	0.57	0.54	0.61
Non-fucosylated	1.01	2.32	2.38	2.81	2.55	3.44
Galactosylated	1.18	15.32	7.19	6.7	7.42	21.54
High Mannose	0.35	1.39	2.82	3.05	2.72	2.81
Total non-fucosylated	1.36	3.71	5.2	5.86	5.27	6.25

Table.4 Results of charge distributions (%) of CHO-02 fed-batch production bioreactors

cIEF	Originator ± 3 STD	BR-AB	BR-Y
Acidic Peaks	19.67-25.46	19.49	22.65
Main Peaks	69.10-76.98	75.71	63.9
Basic Peaks	2.95-5.84	4.81	12.33

CONCLUSION

The abundance of possibilities regarding post-translational modifications necessitates to approach each protein as a unique case during development. As each cell line differs in terms of production needs, their nutritional requirements will be unique and shall be screened and optimized, necessarily. The results of this study clearly put forward the impact of feed and feed strategy on cell growth, viability, glycosylation and charge variants. In the light of the current goal in cell-culture processes towards biosimilar development, adjusting the protein quality attributes from the beginning of the process is pivotal, making media and feed optimization an essential part of process development. Finally, feed strategy has the power to determine culture longevity and modulate protein function through glycosylation and charge variation.

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Conflict of interest statement

There are no conflicts of interest among the authors.

Ethics approval

Not Applicable.

Availability of data and material

All data is available.

Authors' contributions

All the designated authors meet the ICMJE criteria for authorship.

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Detection of *H. pylori* in Pediatric Patients' Stool Sample by Multiplex Urease PCR

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ABSTRACT

Background and objectives: This study aims to detect the *H. pylori* infection in pediatric patients' stool samples by using a multiplex urease PCR assay.

Materials and Methods: A retrospective analysis was performed and the *H. pylori* multiplex urease PCR test from a stool sample of 55 pediatric patients was evaluated from August 2017 to November 2018 compared with the *H. pylori* antigen test and histopathology.

Results: Thirty-six patients (65%) were detected *H. pylori*-positive including nineteen boys (50%) and nineteen girls (50 %) by *H. pylori* multiplex urease PCR test. Fifteen (54 %) of the positive patients were in the 0-6 age range, eighteen (95%) in the 7-12 age range, and three (38%) in the 13-18 age range. Comparison results with the histopathology and *H. pylori* antigen test were showed that the positive predictive value of the multiplex urease PCR test for the stool sample was 72.22%. The test could detect a negative sample of 100 %.

Conclusions: Due to the results of this study it was showed that the prevalence of *H. pylori* infection is still high for pediatric patients. The multiplex urease PCR test for stool samples could be used in the clinic detection of *H. pylori* as a non-invasive method and easy to applicable method, but it needs to be evaluated for high specificity and sensitivity to detect accurate results.

Keywords: *H. pylori*, multiplex PCR, stool sample, pediatric patients

Pediatrik Hastaların Dışkı Örneğinde *H. pylori*'nin Multipleks Üreaz PCR ile Saptanması

ÖZET

Amaç: Bu çalışmada, çoklu üreaz PCR testi kullanılarak pediatrik hastaların dışkı örneklerinde *H. pylori* enfeksiyonunun saptanması amaçlanmıştır.

Yöntem: Retrospektif olarak yapılan bu çalışmada ve Ağustos 2017'den Kasım 2018'e kadar 55 pediatrik hasta dışkı örneğine uygulanan *H. pylori* çoklu üreaz PCR testi, *H. pylori* antijen testi ve histopatoloji test sonuçları karşılaştırılarak değerlendirilmiştir

Sonuçlar: *H. pylori* çoklu üreaz PCR testi ile on dokuz erkek (% 50) ve on dokuz kız (% 50) dahil 36 hastada (% 65) *H. pylori* pozitif tespit edilmiştir. Pozitif hastaların 15'i (% 54) 0-6 yaş aralığında, 18'i (% 95) 7-12 yaş aralığında ve üçü (% 38) 13-18 yaş aralığında olduğu gösterilmiştir. Histopatoloji ve *H. pylori* antijen testi ile karşılaştırma sonuçları dışkı örneği için çoklu üreaz PCR testinin pozitif prediktif değerinin % 72.22 , negatif prediktif değerinin % 100 olduğunu göstermiştir.

Tartışma: Yapılan bu çalışma sonuçları *H. pylori* enfeksiyonu prevalansının pediatrik hastalarda hala yüksek olduğunu gösterilmiştir. Dışkı örnekleri için çoklu üreaz PCR testi, özellikle pediatrik hasta grubunda *H. pylori*'nin klinik tespitinde non-invaziv ve kolay bir yöntem alternatifi olabilecektir. Ancak testin yüksek özgüllük ve duyarlılık açısından iyileştirilmesi için daha fazla örnek üzerinde denenmesi gerekmektedir.

Anahtar kelimeler: *H. pylori*, çoklu PZT, Dışkı örneği, pediatric hasta

Helicobacter pylori (H. pylori) is a bacterial pathogen responsible for the most commonly found infection in the world's population. This pathogenic bacteria is the main cause of gastric diseases such as gastritis, peptic ulcer, and the World Health Organization (WHO) and The International Agency for Research on Cancer (IARC) have identified this bacterium as one of the major causative risk factors for stomach cancer (1). *H. pylori* infection is mainly acquired during adolescence and if it is not treated, it could persist lifelong. Nearly half of the World's population and about one-third of children worldwide are infected with this pathogenic bacteria. *H. pylori* infection prevalence rates are lower in developed countries when it is compared with the developing ones. The rate of *H. pylori* infection, epidemiology, clinical manifestation, and the applicability of diagnostic tests, antibiotic resistance, drug treatment options, and success rates for treatment differ significantly (2-3).

There are different methods to diagnose *H. pylori* infection and these methods are mainly classified as invasive and non–invasive. The invasive ones include endoscopy and biopsy for histologic examination, polymerase chain reaction (PCR), and microbial culture. *H. pylori* antigens, antibodies, and DNA detection in saliva, urine, and stool specimen, are regarded as non-invasive tests. And also urea breath and serology tests are other non-invasive methods. The most frequently used test material is gastric biopsy specimens that are taken from the patients during the invasive methods. However, using stool and saliva samples is the most preferred sample to diagnose *H. pylori* infection as a non-invasive test. Especially for pediatric patients' clinical management, test methods without any instrument introduction are becoming more important (4).

One of the sensitive, specific, and accurate molecular techniques to diagnose *H. pylori* infection is PCR. There are some target genes for the PCR to detect *H. pylori* infection. The stomach has a highly acidic environment. To live in the stomach this pathogenic bacteria produces a urease enzyme to neutralize the environment. The produced urease enzyme decreases the acidity of the stomach environment by generating ammonia and carbonate from urea. There are two subunits in the active site of this enzyme; urease A and urease B. These active sites are coded by the urease A (ureA) and urease B (ureB) genes (5). In one of our articles, we explained that for the first time we developed a multiplex urease PCR for the accurate detection of *H. pylori* from the biopsy specimens taken from the stomach. Due to multiplex urease PCR assay and histopathological staining comparison results the sensitivity of histopathological staining that is one of the widely used methods for the detection of *H. pylori* infection on the gastric biopsy specimens was lower than multiplex urease PCR assay. The accurate detection rate of our multiplex urease PCR is related to that it is possible to detect bacterial DNA that has just begun to colonize(6).

The aim of this retrospective study is to investigate the accurate *H. pylori* infection detection rate of a multiplex urease PCR assay from the pediatric patients' stool sample.

MATERIALS AND METHODS

Patients

55 pediatric patients aged from 0 to 18 years old were included in the study for retrospective analysis who applied to the Pediatric Gastroenterology Department of a state hospital because of gastric complaints (abdominal pain, epigastric, nausea, and vomiting) between 11.08.2017 and 27.12.2018.

Stool Specimen

Fresh stool samples were put into the special stool container with a lid and kept at + 4°C until DNA isolation.

Multiplex Urease PCR

Identification of *H. pylori* infection by using multiplex urease PCR, DNA was isolated from pediatric patients' stool samples by a commercial nucleic acid isolation kit (Quick gDNA, Zymo Research). Isolation experiments were done due to the kit procedure. DNA isolated from patient samples was measured by using a spectrophotometer (ND-2000, ROCHE) and maintained in the refrigerator with –80°C. Amplification of urea A and B genes were done by using the newly designed primers that were shown in Table 1. For the PCR experiments *H. pylori* G27 strain DNA was used as a positive control. Amplification reactions were carried out in a PCR tube with a total volume of 20 µl. All PCR assay mixture ingredients and conditions are shown in Tables 2 and 3. By using an agarose gel electrophoresis the amplified PCR products were loaded to the gels and stained with a nucleic acid dye (SYBR Gold - In vitro gene). To confirm the urease primers specificity positive and negative controls were used.

Table 1. Sequence of Multiplex urease PCR primers for the urea A and B genes amplification

Amplified DNA region(s)	Primer Name	Sequence (5'→3') PCR Product Size (bp)	PCR Product Size (bp)	References
Urease A	ure A-F	TGATGGGACCAACTCGTAACCGT	244	6
	ure A-R	CGCAATGTCTAAGCGTTTGCCGAA		
Urease B	ure B-F	AGTAGCCCGGTAGAACACAACATCCT	645	
	ure B-R	ATGCCTTTGTCATAAGCCGCTTGG		

Table 2. Components of Multiplex Urease PCR assay

Component	Amount
DreamTaq Buffer 10X (including 20 mM $MgCl_2$),	2,5 µl
dNTP (200 µM)	2,0 µl
Forward Primer (20 µM)	1 µl
Reverse Primer (20 µM)	1 µl
Dream Taq DNA polymerase enzyme (0,65 U)	0,69 µl
PCR Grade water	18,81 µl

Table 3. Multiplex Urease PCR conditions

Temperature	Time
95°C	3 min.
95°C	45 sec.
60 °C	45 sec. (45 cycles)
72°C	2 min.
72°C	5 min.
4°C	∞

Statistical Analysis

The sensitivity, specificity, accuracy, and predictive value ratio for *H. pylori* multiplex urease PCR test from stool samples were calculated by using MEDCALC statistical software (7).

MAIN POINTS

- For pediatric patients, it will be more practical to detect *H. pylori* infection from the stool sample with a multiplex urease PCR rather than a biopsy sample.
- Due to the comparison results with the *H. pylori* antigen test, the multiplex urease PCR test has 100% sensitivity with 65,52 specificity.
- The positive predictive value of the multiplex urease test from the stool sample is 72.22 % and the test could detect negative samples with the 100 % percentage. 81.82 % is the accuracy of the test.

RESULTS

The results from 55 pediatric patients examined from 11.08.2017and 27.12.2018 by the multiplex urease PCR were assessed. The population consisted of 24 boys and 31 girls with a mean age of seven. Thirty-six patients (65%) were found to be *H. pylori*-positive including nineteen boys (50%) and nineteen girls (50 %) by *H. pylori* multiplex urease PCR test. Fifteen (54 %) of the positive patients were in the 0-6 age range, eighteen (95%) in the 7-12 age range, and three (38%) in the 13-18 age range (Table 4).

Evaluation of *H. pylori* multiplex urease PCR test for stool sample test results compared with the *H. pylori* antigen test was shown in Table 5. The test has 100% sensitivity with 65,52 specificity. 72.22 %is the positive predictive value of the test and the test could detect negative samples with the 100 % percentage. 81.82 % is the accuracy of the test.

Table 4. Characteristics of 55 pediatric patients.

	Number of patients	Rate of H. pylori Infection
Total	55	38 (69%)
Gender		
Male	24	19 (79%)
Female	31	19 (61%)
Age (Years)		
0-6	28	15 (54%)
7-12	19	18 (95%)
13-18	8	3 (38%)

Table 5. *H. pylori* multiplex urease PCR test from stool samples test evaluation results

Statistic	Value	95% Confidence Interval
Sensitivity	100%	86.77% to 100%
Specificity	65.52%	45.67% to 82.06%
Positive Predictive Value	72.22%	61.15% to 81.11%
Negative Predictive Value	100.00%	86.77% to 100%

DISCUSSION

H. pylori cause the most important bacterial infections involved with about 50% of the population worldwide. This pathogenic bacteria poses a significant health burden, especially in developing countries. Approximately, 10% of children and 80% of adults are infected with this pathogenic bacteria in developing countries. Successful eradication of infection reduces the rate of recurrence, but if it is not treated, it will continue for lifelong (8).

Many different methods were developed to diagnose *H. pylori* infection and mainly these developed methods could be classified as invasive and non-invasive. The most useful invasive method is endoscopy for the detection of this pathogenic bacteria. However, it is not easy to apply endoscopy to all patients like pediatric patients and especially infants.

For the detection of *H. pylori* infection in children, noninvasive diagnostic methods have been used despite their relatively low diagnostic accuracy since invasive investigations like endoscopy are difficult to apply to infants or young children. To be more practical non-invasive tests can be applied to pediatric patients by the analysis of stool, urine, and saliva as bodily materials. Especially the stool sample rather than a biopsy sample as a non-invasive method detection material will be more practical to detect *H. pylori* infection from pediatric patients (9).

As a rapid molecular technique compared to base on culture, polymerase chain reaction (PCR) could be used to diagnose *H. pylori* DNA in stool and saliva samples as an non invasive method. With the help of the PCR, it is possible to detect microorganisms that are present in low numbers and also slow-growing with high sensitivity and specificity. Although culture is defined as the most specific and preferred method to detect *H. pylori*, it is not easy to cultivate this pathogenic microorganism from stool and saliva samples. Thus, compared with bacterial cultivation, the PCR method seems to be a more attractive molecular technique chosen to diagnose this pathogenic bacterial infection for fecal and saliva samples (10-11).

In our previous study, we developed a multiplex PCR for *H. pylori* ure A and ure B genes that could detect bacterial infection by using biopsy samples. The performance of our multiplex urease PCR for biopsy specimen was shown by comparing its results with RUT and histopathology. Cohen's kappa coefficient value comparison results indicated a moderate agreement for histopathological staining and rapid urease test results. Furthermore, rapid urease test and histopathological staining results were negative for some samples that were indicated as positive by the multiplex urease PCR (6).

Herein, we evaluate the performance of our multiplex urease PCR assay to diagnose *H. pylori* infection from the pediatric patient stool sample, and also this retrospective study was showed the *H. pylori* infection rate in the pediatric patients. The positive predictive value of multiplex urease PCR was found 72,22% with 100% sensitivity and 65,52% specificity. Also, the accuracy of the test was found as 81,82%. The main reasons behind these results could be the PCR inhibitors are frequent in stool samples and can lead to false-negative PCR results by decreasing the accuracy of the test.

Our results indicate that approximately 65% of pediatric patients with suspicion of *H. pylori* are found positive in clinical examination in one year. This rate shows that *H. pylori*, which is still an important infection factor in the world, continues in our country In many patients, vomiting, abdominal pain, nausea, and gas problems appear to be common problems.

In conclusion, several different invasives and non-invasive diagnostic techniques are currently available to diagnose *H. pylori* infection. Especially, for pediatric patients, non-invasive test methods are more preferable. PCR assays are increasingly used molecular methods as a standard to diagnose and characterize microorganisms. However, inhibitors found in the analyzed sample may affect the PCR result and cause false-positive or false-negative results. New techniques like a bead or spin column systems could be used during the DNA isolation and a PCR clean-up kit could be used after PCR to overcome these problems.

Our results indicated that the currency of *H. pylori* infection is still high in pediatric patients in our country as the world. The detection of *H. pylori* infection in stool sample multiplex urease PCR could be quite easy especially for pediatric patients. However, many more studies with more samples are needed to evaluate the accuracy of multiplex urease PCR for a stool sample. Using the multiplex urease PCR test as a non-invasive method for the diagnosis of *H. pylori* will be very effective especially for the pediatric patient group that endoscopy applications are difficult.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Dermatology / Dermatoloji

Evaluation of the Knowledge of Sun Damage, Solar Protection and Skin Cancers among University Students and Their Parents

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ABSTRACT

Purpose: Awareness of the harmful effects of the sun, follow up of nevi, and the knowledge of solar protection are important for the prevention and early diagnosis of skin cancers. Our aim is to evaluate the knowledge of university students and their parents about the harmful effects of the sun, and associated skin cancers.

Methods: 653 university students and 615 parents participated in our cross-sectional study. The survey was delivered via the SurveyMonkey application link and demographic data was recorded. Fitzpatrick skin types, natural hair and eye colors, and personal, and family skin cancer history were questioned. Information on the harmful effects of the sun, nevus examination, self-skin examination, symptoms of skin cancers, and facilitating factors were questioned.

Results: 1004 of the participants were women, 264 were men. Fitzpatrick II skin type and brown eyes were the most common in both groups. The nevi follow-up and self-examination habits did not differ statistically between the groups. Nevi follow-up was regarded as essential and requiring a dermatologist. Participants believed that the most common skin cancer was malignant melanoma.

Conclusion: It is important to raise awareness about skin cancers, to follow up nevi and to introduce the habit of self-examination into society in general.

Keywords: Dermatologist, Melanoma, Nevus, Preventive Medicine

Güneş Koruma ve Deri Kanserlerine Dair Farkındalığının Üniversite Öğrencileri ve Ebeveynlerinde Değerlendirilmesi

ÖZET

Amaç: Güneşin zararlı etkileri ve fotokorunmaya dair bilgi ile nevüs takibinin gerekliliğine dair farkındalık, deri kanserlerinden korunma ve erken teşhis için önemlidir. Amacımız, üniversite öğrencilerinin ve velilerinin güneşin zararlı etkileri ve deri kanserleri hakkındaki bilgilerinin değerlendirilmesidir.

Yöntem: Kesitsel çalışmamıza 653 üniversite öğrencisi ve 615 veli katıldı. Anket, SurveyMonkey uygulama bağlantısı üzerinden katılımcılara iletildi. Fitzpatrick deri tipleri, doğal saç ve göz renkleri, kişisel ve aile cilt kanseri öyküsü sorgulandı. Katılımcıların güneşin zararlı etkileri, nevüs muayenesi, kendi kendine deri muayenesi, deri kanserlerinin belirtileri ve kolaylaştırıcı faktörler hakkındaki bilgileri değerlendirildi.

Bulgular: Katılımcıların 1004'ü kadın, 264'ü erkekti. Her iki grupta da en yaygın Fitzpatrick II deri tipi ve kahverengi göz saptandı. Gruplar arasında nevus takibi ve kendi kendine ben muayenesi alışkanlıkları istatistiksel olarak farklılık göstermedi. Nevüs takibinin gerekli olduğu ve dermatolog tarafından yapılması gerektiği bildirildi. Katılımcılar en yaygın deri kanserinin malign melanom olduğunu bildirdi.

Sonuç: Deri kanserleri konusunda farkındalık yaratmak, nevüs takibinin öneminin altını çizmek ve topluma kendi kendine deri muayenesi alışkanlığı kazandırmak oldukça önemlidir.

Anahtar kelimeler: Dermatolog, Koruyucu Hekimlik, Melanom, Nevüs

Ultraviolet rays have harmful effects on human skin. These rays can cause sunburns, skin cancers and aging. Accordingly, intense overexposure to sunlight causes acute sunburn leading to an erythematous skin rash, while chronic exposure leads to both photoaging of the skin and an increased risk of melanoma and non-melanoma skin cancers (1).

Keratinocyte-derived skin cancers are the most common type, but the most lethal skin cancer is malignant melanoma. The facilitating effects of sunlight on the formation of malignant melanoma and keratinocyte-derived squamous cell carcinoma (SCC) and basal cell carcinoma (BCC) are widely known. In addition, the harmful effects of the sun are not only limited to the skin but can cause some damage and diseases in the eyes such as photoconjunctivitis, cataracts and retinal degeneration. Sun rays can also cause uveal/conjunctival melanoma (2).

It has been reported that the incidence of malignant melanoma in the USA has increased by 270% in the last 30 years due to increased life expectancy and UV exposure. It is known that exposure to both natural (sunlight) or artificial UV rays such as tanning beds (solariums) may play a role in the development of melanoma. In addition, iatrogenic exposure may be given with phototherapy. All are known to increase other skin cancers such as BCC and SCC, but this association is stronger in melanoma (3). Apart from the parameters mentioned above, it should be kept in mind that some inalterable phenotypic risk factors such as light skin and eye color are also risk factors for melanoma (4). Being aware of the harmful effects of the sun and following protective behaviors in society may be important in determining future goals and creating a stronger public awareness of this issue (5).

Preventive medicine practice against skin cancers is essential and its popularity is increasing every day. In this regard, it is very important for individuals to know their own skin type and the risks associated with it, to be aware of the risk of familial skin cancer, and to be conscious of protection methods from UV rays (UVR). In addition, it should be known in society that moles on the skin and in areas such as the mouth and genital area may lead to skin cancers and should be strictly followed by a dermatologist. Therefore, the aim of this study is to compare sun awareness between university students and their parents.

MATERIALS AND METHOD

The study was planned as a cross-sectional, online survey study. Istanbul Kent University students and their parents were included in the study. In total, 653 students and 615 parents voluntarily participated in the online survey for the study. The survey was delivered to the participants via SurveyMonkey application link. Permission was obtained before starting the online survey questions, and viewing the other questions was not allowed unless the consent page was accepted.

The age and gender information of the participants who gave consent was recorded and the educational status of the participating parents was questioned. In the survey, totally 39 questions were asked to each participant about solar damage, sun protection methods and skin cancer. Personal and familial history of skin cancer of both students and parents were recorded. In the next step, to determine the skin phototypes, the question "which describes you best?" was asked and the person was asked to mark the answer that best suited them. According to the answers given, the Fitzpatrick skin type of the participants was determined, and no physician evaluation was made. Whether or not all participants were sensitive to the sun was recorded with yes/no questions. In the next step, questions evaluating the knowledge of solar damage, and skin cancer were asked, and sun protection attitudes were assessed.

RESULTS

Demographic Data

1004 of the participants were female (79.2%), 264 were male (20.8%), and the median age was 37 years (min-max: 18-60). While 65.9% of the parents were university graduates, 20% held associate degrees, 8.3% were high school, 3.1% were secondary school, and 2.8% were primary school graduates (Table 1).

Of the parents, 133 were Fitzpatrick type I, 242 were type II, 87 were type III and 153 were type IV (21.6%, 39.3%, 14.1% and 24.9%, respectively). Among university students, 170 were Fitzpatrick type I, 260 were type II, 73 were type III and 150 were type IV (26.0%, 39.8%, 11.2% and 23.90%, respectively).

The distribution of eye color did not differ significantly ($p > 0.05$) between the groups. The distribution of natural hair and eye color in the two groups did not differ significantly ($p > 0.05$), and the rates of having brown eye color and dark brown hair were higher in both groups.

The rate of personal and family history of skin cancer did not differ significantly between the groups ($p > 0.05$ for both).

Table 1. Age, gender, and educational status					
		Min-Max	**Median**	**Mean.sd±/n-%**	
Age		18.0-60.0	37.0	36.2±11.9	
Gender	Female			1004	79.2%
	Male			264	20.8%
Education	Primary			17	2.8%
	Middle			19	3.1%
	High School			51	8.3%
	Associate degree			123	20.0%
	University			405	65.9%

The rate of sun sensitivity and sun protection habit with hats did not differ significantly between the groups (p>0.05). There was no significant difference in the preference of sitting in open areas and choosing shade areas in the university student and parent groups (p > 0.05). The rate of consulting a pharmacist or social media about sunscreen products did not differ significantly (p > 0.05) between the groups. The rate of consulting a family physician or social acquaintances about the choice of sunscreen products in the parent group was significantly higher (p < 0.05) than the student group. In the student group, the rate of consulting a dermatologist about sunscreen products was found to be significantly higher (p < 0.05) compared to the parents (Table 2).

There was no significant difference (p > 0.05) between the groups on the knowledge about the time when the sun is strongest and whether the damage caused by the sun can be repaired. Similarly, there was no significant difference between the groups in response distributions regarding which clothes offer greater protection from UV rays and in which environments there is a risk of sunburn (p > 0.05).

There was no significant difference (p > 0.05) between the groups in determining the angle of sun rays according to the length of shade. There was no significant difference (p > 0.05) between the groups in the knowledge of whether sunbathing during the summer vacations for a few days a year would increase the risk of skin cancer.

Monitoring of Nevi and Evaluation of Awareness about Skin Cancer

The rates of identifying regular nevi follow-up as necessary and self-examination habits did not differ significantly between the groups (p > 0.05). Opinions about which physician should follow up the moles on the body did not differ significantly between the groups (p > 0.05), and the requirement for dermatologist follow-up was answered correctly at a high rate (students: 82.4% and parents: 77.6%) (Table 3).

Table 2. Getting information about sun protection preferences and sunscreen products						
	Student		**Parent**		**p**	
	n	**%**	**n**	**%**		
Do you have sun sensitivity?						
Yes	310	47.5%	262	42.6%	0.081	X^2
No	343	52.5%	353	57.4%		
Do you have a habit of protecting yourself from the sun with a hat?						
Yes	336	51.5%	344	55.9%	0.110	X^2
No	317	48.5%	271	44.1%		
Would you prefer to sit in shade when sitting outside?						
Yes	594	91.0%	555	90.2%	0.660	X^2
No	59	9.0%	60	9.8%		
Who do you consult about sunscreen products?						
Pharmacist	182	27.9%	174	28.3%	0.916	X^2
Family Physician	46	7.0%	99	16.1%	**0.000**	X^2
Dermatologist	289	44.3%	177	28.8%	**0.000**	X^2
Social Media/YouTube	62	9.5%	62	10.1%	0.797	X^2
Social Acquaintances	74	11.3%	103	16.7%	**0.007**	X^2
X^2 Chi-square test						

Table 3. Evaluation of awareness about moles follow-up on the body						
	Student		Parent		p	
	n	%	n	%		
Is it necessary to follow-up the moles?						
Yes	598	91.6%	545	88.6%	0.077	X^2
No	55	8.4%	70	11.4%		
Do you have the habit of skin self-examination?						
Yes	242	37.1%	240	39.0%	0.471	X^2
No	411	62.9%	375	61.0%		
Which specialist follows-up the moles on the body?						
Family physician	30	4.6%	25	4.1%	0.064	X^2
Internal specialist	50	7.7%	71	11.5%		X^2
General surgeon	35	5.4%	42	6.8%		X^2
Dermatologist	538	82.4%	477	77.6%		X^2
X^2 Chi-square test						

Evaluation of Awareness about Moles Follow-up on the Body

There was no significant difference ($p > 0.05$) within the groups regarding the opinions that "dark-skinned people will never have skin cancer" and "excessive exposure to the sun is the only way for a person to get skin cancer" ($p > 0.05$ for both). When the most common skin cancer was questioned in both groups, there was no statistical difference between the answers given and the most common answer was "melanoma" ($p > 0.05$). There was no significant difference in knowledge level between the groups in terms of symptoms of skin cancer ($p > 0.05$).

Evaluation of Sun Protection Measures

The response rate to the question of whether the habit of using sunglasses is essential or necessary for protection against UV rays of the sun did not differ significantly ($p > 0.05$) between the groups. Knowledge of the presence of sunscreen and UV filtered clothing did not differ significantly between the groups ($p > 0.05$).

There was no significant difference between the groups in the response rates on whether tanning with a solarium is safe ($p > 0.05$). The answers given to the statements "it is possible to tan without any negative effects when sunscreen cream/spray is applied" and "tanning protects my skin against the harmful effects of sun" did not differ significantly between the two groups ($p > 0.05$ for both).

Among the questions given in Table 4, only the opinion on whether gradual tanning removes the harmful effects of the sun was statistically significant between the groups. The awareness rate of this proposition, which is known to be false, was found to be higher in university students compared to parents ($p=0.012$).

It was determined that the knowledge and attitudes regarding the correct timing of sunscreen use were not statistically significant between the groups, and the accuracy rates were high in both groups ($p > 0.05$) (Table 5).

Participants have knowledge that both having a severe sunburn and having a family history of skin cancer increase the risk of skin cancer. However, the knowledge that having both sunburn and a family history of skin cancer increase the risk separately was found to be statistically higher in the student group compared to the parents. Alterations in the existing nevi and non-healing wounds, which are symptoms of skin cancer, are concepts that are well known in both groups, and no statistical difference was observed (Table 6).

Table 4. Information on Artificial Tanning Beds

	Student		Parent		p	
	n	%	n	%		
Tanning beds are safe to get a tan						
True	62	9.5%	62	10.1%	0.725	X^2
False	591	90.5%	553	89.9%		
It is possible to get a tan without any negative effects when using sunscreen cream/spray						
True	281	43.0%	286	46.5%	0.214	X^2
False	372	57.0%	329	53.5%		
Tanning protects my skin against the sun						
True	203	31.1%	187	30.4%	0.793	X^2
False	450	68.9%	428	69.6%		
Bronzing sprays provide no sun protection						
True	287	44.0%	250	40.7%	0.235	X^2
False	366	56.0%	365	59.3%		
Tanning with tanning beds (solariums) in winter protects the skin against sun damage in summer						
True	125	19.1%	140	22.8%	0.113	X^2
False	528	80.9%	475	77.2%		
Gradual tanning eliminates most of the negative effects of prolonged sun exposure						
True	494	75.7%	501	81.5%	**0.012**	X^2
False	159	24.3%	114	18.5%		
Tanning is a sign of skin damage						
True	248	38.0%	233	37.9%	0.973	X^2
False	405	62.0%	382	62.1%		
UVR from tanning beds are safer than UVR from the sunlight						
True	134	20.5%	122	19.8%	0.762	X^2
False	519	79.5%	493	80.2%		
Tanning is an unsafe way to get the vitamin D that your body needs						
True	355	54.4%	311	50.6%	0.176	X^2
False	298	45.6%	304	49.4%		
Tanning is a sign of physical health						
True	251	38.4%	232	37.7%	0.793	X^2
False	402	61.6%	383	62.3%		
If you don't usually get sun exposure, getting two or three severe sunburns in your life probably won't increase your chances of skin cancer						
True	276	42.3%	234	38.0%	0.126	X^2
False	377	57.7%	381	62.0%		

X^2 Chi-square test

Table 5. Evaluation of Timing Regarding the Use of Sunscreen Creams						
	Student		Parent		p	
	n	%	n	%		
When to apply sunscreen for best protection?						
Just before exposure to the sun	89	13.6%	93	15.1%	0.573	X^2
15-30 minutes before sun exposure	546	83.6%	501	81.5%		
Within 15-30 minutes after sun exposure	18	2.8%	21	3.4%		
How often should sun protection factor (SPF) 30 sunscreen should be reapplied?						
In every 30 minutes	150	23.0%	134	21.8%	0.153	X^2
In every 2-3 hours and more often when swimming or sweating	433	66.3%	393	63.9%		
None of the above	70	10.7%	88	14.3%		
X^2 Chi-square test						

Table 6. Awareness of Skin Cancers						
	Student		Parent		p	
	n	%	n	%		
Dark-skinned people do not have skin cancer						
True	34	5.2%	39	6.3%	0.386	X^2
False	619	94.8%	576	93.7%		
The only way a person can get skin cancer is overexposure to sun						
True	94	14.4%	111	18.0%	0.077	X^2
False	559	85.6%	504	82.0%		
Which of the following increases your risk of skin cancer?						
Three severe sunburns in the past	54	8.3%	76	12.4%	**0.021**	X^2
Having a family history of skin cancer	182	27.9%	198	32.2%	0.105	X^2
Both options above	390	59.7%	313	50.9%	**0.002**	X^2
None of the above	27	4.1%	28	4.6%	0.820	X^2
What is the most common type of skin cancer?						
Malign Melanoma	313	47.9%	284	46.2%	0.508	X^2
Basal Cell Carcinoma	146	22.4%	125	20.3%		
Squamous Cell Carcinoma	87	13.3%	95	15.4%		
None of the above	107	16.4%	111	18.0%		
Which of the following may be a sign of skin cancer?						
A sudden or gradual change in the appearance of a mole	177	27.1%	175	28.5%	0.549	X^2
A wound that does not heal	83	12.7%	91	14.8%		
Both options above	359	55.0%	315	51.2%		
None of the above	34	5.2%	34	5.5%		
X^2 Chi-square test						

DISCUSSION

It has been reported that skin cancers increase every year in epidemiological studies. Between 2001 and 2010, there was an annual increase of at least 1.6% new incidence. In addition, it has been emphasized that the rates of non-melanoma skin cancers (NMSCs) have increased by 77% in the last 20 years, and malignant melanoma has increased by at least 250% in the last 40 years in young adulthood, adolescence and childhood (6). Due to the increasing frequency, it is very important to be aware of the harmful effects of the sun and to be aware of protection measures. As far as we know, no study has been conducted in Turkey comparing these knowledge and protection attitudes among university students and their parents. However, in a survey conducted by Selçuk et al. in 2019, university students aged 18-26 were evaluated and sun protection behaviors such as wearing hats, wearing long sleeves, using sunglasses and preferring to sit in the shade were evaluated, and it was reported that the participants had high sun protection rates, especially in medical students (7).

Due to the increase in the use of social media and the ease of access to information today, it can be thought that university students have higher knowledge of sun damage and protection attitudes compared to their parents. However, in this study, parents' knowledge, and protective attitudes against the harmful effects of the sun were found to be similar to those of university students in most parameters. This may be due to the fact that this age population also uses social media more actively today and makes use of resources such as conventional media methods.

In a cross-sectional study conducted with university students in Brazil, although sun awareness was found to be higher in health sciences faculties compared to other faculties, it was reported that all participants had sufficient awareness. However, despite the fact that the information questioned in this study is very basic, it has been emphasized that 10% of the population still does not have sufficient information. In addition, although skin cancer and sun damage are known, the frequency of use of sunscreen methods was found to be quite low, and it was found that only one third of the participants used sunscreen regularly (8). Since our study does not only measure the knowledge and protection levels of university students, but also compares this information with their parents, it is not very appropriate to make these inferences. However, the knowledge of university students regarding the harmful effects of the sun is generally sufficient. The group selected in our study was not exclusively selected from medical branches but is a heterogeneous group that includes all faculties. The knowledge of the individuals participating in our study about the harmful effects of the sun showed different results in different questions and can be interpreted as medium-high in general.

In this study, both university students and their parents were found to be highly aware of the need to monitor their nevi and to consult a dermatologist in this regard. However, the rates of skin self-examination habits in both parent and student groups were quite low (parents: 39%, students: 37.1%). Self-examination for breast cancer has become very popular and practiced across society. The internet, conventional media organizations, social media and patient schools have played an important role in obtaining these results (9). However, skin self-examination is not a known and prominent concept today. In a study conducted in 2013, it was determined that only 22% of the participants in all age groups performed annual skin self-examination (10). Although the rates are observed to have increased compared to this year in this study, we still think that it is not an adequate rate. In a study conducted of adolescents in Northern Cyprus in 2019, it was reported that skin self-examination was performed by 39.8% of 163 participants, and was higher in women (11). It has been reported that sensitivity in skin self-examination is between 25% and 93%, but these studies are not randomized-controlled studies (12). Although it has been reported that this examination can be facilitated with mobile phone applications, it has been shown in a randomized-controlled study conducted in Australia that mobile phone applications are not superior to self-examination with naked eye (12). We think that it is necessary to organize community-based education studies and patient schools on skin self-examination. Thus, earlier diagnosis and better response to treatment of skin cancers will be possible and morbidity, mortality and economic burdens related to these diseases will decrease.

Today, with the increasing frequency of social media use and the concern of looking more beautiful and aesthetic, artificial tanning such as solariums and natural tanning such as sunbathing have become increasingly popular among the young population. There is an increasing amount of data showing that the facial appearance of a person significantly affects factors such as personality and attractiveness perception (13). People now use social media platforms such as Instagram more often than other communication methods. The rate of use of these platforms can reach 90%, especially among young individuals between the ages of 18-29, and different photos and content are watched continuously or intermittently. Trends such as looking slimmer are increasing day by day on social media platforms and can lead to a number of consequences such as body dissatisfaction (14). In a study, 80% of young adults between the ages of 18 and 25 who used tanning beds regularly or intermittently used Facebook, 30% regularly or intermittently used Twitter and Instagram platforms, and those who regularly used Instagram and Twitter had higher rates of tanning bed use (15). In addition, it was emphasized that advertising on these platforms to promote artificial tanning is also legal in some countries and the view that this may increase use should not be ignored (16). In this study, data on advertisements promoting artificial tanning were not evaluated. In addition, individuals were not questioned about their artificial tanning habits, but only whether they were aware of the harms of these methods. In the study, students were expected to have higher awareness than their parents. However, the opinion that a solarium is harmful was not found to be statistically significant between the two groups. However, the statement "it is possible to get a tan without any negative effects while using sunscreen" was not commented on correctly at a high rate, like the previous statement, and there is no statistical difference between the two groups. It shows that dermatologists should also contribute to education in these age groups as a preventive medicine duty. In addition, the idea that "gradual tanning removes most of the negative effects of long-term sun exposure" was positively received in both groups. In order to replace this knowledge, family physicians, especially dermatologists, and all branches that take an active role in preventive medicine have important responsibilities.

The questions evaluating the timing and frequency of application of sun protection creams were answered correctly by 81.5% and 83.6% of both parents and students, respectively, and there was no statistical difference between the groups. In addition, the participants answered with high accuracy that the frequency of sunscreen should be repeated every 2-3 hours during the day and that it should be applied more frequently with sweating and swimming (parents: 63.9%, student: 66.3%), and there was no statistical difference between them. However, the applicability of this correct information by these people was not evaluated in this study, which is one of the limitations. Although the level of knowledge is high, the participants may not be using sunscreens correctly. While this situation may be caused by reasons such as cost, it may also be due to not completely understanding the extent of sun damage.

In our study, information about sun damage was determined at various levels in both groups. For example, participants believe that gradual tanning protects against the harmful effects of the sun and that tanning is an indicator of health. In addition, the number of people who think that tanning is necessary to meet their vitamin D needs has been determined at a very high rate. Moreover, protection attitudes such as wearing a hat, using sunglasses, or preferring the shade of the umbrellas in outdoor areas were also evaluated as moderately high. Although the participants knew that their nevi should be followed up by a dermatologist, the rate of skin self-examination was not very high. The rate of consulting a dermatologist on sunscreen products was found to be significantly higher in the university student group compared to parents. Necessary educations and workshops should be conducted in order to increase the rate of application to the right resources for the parent group in terms of choosing the right sunscreen products.

To acquire sun protection habits, it is important to give education at earlier levels, especially at primary school ages. However, according to the data obtained from the study, some misconceptions and misinformation about the harmful effects of the sun and protection persist among university students. For this reason, we are of the opinion that it is not late, and even necessary, to provide relevant education at these ages. In addition, it is very important to determine whether sunscreen usage habits are governed by cost or incomplete information in further studies.

CONCLUSION

Since this study is an online survey based on personal reporting, it does not include an objective physician evaluation. This is especially valid for determining the Fitzpatrick skin type. In addition, considering the cross-sectional

nature of the study, it is not correct to make inferences about causality. In this study, it is not known at what age the individuals who say they have the habit and awareness of sun protection implement these practices, and whether they apply them in every situation. Large-scale and multi-center studies are required to determine these issues.

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Predictive Value of the Intestinal Free Fatty Acid Binding Protein in Celiac Disease

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ABSTRACT

Purpose: Non-invasive tests used in the screening and follow-up of celiac disease (CD) are currently below expectations because they show false negatives/positives and are not always correlated with duodenal histology. We aimed to investigate the predictive value of intestinal free fatty acid binding protein (FABP-I) which can easily be released into the circulation in the presence of enterocyte damage in a short time in CD.

Methods: This study included 59 patients with CD who were not on gluten free diet (GFD)(n=24) and who were on GFD(n=35) and 52 healthy controls. Demographic variables, complete blood count, ferritin, vitamin D, calcium, phosphorus, vitamin B12, prothrombin time, INR, and serum FABP-I levels were recorded for all groups.

Results: There was no difference between the groups in terms of complete blood count, ferritin, calcium, phosphorus, vitamin B12, prothrombin time and INR (all p>0.05). Mean serum FABP-I was determined as 499.2±33.3 ng/L for patients with CD who were not on GFD and as 487.7±48.0 ng/L for who were on GFD, and these values were significantly higher when compared to the healthy controls 432.2±63.8 ng/L(p<0.001). The sensitivity, specificity, positive predictive value, and negative predictive value of FABP-I for a cut-off value of 456.8 ng/L were 84.7%, 69.2%, 10.2% and 61.5%, respectively(AUC=0.785).

Conclusion: This study has shown that FABP-I can serve as a non-invasive predictive marker for CD diagnosis. Overlooked diagnosis in serology-negative patients and false serology positivity for reasons other than CD will be prevented with its use in clinical practice since FABP-I directly reflects intestinal damage.

Keywords: Celiac disease, enterocyte damage, FABP2, FABP-I, gluten-free diet, intestinal free fatty acid binding protein

İntestinal Serbest Yağ Aside Bağlayan Proteinin Çölyak Hastalığındaki Prediktif Değeri

ÖZET

Amaç: Çölyak hastalığının tarama ve takibinde kullanılan non invaziv testler, yalancı negatiflik/ pozitiflik göstermeleri ve duodenal histoloji ile her zaman korele olmamaları nedeniyle günümüzde beklentinin altında kalmaktadır. Son çalışmalar, çölyak hastalığındaki bu eksikliği tamamlamak için barsak epitelyal hasarını gösteren direk belirteçler üzerine yoğunlaşmaktadır. İntestinal serbest yağ asidi bağlayan protein (FABP-I); suda eriyen küçük bir protein olduğu için enterosit hasarını takiben kısa süre içinde dolaşıma salınır. Çalışmamızda FABP-I'nın çölyak hastalığındaki prediktif değerini araştırmayı amaçladık.

Yöntem: Çalışmaya glutensiz diyete (GDF) uyum göstermeyen (n=24) ve GFD'ye uyum gösteren (n=35) 59 çölyak hastası ve 52 sağlıklı kontrol dahil edildi. Tüm gruplarda demografik veriler ve tam kan sayımı, ferritin, vitamin D, kalsiyum, fosfor, vitamin B12, protrombin zamanı, INR ve serum FABP-I düzeyleri kaydedildi.

Bulgular: Tam kan sayımı, ferritin, kalsiyum, fosfor, vitamin B12, protrombin zamanı, INR düzeyleri açısından gruplar arasında farklılık görülmedi (tüm p>0.05). Ortalama serum FABP-I düzeyi GFD uyumsuz çölyak hastalarında 499.2±33.3 ng/L, GFD uyumlu çölyak hastalarında 487.7±48.0 ng/L saptandı ve bu sonuçlar sağlıklı kontrole göre (432.2±63.8 ng/L) anlamlı derecede yüksek bulundu (p<0.001). Serum FABP-I için cut-off değeri 456.8 ng/L alındığında, FABP-I'nin çölyak hastalığı tanısında duyarlılığı, özgüllüğü, pozitif ve negatif prediktif değeri sırasıyla %84.7, %69.2, %10.2 ve %61.5 bulundu (AUC=0.785).

Sonuç: Serum FABP-I, çölyak hastalığı tanısında direkt barsak hasarını gösteren non invaziv prediktif bir belirteçtir. FABP-I'nın klinik kullanıma girmesiyle seronegatif hastalarda tanının gözden kaçması ve çölyak hastalığı dışındaki nedenlere bağlı serolojinin yanlış pozitif olduğu durumlarda tanıdaki zorluklar önlenmiş olacaktır.

Anahtar Kelimeler: Çölyak hastalığı, enterosit hasarı, FABP2, FABP-I, glutensiz diyet, intestinal serbest yağ asidi bağlayan protein

Celiac disease (CD) is an auto-immune, familial disease that develops in genetically predisposed individuals due to intolerance to gluten found in grains and grain products, which typically progresses with malabsorption, creates characteristic lesions in the small intestine and shows clinical improvement when a gluten-free diet (GFD) is adopted. In CD, the primary mechanism responsible for the loss of villous architecture, which is tasked with absorption, is excess enterocyte apoptosis; and the degree of apoptosis is directly related to the extent of villous atrophy. Apart from markers of apoptosis, researchers have discussed searching for different parameters that could indicate intestinal epithelial damage.

Fatty acid binding proteins are 14-15 kDa cytoplasmic proteins that are abundantly expressed in almost all mammalian cells. FABPs regulate the lipid response in cells and are associated with metabolic and inflammatory pathways. Tissues with a rapid rate of fat metabolism, such as intestine, liver, adipose, and muscle tissues, demonstrate high FABP levels that parallel fatty acid intake and use. According to the most recent studies, intestinal free fatty acid binding protein (FABP-I) also known as FABP2 is a sensitive marker of enterocyte damage in CD and its serum levels are correlated with the severity of histological lesions (1,2). This study aims to investigate the predictive value of the FABP-I in CD.

MATERIALS AND METHODS

Study Population and Laboratory Assessments

This study included patients with CD who were on follow-up in the gastroenterology outpatient clinic between October 2017 and January 2018. Group 1 was composed of patients with CD who were not on GFD (n:24) (antibody-positive), Group 2 was composed of patients with CD who were on GFD (antibody-negative) (n:35), and Group 3 was composed of healthy controls working in the hospital (n:52). Patients over the age of 18 who were diagnosed with CD were included in the study. Exclusion criteria were age below 18, positive personal or family history concerning inflammatory bowel disease, pregnancy and/or breastfeeding, liver or kidney disease, use of supplementation with vitamin D and/or calcium salts.

The diagnosis of CD based on the presence of positive–specific autoantibodies (anti- tissue transglutaminase (tTG) IgA) and concomitant diagnostic intestinal biopsies (at least six biopsies) according to Oberhuber/Marsh criteria when Marsh ≥2 (Marsh 0: normal mucosa; Marsh 1: increased number of intraepithelial lymphocytes, exceeding 40 per 100 enterocytes; Marsh 2: the proliferation of the crypts of liberkuhn; Marsh 3: variable villous atrophy; Marsh 3A: partial villous atrophy, Marsh 3B: subtotal villous atrophy, Marsh 3C: total villous atrophy) (3). anti-tTG and endomysial antibodies (anti-EMA) were presented as negative, weakly positive, positive and strong positive. A negative HLA test excluded CD when negative serology and histologic findings were observed. In these cases with conflicting results, serology is repeated after at least six weeks after on gluten containing diet and determining positive autoantibodies confirmed the diagnosis (4). Age, body mass index (BMI), gender, complete blood count parameters, calcium, phosphate, vitamin D, vitamin B12, ferritin, prothrombin time (PT), INR, and FABP-I levels (Biont, YLA1817HU Elisa Kit, China, Shanghai) were recorded for all groups. Age at diagnosis, immunoglobulin A (IgA) levels, anti-tTG IgA, anti-EMA IgA and Oberhuber/Marsh classification of duodenal biopsy specimens at the time of diagnosis were also recorded for patients.

Statistical Analysis

Statistical data were analyzed using SPSS v.23.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were presented as mean ± standard derivation (SD) for continuous variables. Variables were tested for normality using the Kolmogorov-Smirnov test. The Mann-Whitney U or Kruskal- Wallis H were used to compare non-normally distributed variables. Categorical data was analyzed using a chi-square test or Fisher's exact test. The capacity of serum FABP-I values in predicting the presence of CD was analyzed using ROC (Receiver Operating Characteristics) curve analysis. When a significant cut-off value was observed, the sensitivity, specificity, positive and negative predictive values presented. Statistical significance was considered at $p \leq 0.05$.

RESULTS

This study included 59 patients with CD and 52 healthy controls. The mean age of patients with CD was 39.3 ± 11.9 years and 38 (64.4%) of them were female. There were no differences between the groups in terms of age, gender, and BMI. Demographic data of patients and healthy controls have been presented in Table-1. There were no differences between the groups in terms of calcium, phosphate, ferritin, vitamin B12, PT, INR, and complete blood count parameters, except vitamin D and FABP-I (Table-2). Vitamin D level was 21.1±15.0 ng/ml in CD patients who were not on GFD and significantly lower than CD patients who were on GFD (29.2±18.9 ng/ml) and healthy controls (33.7±11.5 ng/ml) **(p= 0.004)**.

Table-1. Demographic and Follow-up Characteristics of the Study Population				
	Celiac Ab (+) Patients	**Celiac Ab (-) Patients**	**Healthy Controls**	**P value**
Number of patients, n (%)	24 (21.6)	35 (31.5)	52 (46.8)	
Sex, female, n (%)	16 (66.3)	22 (62.9)	32 (61.5)	0.911
Age (year) ± SD	38.5 ± 10.2	39.9 ± 13.0	43.9 ± 15.5	0.214
BMI (kg/m^2) ± SD	25.6 ± 2.8	25.6 ± 3.4	26.6 ± 2.7	0.226
IgA (mg/dl) ± SD	241.4 ± 119.6	190.9 ± 121.0	-	0.119
Time since diagnosis mth± SD	46.8 ± 31.5	28.6 ± 26.2	-	0.019
anti-EMA IgA, n(%)				
negative	0(0)	35 (59.3)	-	-
weakly positive	5 (8.5)			
positive	5 (8.5)			
strong positive	14 (23.7)			
anti-tTG IgA, n(%)				
negative	0(0)	35 (59.3)	-	-
weakly positive	9 (15.3)			
positive	2 (3.4)			
strong positive	13 (22.0)			
Marsh Grade, n (%)				
0	0(0)	8 (22.9)		
1	0(0)	3 (8.6)		
2	0(0)	4 (11.4)		
3a	2 (8)	14 (40)		
3b	11 (46)	4 (11.4)		
3c	11 (46)	2 (5.7)		

anti-EMA, anti-endomysium antibody; anti- tTG: anti –tissue transglutaminase; BMI, body mass index; IgA, immunoglobulin A; SD: Standard deviation

Table-2. Laboratory Characteristics of the Study Populations				
	Celiac Ab (+) Patients	**Celiac Ab (-) Patients**	**Healthy Controls**	**P value**
FABP-I(ng/L) ± SD	499.2±33.3	487.7±48.0	432.2±63.7	0.001[a]
Vit D (ng/mL) ± SD	21.1±15.0	29.2±18.9	33.7±11.5	0.004[b]
Ca (mg/dl) ± SD	9.1±0.9	9.4±0.8	9.36±0.4	0.163
P (mg/dl) ± SD	3.1±0.7	3.4±0.7	3.2±0.6	0.074
Ferritin (mg/L) ± SD	34.7±29.1	58.8±78.7	68.5±95.2	0.236
Vit B12 (pg/Ml) ± SD	482.8±394.7	331.8±102.6	407.3±305.0	0.133
PT (s) ± SD	13.0±4.8	12.3±3.4	11.9±1.0	0.315
INR ± SD	1.1±0.4	1.1±0.3	1.03±0.1	0.340
Hb (g/dl) ± SD	13.9±1.4	13.8±1.8	13.9±2.3	0.965
Htc (%) ± SD	41.0±3.5	41.3±4.2	41.8±5.6	0.789

Ca, Calcium; FABP-I, Intestinal fatty acid binding protein; Hb, Hemoglobin; Htc, Hematocrit; INR,International Normalized Ratio; P, Phosphate; PT, prothrombin time; SD, Standard deviation; vit B12, vitamin B12; vit D, Vitamin D
[a]Difference of Celiac Ab (+) and Celiac Ab (-) patients from the healthy controls
[b]Difference of Celiac Ab (+) patients from Celiac Ab (-) patients and healthy controls

Mean FABP-I was determined as 499.2±33.3 ng/L for antibody-positive celiac patients and as 487.7±48.0 ng/L for antibody-negative celiac patients, and these values were significantly higher when compared to the healthy controls as it was 432.2 ± 63.7 ng/L (p<0.001). The distribution of FABP-I levels by groups has been shown in Figure-1. The cut-off value of FABP-I was computed as 456.8 ng/L. The sensitivity, specificity, positive and negative predictive values of FABP-I at this level were found as 84.7%, 69.2%, 10.2%, 61.5%, respectively (Figure-2).

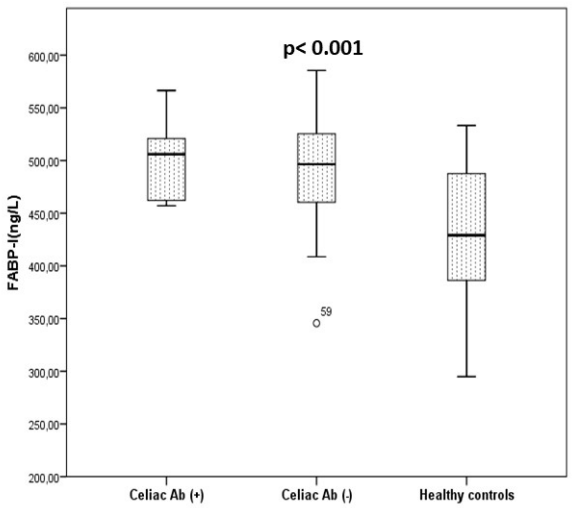

Figure-1. Distribution of FABP-I levels by groups

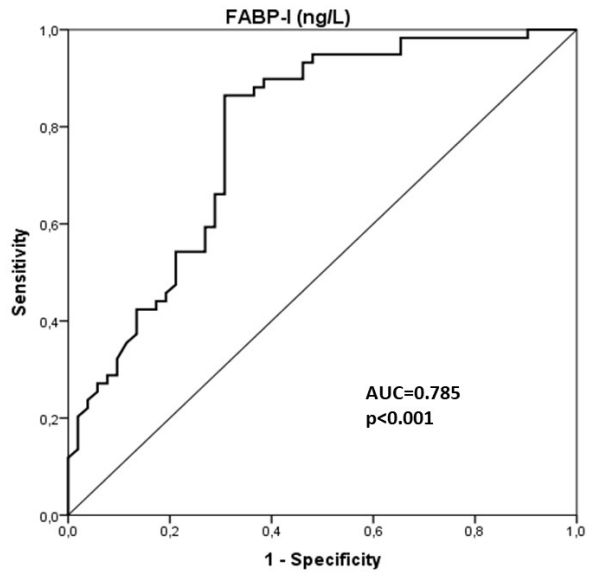

Figure-2. ROC curves of the FABP-I for predicting celiac patients

DISCUSSION

FABP-I can easily be released into the circulation in the presence of enterocyte damage in a short time as they are small and water-soluble proteins. In the present study, we have shown that patients with CD (both compatible and incompatible with GFD) had higher serum FABP-I levels when compared to healthy controls. The sensitivity of FABP-I to predict CD was 84.7% which was lower than anti- EMA IgA (93.7%) and anti-tTG IgA (96.8%) (5). We think its relative lower sensitivity can be improved while a cut-off value can be determined for FABP-I by further wide populations studies. It should also be emphasized that conventional serologic tests also have some restrictions. First, anti-tTG IgA may be negative at a rate of 5-16%, even in cases of villous atrophy confirmed by biopsy (6). Second, the biopsy is not recommended for pediatric patients who also have lower anti-tTG-IgA (7,8). Third, serum samples for antibody measurement for CD diagnosis should be done after at least six weeks of gluten-containing diet intake. Otherwise, false negative results will be seen. In a study that investigated the relatives of patients with CD who were genetically positive for HLA DQ2 and DQ8 and had antibodies in the intestinal tissue despite they had negative serology (9). Consequently, negative serology does not eliminate a diagnosis of CD. On the other hand, anti-tTG IgA is not associated with duodenal mucosal damage and may also cause false positivity besides false negativity (10). Thus, when children with Down syndrome, autoimmune diseases and chronic liver disease are screened for CD, anti-tTG IgA levels are detected even if the mucosal structure is normal (11-13). As a marker that directly reflects intestinal damage, it seems plausible that FABP-I will be able to eliminate this screening confusion.

In the present study, one half of patients with CD who were not on GFD had strong anti-tTG IgA positivity, did not demonstrate any Marsh grades lower than grade III and had the highest FABP-I levels. A study conducted on pediatric celiac patients showed higher serum levels of FABP-I in patients with Marsh grade IIIC changes who show severe villous atrophy than in patients with Marsh grade IIIA changes and mild atrophy. It has been proposed that the relatively lower FABP-I levels seen in some patients who are histologically determined to have villous atrophy are linked to mild mucosal damage that is limited to the proximal small intestine (1). Similarly, it has been reported that the antibody positivity increases in parallel with FABP-I levels (14). However, a correlation between Marsh grade, antibody strongness degree and FABP-I

levels was not observed in the present study may be due to low patient number.

GFD is the only treatment modality for CD. After conversion to a GFD, apoptosis decreases and approaches normal levels (2). GFD compliance of patients can be evaluated, either by negative antibody levels or by demonstration of mucosal healing on biopsy which is an invasive method. Despite anti-tTG IgA is a commonly used test to identify patients with CD adhering to a GFD, its absence in the circulation does not indicate healing of the intestinal epithelium (5,15). In addition, it may take more than a year for celiac antibodies to become negative despite GFD (16). Certain studies done on pediatric patients have shown that FABP-I levels decrease sooner than serum auto-antibodies on a GFD (7). Supporting this, the current United European Gastroenterology (UEG) guideline emphasized that serum FABP-I may be a new marker in evaluating dietary compliance (17). In the present study, we determined higher serum FABP-I levels in CD patients who were on GFD than those who were not, despite the difference was not significant, statistically. In a study that evaluated patients with high pre-treatment FABP-I levels after 12 months of adherence to a GFD, FABP-I levels were found to decrease but did not reach levels comparable to those of healthy controls, indicating persisting mucosal damage in celiac patients even under treatment. Supporting this, refractory CD patients had decreased anti-EMA and anti-tTG IgA levels but increased FABP-I levels with long-term GFD (2). So, FABP-I can be a potential follow-up marker for patients with refractory CD (8).

This study had some limitations. First, it was a cross sectional study. Therefore, we could not compare FABP-I levels at diagnosis and while on a GFD and in histological remission. Second, the antibody levels and Marsh grading could not be included in the statistical analysis due to the low number of cases.

In conclusion, patients with CD have higher serum FABP-I levels when compared to healthy controls. Serum FABP-I level which is an independent marker of enterocyte damage can be detected in the serum before serum antibodies in the early period as a predictive marker. Overlooked diagnosis in serology-negative patients and false serology positivity for reasons other than CD will be prevented with its use in clinical practice.

DECLARATIONS

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Authors Contributions: Conceptualization: PG, EC, KO; Resources: HOD, PG, EC, HO, HLD; Investigation: GA, HOD, PG, HO, KO; Formal Analysis: GA, OO, PG, HO, HLD; Writing – original draft: OO, PG, EC, KO; Writing – review & editing: All authors; Supervision: GA, HOD, OO, PG, HLD

Ethics Committee Approval: The study was approved by the local ethics committees of Sivas Cumhuriyet University with the number 2017-09/06.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Neurology / Nöroloji

Evaluation of the Quality and Reliability of Youtube Videos on Neurological Symptoms of COVID-19

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ABSTRACT

Purpose: The objective of this study was to identify key features of the videos related to neurological symptoms of COVID-19 published on YouTube and evaluate the quality and reliability of them.

Methods: YouTube searches was performed using keywords "COVID -19 Neurological Symptoms" and the first 50 YouTube videos with the highest number of views were evaluated by one neurologist and one infectious disease specialist with DISCERN and JAWA scoring systems.

Results: Videos uploaded by health channels (50%), news channels (26%), physicians (22%), or patients (2%). The mean Video Power Index value was 95.51. The mean DISCERN score was 46.59±10.90 (average) and the mean JAMA score was 2.87±0.65. Health Channel mean JAMA and DISCERN scores were higher than News Channel scores. DISCERN or JAMA scores did not correlate with view counts, view rate, comment counts, like counts, or dislike counts.

Conclusion: Proper use of Youtube as a source for reaching information, can play a role in managing the COVID-19 outbreak. Lack of control on video sources reduces validity of information. With the increase of the publication of videos by neurologists, the spread of false information can be minimized.

Keywords: COVID-19, neurologic symptoms, instructional film and video

COVID-19 Nörolojik Belirtileri Üzerine Youtube Videolarının Kalite ve Güvenilirliği

ÖZET

Amaç: Bu çalışmanın amacı, COVID-19'un nörolojik semptomlarıyla ilgili YouTube'da yer alan videoların temel özelliklerini belirlemek ve geçerlilik ve kalitelerini incelemektir.

Yöntemler: YouTube üzerinde "COVID -19 Nörolojik Belirtiler" anahtar kelimeleri kullanılarak arama gerçekleştirildi ve belirlenen en yüksek görüntüleme sayılarına sahip 50 video bir nörolog ve bir enfeksiyon hastalıkları uzmanı tarafından DISCERN ve JAWA puanlaması ile değerlendirildi.

Bulgular: Videolar sağlık kanalları (%50), haber kanalları (%26), doktorlar (%22) veya hastalar (%2) tarafından yüklenmişti. Ortalama Video Güç İndeksi değeri 95,51 idi. Ortalama DISCERN skoru 46,59±10,90 (vasat) ve JAMA skoru 2,87±0,65 idi. Sağlık kanalı ortalama DISCERN ve JAMA puanları haber kanalı puanlarından anlamlı daha yüksekti. DISCERN veya JAMA puanları ile görüntüleme sayıları, görüntüleme oranları, yorum sayıları, beğenme sayıları veya beğenmeme sayıları arasında istatistiksel olarak anlamlı bir ilişki yoktu.

Sonuç: Youtube'un bilgi kaynağı olarak doğru kullanımı, COVID-19 salgınının başarılı bir şekilde yönetilmesinde rol oynayabilir. Video kaynakları üzerinde kontrol bulunmaması bilgi geçerliğini düşürmektedir. Nörologlar tarafından videoların yayınlanması ile yanlış bilgi yayılımı en aza indirilebilir.

Anahtar kelimeler: COVID-19, nörolojik semptomlar, eğitici film ve videolar

The internet, which is used as the fastest and most widespread source of information, has enabled the public to access many health related information (1). Internet is used by more than 70 percent of the adult population as a resource on health-related issues (2). Youtube is one of the most important social media sites, is used by 95% of those who use the internet and has over 2 billion monthly active users (3).

Even if patients can easily access information about their illnesses, they cannot always access quality and accurate information through the internet (4). People have been shown that use the internet to get information about the diseases and medical treatments, and to learn about other people's health experiences (4-5).

It has been shown in previous studies that Youtube provided misleading information as well as useful information in Zika, H1N1 and Ebola outbreaks. It was stated in these studies that 23% to 26.3% gave misleading information (6).

Covid-19 is one of the most serious epidemics in history (7). The respiratory system was in the foreground and most frequently reported clinical symptoms include fever, shortness of breath and cough. Many neurological findings including headache, hyposmia / anosmia, nausea, vomiting, myalgia, dizziness, Guillain-Barré syndrome (GBS), seizures, encephalitis and impaired consciousness (meningoencephalitis and encephalopathy) can be observed during COVİD-19 disease (8-9).

The objective of this study was to identify key features of the videos related to neurological symptoms of COVID-19 published on YouTube and evaluate the quality and reliability of them.

MATERIAL AND METHODS

A screening was performed by "COVID - 19 Neurological Symptoms" in the YouTube search bar with "view count" filter option. Search results sorted for the most viewed videos. The top 50 videos with the highest views on YouTube were evaluated by a neurologist and an infectious disease specialist. Two reviewers watched 50 videos included and analyzed them all.

Non-audio, non-visual, non-English videos, and videos less than one minute and over an hour, advertising and animation videos were not included in the study. Only the first video from two or more repeated videos included. The titles, the number of views, the video duration, the number of likes, dislikes, and the number of comments were recorded.

YouTube videos are divided into subgroups according to video source as health channels, news channels, physicians, and patients. The Video Power Index (VPI), which determines the popularity of videos, is calculated with the following formula (10).

$$VPI = [(\text{like count}/\text{dislike count} + \text{like count}) \times 100)]$$

Quality Assessment

Selected Youtube videos were watched by a neurologist and an infectious disease specialists simultaneously. The videos were evaluated according to DISCERN (Quality Criteria for Consumer Health Information) (Table1) (11) and JAMA (Journal of the American Medical Association) scoring systems (Table 2) (12). Scores were recorded by the observers separately and the mean scores were calculated (13).

The DISCERN scoring system consists of 16 questions and each question scores between 1 and 5 points results in a total score ranging between 16 and 75. There are three separate sections, treatment information (7 questions), reliability of the information (8 questions), and general quality of the information (1 question) (13-14). A higher score indicated higher quality of information. Scores were classified as 'excellent' between 75 and 63 points, as 'good' between 62 and 51 points, as 'average' between 50 and 39 points, as 'poor' between 38 and 28 points, and as 'very poor' below 28 points. (11).

The JAMA scoring system is one of the leading tools used to evaluate the medical information obtained from websites. It includes 4 criteria (Currency, Attribution, Disclosure, Authorship) of 1 point each with a total possible score of 4 points which indicates the highest quality (12).

After the data were digitalized and corrected, the ordinal data were presented with frequency and percent, the categorical data were presented with mean and standard deviation for descriptive information. Analyzes were carried out using Chi-square test, Kruskal Wallis test, Spearman correlation test in accordance with variable characteristics. Dunn test was used for the post hoc analyses of the Kruskal Wallis test. Test constants and absolute p values were presented for all analyzes, $p < 0.05$ was accepted as the general significance limit.

TABLE 1: DISCERN Scoring System						
Section	Questions	Scoring				
Reliability of the publication	1. Explicit aims	Yes	Partly			No
	2. Aims achieved	1	2	3	4	5
	3. Relevance to patients	1	2	3	4	5
	4. Source of information	1	2	3	4	5
	5. Currency (date) of information	1	2	3	4	5
	6. Bias and balance	1	2	3	4	5
	7. Additional sources of information	1	2	3	4	5
	8. Reference to areas of uncertainty	1	2	3	4	5
Quality of information on treatment choices	9. How treatment works	1	2	3	4	5
	10. Benefits of treatment	1	2	3	4	5
	11. Risks of treatment	1	2	3	4	5
	12. No treatment options	1	2	3	4	5
	13. Quality of life	1	2	3	4	5
	14. Other treatment options	1	2	3	4	5
	15. Shared decision making	1	2	3	4	5
Overall rating of the publication	16. Based on the answers to all of these questions, rate the overall quality of the publication as a source of information about treatment choices	1	2	3	4	5

TABLE 2: JAMA Scoring System			
Section		Rating	
		No	Yes
Authorship	Authors and contributors, their affiliations, and relevant credentials should be provided	0	1
Attribution	References and sources for all content should be listed clearly, and all relevant copyright information should be noted	0	1
Disclosure	Website "ownership" should be prominently and fully disclosed, as should any sponsorship, advertising, underwriting, commercial funding arrangements or support, or potential conflicts of interest	0	1
Currency	Dates when content was posted and updated should be indicated	0	1

RESULTS

Of the 68 videos screened 50 videos (73.5%) were included. The remaining 18 videos (26.5%) were excluded for non-English language (8), less than 1 minute (1), over 1 hour long (8) or duplicates (1).

Of the 50 videos evaluated, source of upload were health channels for 25 (50%), news channels for 13 (26%), physicians for 11 (22%), and patients for 1 (2%) (Table 3).The mean video length was 13.46 minutes (1.43-57.59 minutes).

Fifty included videos was viewed 136,600 times in total with the mean of 2732 (104 to 39740) times. The mean view rate was 69.47 per day (1.24 to 894.00 per day). There was 16.46 (0 to 200) comments for each video. The mean number of likes was 46.54 (1 to 413), the mean number of dislikes was 1.88 (0 to 19). The mean VPI value was calculated as 95.51 (66.67 to 100). Key features of the evaluated videos are given in Table 3.

TABLE 3: Analyzed videos and their main features

Video number	Video name	Video length (minutes)	View count	Time since video upload (days)	Comment count	Like count	Dislike count
1	New Concerns Over How Coronavirus Impacts The Brain | NBC Nightly News	2.27	39740	55	78	292	12
2	Lesser-known symptoms of coronavirus	2.03	16107	54	0	127	8
3	Coronavirus May Cause Brain Damage	1.56	10185	58	200	355	19
4	COVID-19: A Global Perspective - American Academy of Neurology	23.46	9792	78	11	74	4
5	Jennifer Frontera, MD: Neurologic Symptoms of COVID-19	7.44	8470	43	86	90	9
6	NeuroBytes: What Neurologists Should Know About COVID-19 - American Academy of Neurology	3.52	6749	57	1	67	1
7	How COVID-19 Affects The Brain	8.24	5829	39	87	413	13
8	Neurologic Complications of COVID-19: Separating Fact from Fiction - American Academy of Neurology	24.47	5046	55	8	104	3
9	Strange Neurological Symptoms	5.32	3585	87	137	114	0
10	Woman with COVID 19 developed a rare brain condition	2.06	3231	41	8	51	1
11	Covid-19NeuroInvasion:Dr. Judy Mikovits Medical Corruption	25.00	3025	38	11	36	0
12	Covid-19 and encephalitis - podcast	36.28	2959	83	6	41	1
13	Mayo Clinic Q&A podcast: Possible neurological effects of COVID-19	13.00	1901	41	7	25	2
14	COVID-19 impact on the brain	1.56	1757	50	1	24	4
15	COVID-19: How the Pandemic is Impacting Neurology – An Update - American Academy of Neurology	19.00	1757	62	8	30	0
16	COVID-19: Neurology on the Leading Edge: Lessons from the Pandemic in Italy - AAN	57.17	1554	30	1	33	0
17	COVID-19 from Neurological Perspective	3.55	1339	75	5	30	1
18	COVID19: Precautions for Neurology Patients	3.48	1139	63	0	1	0
19	Neurologist talks about risk of blood clots, stroke, and heart attack associated with COVID-19	3.53	1125	44	0	9	0
20	NeuroBytes: Cerebrovascular Complications & Management of COVID-19 - American Academy of Neurology	4.53	1002	27	0	33	0
21	Doctors Study the Lingering Symptoms of Covid-19	3.20	894	1	9	27	2
22	COVID-19: What Every Practitioner Should Know - American Academy of Neurology	25.03	662	62	1	13	2
23	Covid-19 and Neurology	27.06	603	58	2	11	1
24	Coronavirus may attack the brain and nervous system	1.43	603	28	0	27	1
25	COVID-19 from Neurological Perspective -Part 2	6.46	566	66	0	20	0
26	Neurologist explains COVID-19 and Stroke, Encephalitis, Guillain-Barre Syndrome, Encephalopathy, etc	7.43	559	44	17	27	1
27	Covid-19 and the Nervous System - First Choice Neurology - Dr. Jeffrey Gelblum	34.20	470	59	50	17	1
28	Covid-19 from Neurological perspective 3	5.35	451	60	0	11	0
29	Coronavirus effects on Brain| COVID19 neurological infection. | Covid-19 and Neurology	4.43	442	59	24	61	0
30	Neurologist discusses COVID-19 and strokes in some patients	2.06	405	47	1	9	0
31	Apr 10, 2020 Neurological Problems in "C0 Ved I9	3.21	398	61	20	37	1
32	Neurological Implications of COVID-19 with Dr. Joseph Berger	57.59	372	21	1	12	1
33	Migraine and COVID-19 - First Choice Neurology - Dr. Jennifer Buczyne	30.17	330	78	1	9	1

TABLE 3: Analyzed videos and their main features (Continuation of TABLE 3)

Video number	Video name	Video length (minutes)	View count	Time since video upload (days)	Comment count	Like count	Dislike count
34	The US Government Response to COVID-19 - American Academy of Neurology	26.43	324	37	0	3	0
35	Coronavirus in Context: Neurological Effects of COVID-19 | WebMD	17.18	346	37	1	12	0
36	Epilepsy and COVID-19 - First Choice Neurology - Dr. Andrew Lerman	29.59	293	79	5	6	0
37	COVID-19 Digest: Neurological Manifestations of COVID-19	14.39	257	49	0	6	1
38	Dr Siddharth Warrier, Neurologist, Wockhardt Hospital, Mumbai	8.40	222	55	0	7	0
39	COVID-19 New Symptoms and Signs In Kids | Dr Sailaja Golla, Pediatric Neurologist | TeluguOne Health	2.56	218	38	0	4	1
40	How to Manage Headaches During COVID-19 - First Choice Neurology - Dr. Jeffrey Steinberg	16.09	310	50	1	3	1
41	Barry J. Byrne, MD, PhD: Adjusting Care for Neuromuscular Disease Amid COVID-19	3.36	180	66	0	1	0
42	Management of Neurological Diseases Amidst the COVID-19 Pandemic	4.26	190	20	8	3	0
43	Does Covid 19 cause Stroke??	25.15	176	47	7	4	0
44	Jennifer Frontera, MD: Risk of COVID-19 in Patients With Neurologic Disorders	4.14	220	41	0	5	0
45	Neurology and COVID-19	3.38	163	53	2	10	0
46	2 symptoms warning you to be infected with COVID-19	2.48	158	54	1	5	0
47	CAN CORONAVIRUS AFFECT YOUR BRAIN? Neurological Symptoms: (COVID-19, 2020)	4.19	144	28	17	21	1
48	TeleSpecialists 2020: Neurological Effects of COVID-19 Interview	8.28	133	50	0	4	0
49	Colorado Boy With Neurological Disease Struggling Without Physical Therapy During Coronavirus Pandemi	1.58	115	51	0	2	1
50	Taking Care of Your Neurological Disorder during Coronavirus (COVID-19) - First Choice Neurology	46.53	104	84	0	1	0

The mean score of DISCERN was 35.42±17.53 (16 to 73), and the mean score of JAMA was 2.02±1.00 (1 to 4) according to the first researcher. The mean score of DISCERN was 57.76±13.71 (31 to 79), and the mean score of JAMA was 3.72±0.73 (1 to 4) according to the second researcher. The mean scores of the 2 researchers were 46.59±10.90 (27.5 to 73.0) for DISCERN and 2.87±0.65 (1 to 4) for JAMA There was a high correlation between DISCERN and JAMA scores of the videos (r=0.667, p<0.001).

According to the mean DISCERN scores quality of the videos was found as very poor in 2%, poor in 11%, medium in 46%, good in 18%, and excellent in 12% (Figure 1). The mean JAMA scores of the videos were 2 or low in 6%, >2 to 3 in 70%, and over 3 in 24% (Figure 2).

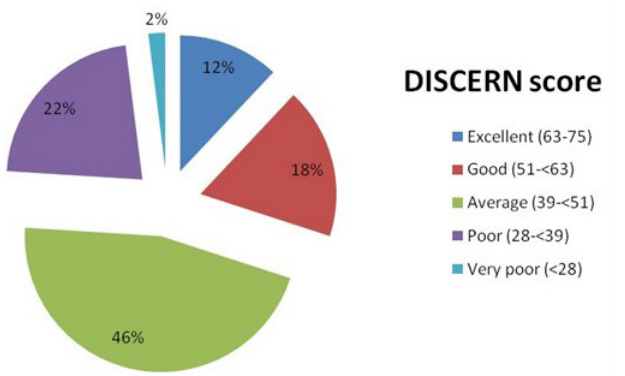

Fig. 1 Quality of the videos according to the mean DISCERN score of two raters

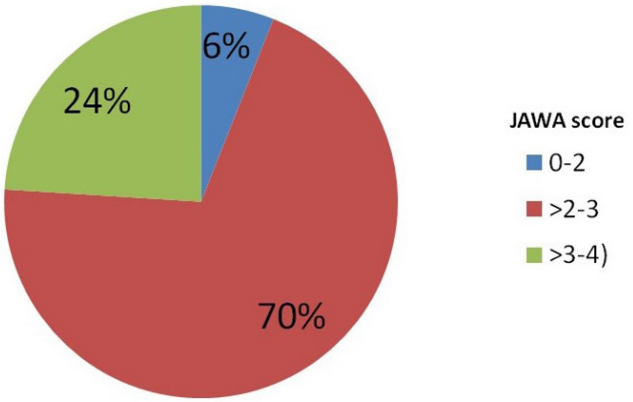

Fig. 2 Quality of the videos according to the mean JAMA score of two raters

The most watched video was a news video about the impacts of the Corona virus on brain, that lasted for 2.27 seconds and was watched approximately 40 thousand times in 55 days. One of the other two videos, which was watched over 10 thousand times in the same airtime, was the health channel video that lasted 1.56 seconds about brain damage due to Corona virus and the news video that lasted 2.23 seconds about less known disease symptoms. While the lower scores of the news videos from both evaluations were remarkable, the JAMA score of 3.5 for the health channel video was above the average.

The average VPI, DISCERN and JAMA scores of the groups formed according to the video sources are presented in Table 4. There was a significant difference detected between DISCERN and JAMA scores of the groups (X^2=15.370, p=0.002 and X^2=18.804, p=0.002, respectively), but not in terms of mean VPI scores (X^2=3.635, p=0.304), According to post-hoc analysis, Health Channel mean DISCERN and JAMA scores were significantly higher than News Channel scores (p=0.001)

There is no statistically significant correlation between VPI scores and DISCERN or JAMA scores (p>0.05). There was a weak statistically significant correlation between the video length rate and both the DISCERN scores (r=0.597, p<0.001) and JAMA scores (r=0.585, p<0.001). There is no statistically significant correlation between DISCERN or JAMA scores and view count, view rate, comment count, like count, dislike count (p>0.05)

TABLE 4: Average VPI, DISCERN and JAMA scores of the videos according to sources

Video source	VPI	DISCERN	JAMA
HEALTH CHANNELS	94.78±6.81	52.36±11.29	3.10±0.80
NEWS CHANNELS	94.22±9.22	38.27±7.22	2.50±0.20
PHYSICIANS	98.28±2.87	43.50±5.47	2.82±0.40
PATIENTS	100	44.5	2.5
Total	95.51±6.93	46.59±10.90	2.85±0.72

DISCUSSION

In this study, it was examined whether the quality, reliability and validity of the information received from Youtube videos differ in terms of source of the video. The overall quality of videos on YouTube about the neurological symptoms of COVID-19 are low. The quality of the videos from the Health Channels was significantly higher than the ones from the News Channels. The Video Power Index of the videos did not correlate with DISCERN or JAMA scores. The only key feature that was weakly correlated with quality was video length.

Little is known about the neurological symptoms of COVID-19 patients. Systemic inflammation caused by COVID-19 increases the blood brain barrier permeability and allows passage of infected cells and virus to the central nervous system (14). There are few case reports of neurological symptoms in COVID-19 patients, and a study conducted in Wuhan, China reported neurological findings in hospitalized COVID-19 patients (9). Another systematic study conducted in France showed neurologic findings like confusion, encephalopathy, and corticospinal tract in 49 of 58 patients (15).

Headache is a common complaint in COVID-19. The prevalence varies, but it is known to affect one third of patients diagnosed. Nociceptive sensory neurons are affected by cytokines and chemokines formed after neuro inflammation (16-18). In Germany, anosmia was reported in 88.5% and ageusia in 88.0% of COVID-19 patients (19). 37% of patients hospitalized with COVID-19 reported to have impaired consciousness as a result of toxic-metabolic encephalopathy, parenchymal damage, seizures and demyelinating diseases (9). Risk factors that make COVID-19 patients prone to delirium are advanced age, dementia, comorbid diseases and malnutrition (20). Endocrine and metabolic disorders such as hyper/hypoglycemia, hyper/

hyponatremia, hyper/hypocalcemia, kidney and liver dysfunction may increase the risk of encephalitis. In addition, cytokine storm can also cause encephalopathy by increasing interleukins 6, 8 and 10 and tumor necrosis factor-alpha (21). Epileptic seizures were observed in only two of 304 patients diagnosed with COVID-19 (22).

In a study, 5% of hospitalized patients due to COVID-19 in Wuhan reported acute stroke. Of these patients, 11 were hospitalized for ischemic stroke, 1 for cerebral venous sinus thrombosis and 1 for intracerebral hemorrhage (23).

In Italy, 5 GBS patients have been reported subsequently COVID-19 infection, in 4 patients with lower extremity weakness and paresthesia (24). In the electromyography study, two patients had acute inflammatory demyelinating polyneuropathy and three patients had acute motor axonal neuropathy (25). In addition, an acute motor axonal neuropathy patient in Iran and Miller-Fisher variant of GBS in Italy were reported (26).

Resources freely accessible from internet constitute an important resource for the health information needs of the society and such resources are frequently used. However, the validity and reliability of these sources are not under control. To date, many scoring systems have been used to evaluate the quality and accuracy of videos on the internet (27-28). This study is the first study in the literature on information content and reliability of videos published on YouTube about neurological symptoms in COVID-19.

CONCLUSION

In our study, Youtube videos on neurological symptoms of Covid-19 were evaluated using JAMA and DISCERN scoring systems that are among the most frequently used scoring systems. Videos analyzed showed significant variation according to both scoring systems. The mean DISCERN score of the videos was "average" and JAMA scores were 2.9 over 4.0. These mean values are far from expectations. Considering the distribution of the quality of the videos according to the DISCERN scoring system, only 30% were scored as 'excellent' or 'good'. Significant proportions of videos have worse than medium scores. It is noteworthy that the values of videos uploaded from health channels in both score systems are higher than other important source news channels.

Youtube is a social media channel that provides rich options and frequently used for visual content. In this respect, it can be said that it meets an important need. It allows rapid sharing on issues affecting the whole world, especially in the COVID epidemic, and is accepted and used by world population. However, the validity and reliability of the content provided in this media is not under control. In the videos examined in our study, this issue has been presented remarkably. There is a need to develop mechanisms for checking the validity of social media shares on issues of general importance such as public health. Until progress is made on this issue, it may be considered to use and include valid content on social media in public health practice.

Ethics Approval

Ethics committee approval was obtained for the study from XXX University Ethic Committee for Clinical Studies with the decision dated June 09, 2021 and numbered 06-29.

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Evaluation of the Relationships between Obesity and Central Retinal Thickness, Retinal Nerve Fiber Layer, Intraocular Pressure, and Central Corneal Thickness in Children

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ABSTRACT

Purpose: The purpose of this study was to investigate the effect of childhood obesity on the retinal nerve fiber layer (RNFL), retinal thickness, central corneal thickness and intraocular pressure.

Method: Children with obesity (n:24) (Group 1; n:48 eyes) and healthy children (n:23) (Group 2; n:46 eyes) were included in the study. Average RNFL thickness, central 1 mm diameter of foveal thickness (CFT) and subfoveal choroidal thickness (SFCT) were measured using the fourier domain - optical coherence tomography (FD-OCT). Central corneal thickness (CCT) was measured using contact ultrasonic pachymetry and intraocular pressure (IOP) using Goldmann applanation tonometry.

Results: The mean IOP in Group 1 was found to be significantly higher (p=0.002) and 16.1 ± 3.1 mmHg in group 1 and 13.6 ± 3.2 mmHg in group 2, respectively. Mean RNFL, CFT and SFCT significantly were lower in group 1 ($p < 0.05$) than group 2. The average RNFL was detected to 107.9 ± 10.5 µm in group 1 and 112.6±11.8 µm in group 2, respectively (p=0.001). Mean CFT was found to be 231.6±14.4 µm in group 1 and 245.9±19.98 µm in group 2, respectively (p=0.001). The average SFCT was observed to 193.3±15.3 µm in group 1 and 221 ± 25.1 µm in group 2, respectively (p<0.001). Although CCT was relatively higher in group 1, no statistically significant difference was observed among the groups (p=0.08). There was a positive correlation between the presence of obesity and mean IOP measurements ($r = 0.847$, $p = 0.011$), and besides a negative correlation was detected between mean RNFL thickness and mean weight of the patients ($r = -0.749$, $p = 0.039$).

Conclusion: In current study, it should be kept in mind that elevated IOP and decrement of RNFL thickness in children with obesity increased the risk of developing glaucoma, as well as decreased CFT and SFCT may form the basis for the development of macular diseases in future.

Keywords: Obesity, ocular parameters, children.

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Çocuklarda Obezite ile Santral Retina Kalınlığı, Retina Sinir Lifi Tabakası, Göz İçi Basıncı ve Santral Kornea Kalınlığı Arasındaki İlişkilerin Değerlendirilmesi

ÖZET

Amaç: Bu çalışmanın amacı çocukluk çağı obezitesinin retina sinir lifi tabakası (RSLT), retina kalınlığı, santral kornea kalınlığı ve göz içi basıncı üzerine etkisini araştırmaktır.

Hastalar ve Yöntem: Obeziteli çocuklar (n:24) (Grup 1; n:48 göz) ve sağlıklı çocuklar (n:23) (Grup 2; n:46 göz) çalışmaya dahil edildi. Ortalama RSLT kalınlığı, merkezi 1 mm çapındaki foveal kalınlık (MFK) ve subfoveal koroid kalınlığı (SFKK), fourier domain - optik koherens tomografi (FD-OKT) kullanılarak ölçüldü. Santral kornea kalınlığı (SKK) kontakt ultrasonik pakimetrisi ve göz içi basıncı (GİB) Goldmann aplanasyon tonometrisi kullanılarak ölçüldü.

Bulgular: Ortalama GİB Grup 1'de anlamlı olarak daha yüksek (p=0.002) ve grup 1'de 16.1 ± 3.1 mmHg ve grup 2'de 13.6 ± 3.2 mmHg bulundu. Ortalama RSLT, MFK ve SFKK grup 1'de grup 2'ye göre anlamlı olarak daha düşük bulundu ($p < 0.05$). Ortalama RSLT grup 1'de 107.9 ± 10.5 µm ve grup 2'de 112.6±11.8 µm olarak saptandı (p=0.001). Ortalama MFK grup 1'de 231.6±14.4 µm ve grup 2'de 245.9±19.98 µm bulundu (p=0.001). Ortalama SFKK sırasıyla grup 1'de 193.3±15.3 µm ve grup 2'de 221 ± 25.1 µm olarak gözlendi (p<0.001). Grup 1'de SKK göreceli olarak daha yüksek olmasına rağmen gruplar arasında istatistiksel olarak anlamlı bir fark gözlenmedi (p=0.08). Obezite varlığı ile ortalama GİB ölçümleri arasında pozitif korelasyon ($r = 0.847$, $p = 0.011$) ve ayrıca ortalama RSLT kalınlığı ile hastaların ortalama ağırlığı arasında negative bir korelasyon saptandı ($r = - 0.749$, $p = 0.039$).

Sonuç: Bu çalışmada obezitesi olan çocuklarda GİB değerinin yüksekliğinin ve RSLT kalınlığının azalmasının glokom gelişme riskini artırdığı, aynı zamanda azalmış MFK ve SFKK' nın gelecekte makula hastalıklarının gelişimine temel oluşturabileceği göz önünde bulundurulmalıdır.

Anahtar kelimeler: Obezite, oküler parametreler, çocuklar.

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Obesity is an important public health problem that is increasing in both developed and developing countries. The number of overweight and obese children in the world is 43 million, of which 35 million live in developed countries. The prevalence of overweight and obesity in 2010 was 6.7%, and this is predicted to rise to 9.1% by 2020 in the world (1).

Obesity causes numerous health, social and economic problems. Global expenditure for medicine has been found to be 30% higher than for individuals of normal weight (2). Hyperinsulinemia triggers various systemic disorders such as impairement of glucose tolerance, type 2 diabetes mellitus, hypertension, hyperlipidemia, sleep apnea syndrome and menstrual cycle disturbance in association with polycystic ovarian syndrome and depression are seen in majority of the patients (3-5).

Elevated intraocular pressure (IOP) is the major risk factor for glaucoma, and at the same time only treatable risk factor for disease (6). IOP measurement can be affected by various factors. The most important is central corneal thickness (CCT). A thin cornea is a significant risk factor in terms of development of glaucoma (7).

Optical coherence tomography (OCT) is a non-invasive diagnostic technique providing high-resolution, cross-sectional images of the retina using near-infrared light and giving quantitative informations (8). OCT is used in diagnosis, treatment and monitoring of retinal thickness, retinal pathologies and optic nerve-related glaucoma (9,10). The purpose of this study was to investigate whether or not childhood obesity affects ocular parameters.

MATERIALS AND METHODS

Patients

Children with obesity and healthy children who were under outpatient follow-up between January 2013 and January 2014 in the Pediatric Endocrinology Clinic of the tertiary university hospital were included in the study. The study was implemented in a prospective and controlled manner. Approval conforming to the Helsinki Declaration was obtained from the local ethical committee before the study commenced. Children whose parents provided informed consent were enrolled.

All ophthalmological examinations were carried out by the same ophthalmologist. Absence of any ophthalmological or systemic disease that might affect RNFL or retinal thickness was confirmed. Subjects with corneal pathology, using contact lenses, with a history of intraocular surgery or using topical eye drops were excluded.

Visual acuity measurement was performed from 4 meters on an Early Treatment Diabetic Retinopathy Study (ETDRS) chart. Best corrected visual acuity (BCVA) was converted to Snellan chart. Ophtalmic examination was performed with a slit lamp biomicroscopy following pupil dilatation with 0.5% phenylephrine hydrochloride and 0.1% tropicamide. Fundus photographs were taken after each examination. All eyes included in the study were emmetropic.

Height and Weight Measurements

All participants included in the study were weighed and measured. Measurements made by a single physician (A.C.) using the same scale.

In height measurement, a measuring stick that was sensitive to 1 mm and fixed to a wooden base with a mobile indicator at the top was used (Holtain, Ltd, Crymych, Dyfed, UK). Patients stood barefoot on their feet flat on the ground and heels together with the back of the head, lower back, hips and shoulders in contact with the device and their heads in an upright position and looking straight ahead. The indicator was then depressed onto the top of the head. Weight was measured using a NAN Scale TSE No:5094 system and patients stood on the device barefoot with a fixed clothing weight of 440 gr and subsequently data were recorded. Percent optimal body weight and body mass index (BMI) (weight (kg)/height squared (m^2)) were calculated for each participant from the height and weight measurements were obtained. Body weight and growth percentile charts prepared on the basis of sex and age were used in calculating percent of ideal body weight. Participants were classified by weight by comparing ideal weight values for each child with age-adjusted international cut-off values. BMI (weight in kilograms divided by the square of the height in meters) is correlated sufficiently with direct measures of fatness (4). Accordingly, a child with a BMI above the 97th percentile in regard to age and gender is considered to be an obese group (group 1). A child with a BMI greater than the 90th but below the 97th percentile would be considered to be overweight and these participants excluded from the study. Participants with BMI between 5th and 90th percentile were enrolled at the healthy control group (group 2) (11).

Optical Coherence Tomography Measurement

The RTVue-100 OCT (Optivue Inc., Fremont, Ca) is a Fourier-Domain (FD) A-scan instrument with an axial resolution of 5 µ and a scanning speed of 26,000/sec. Optic nerve fiber layers, retinal thickness in a 1 mm-diameter circular region at the fovea (CFT) and subfoveal choroidal thickness (SFCT) benath the fovea were measured using the RTVue-100 device following pupillary dilation. The optic nerve head (ONH) protocol consists of 12 radial scans of 3.4 mm and 6 concentric ring scans ranging between 2.5 and 4.0mm in diameter, all of which are focused on the optic disc. The ONH protocol is employed to produce a polar RNFL thickness map. This is calculated along a 3.45-mm diameter circle based on the optic disc. This provides a mean RNFL thickness in the temporal, superior, nasal and inferior quadrants, in addition to a total mean along the complete measurement circle. The MM5 protocol which comprises an intense (5 × 5) mm network of linear scans performed around the macula. This protocol involves more rapid scans, 12 horizontal and 12 vertical, at 0.5 mm intervals. Each line scan consists of 512 A-scans over a 5 mm scanning length.

Mean retinal thickness in a 1 mm-diameter circle at the fovea (CFT) was calculated by means of EMM5 software for the RTVue-100.

Subfoveal choroidal thickness (SFCT) measurements were provided by the EDI-OCT imaging method defined by Spaide (12). SFCT was characterized as the vertical distance from the basal edge of retinal pigment epithelium below the central fovea to the endpoint of the choroid-scleral junction. Figure 1 shows macular measurements of an obese patient. Figure 2 shows optic nerve head measurements from an healthy individual.

Intra-ocular Pressure and Central Corneal Thickness Measurement

Intra-ocular pressure was measured under topical anesthesia (proparacaine HCl 0.5 %) using with Goldmann applanation tonometry (GAT, Haag Streit, Koeniz, Switzerland). CCT was measured using contact ultrasonic pachymetry (Pacline Opticon 2000 spa, Rome, Italy) at least 3 times for each eye and the lowest CCT value was selected for statistical analysis.

Statistical Analysis

Descriptive statistics (mean, standard deviation, minimum and maximum values) were used in the study and the paired sample t test was used to compare numerical data between the groups. Shapiro Wilk test was used to check whether the distribution between the groups was homogeneous. Generalized equation estimation (GEE) analysis was used for statistical analysis, since the double eyes were included in the study in some patients. Statistical significance was defined as $p < 0.05$. Pearson correlation test was used to determine the linear relationship between variables. SPSS 20.0 package version was used for statistical analysis.

RESULTS

A total of 94 eyes of 47 participants were included in the study that 48 eyes of 24 children were in the obese group (group 1) and 46 eyes of 23 children were in the healthy individual group (group 2), respectively. Descriptive characteristics (age, weight, height, gender distribution) of each groups are shown in Table 1.

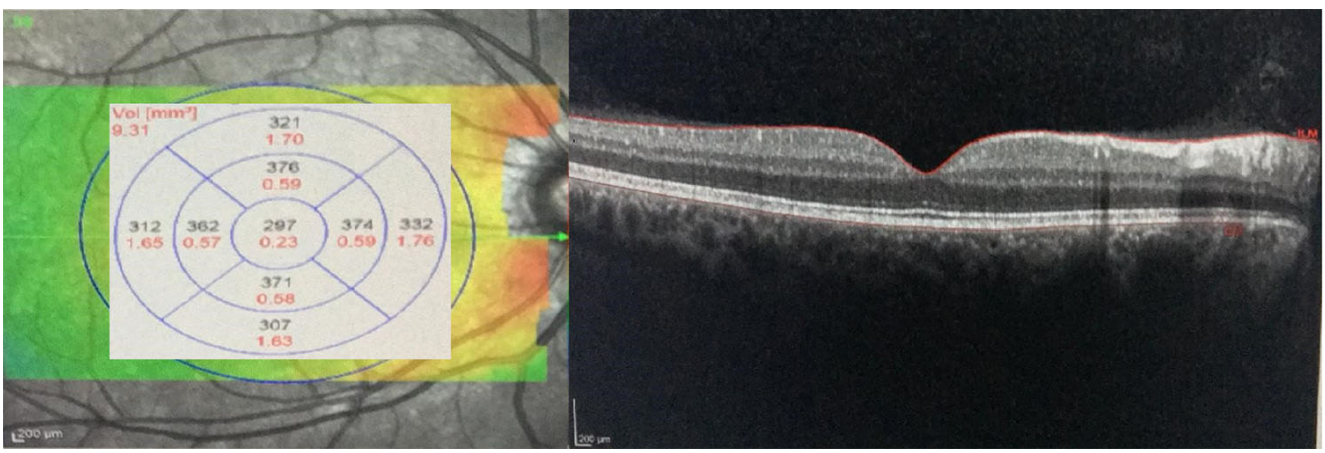

Figure 1. Measurements of the macula of an obese patient are shown.

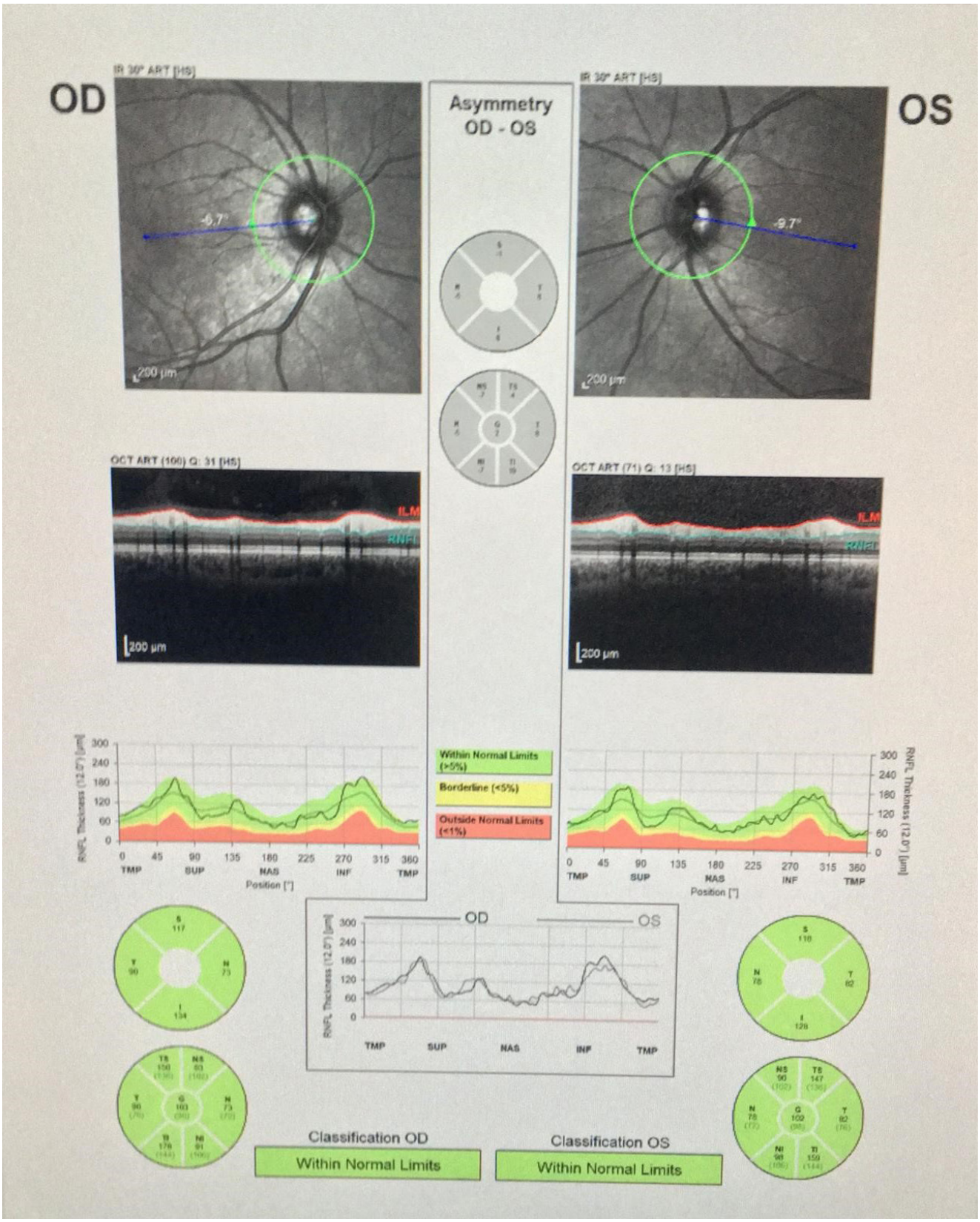

Figure 2. The optic nerve head measurements of a healthy individual are shown.

Table 1: Demographic characteristics of groups			
Mean ±SD	**Group 1 Obese group (n=48)**	**Group 2 Control Group (n=46)**	***p values***
Age (years)	11.4±1.8	11.8±1.6	***p=0.897***
Weight (kg)	58±15.9	37.8±8.3	***p<0.001***
Height (cm)	147.5±14.3	146.6±10.6	***p=0.792***
Male/Female (n)	23/25	24/22	***p=0.749***
*Student t test** *n:number; SD, standard deviation.*			

No statistically significant difference was determined among the groups in terms of mean age and height, and gender distributions (p>0.05). Mean weight were significantly higher in Group 1 (p<0.001).

The mean IOP in Group 1 was found to be significantly higher (p = 0.002) and 16.1 ± 3.1 mmHg in group 1 and 13.6 ± 3.2 mmHg in group 2, respectively. Mean RNFL, CFT and SFCT significantly were lower in group 1(p < 0.05) than group 2. The average RNFL was detected to 107.9 ± 10.5 µm in group 1 and 112.6 ± 11.8 µm in group 2, respectively (p=0.001). Mean CFT was found to be 231.6 ± 14.4 µm in group 1 and 245.9 ± 19.98 µm in group 2, respectively (p=0.001). The average SFCT was observed to 193.3 ± 15.3 µm in group 1 and 221 ± 25.1 µm in group 2, respectively (p<0.001). Although CCT was relatively higher in group 1, no statistically difference was observed among the groups (p=0.08).

There was a positive correlation between the presence of obesity and mean IOP measurements (r = 0.847, p = 0.011), and besides a negative correlation was detected between mean RNFL thickness and mean weight of the patients (r = - 0.749, p = 0.039).

The results of the study are summarized in Table 2. The graphic of outcomes in study is given in Figure 3.

Table 2. Results of the study			
Mean ± SD	**Group 1 Obese Group (n=48)**	**Group 2 Control Group (n=46)**	***p values***
CFT, µm	231.6 ± 14.4	245.9 ± 19.9	***p=0.001****
SFCT, µm	193.3 ± 15.3	221 ± 25.1	***p<0.001****
Mean RNFL, µm	107.9 ± 10.5	112.6 ± 11.8	***p=0.019****
IOP, mmHg	16.1 ± 3.1	13.6 ± 3.2	***p=0.002****
CCT, µm	578.9 ± 41.6	573 ± 34.5	***p=0.08***
*Student t test** *CFT: Central 1 mm foveal thickness,* *SFCT: Subfoveal choroidal thickness at the foveal pit,* *RNFL: Retinal nerve fiber layer,* *IOP: Intraocular pressure, CCT: Central corneal thickness.* *n:number; SD, standard deviation.*			

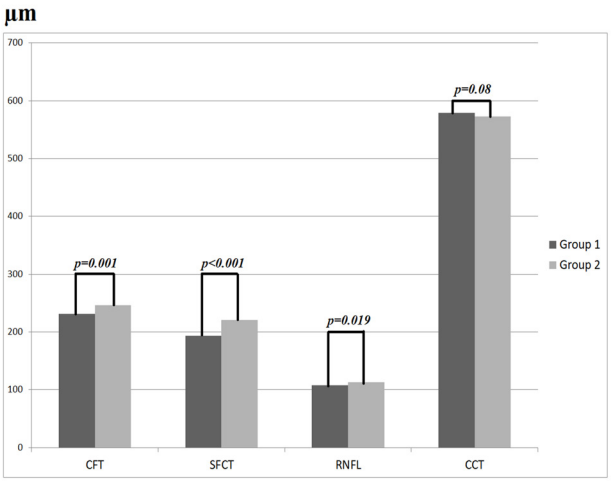

Figure 3. The graphic of the results is summarized in the study.

DISCUSSION

In this study, it was aimed to investigate whether childhood obesity affects ocular parameters. A significant decrease in SFCT, CFT, RNFL and a significant increase in IOP were observed in obese children. High IOP values often lead to glaucomatous optic nerve damage and visual field loss (6). Studies on adults have been reported conflicting views on IOP and obesity. Some studies have reported a positive correlation between IOP and obesity (13,14) while another one has determined no significant correlation. Those studies identifying a positive correlation between IOP and obesity have proposed two different views; an elevation in IOP associated with increased blood viscosity and pressure in the episcleral veins related to increased fatty tissue in the orbita due to obesity, or a rise in IOP as a result of autonomous dysfunction disorders associated with insulin resistance in obese children (14). Akıncı et al (15) pointed out that there was a positive correlation between obesity and IOP while Albuquerque et al. (16) reported that they were not found any correlation between obesity and IOP measurements. Although present study was implemented in Turkish cohorts, our results were consistent with a study by Akıncı et al (15). Measurement of IOP is important for early diagnosis, treatment and monitoring of glaucoma. The accuracy of IOP measurements is critical for before and after glaucoma therapy and CCT is one of the parameters that most affect IOP values. Studies have shown that the thinner the cornea, the lower the IOP were found and also the thicker the cornea, the higher the IOP were observed (17-19).

Some studies have examined the association between obesity and CCT, and as far as we know, all of these involved in adults. The Singapore Malay Eye Study (SiMES) measured CCT using ultrasonic pachymetry and investigated whether or not systemic factors were affected CCT. Significantly high IOP was determined in subjects with high BMIs (20). The Gutenberg Health Study pointed out that there was a positive correlation among CCT and BMI (21). A study from Japan involving specular microscopy also determined significantly high CCT in obese adults (22). In a study of Teberik et al., intraocular pressure measurements were found to be significantly higher in the morbidly obese group compared to the healthy control group which were consisted of adult participants (15.5 ± 2.5 vs. 14.5 ± 2.6 mmHg, p=0.009). However, CCT did not differ between healthy and the morbid obese participants (p>0.05). The number of participants consisted of 101 morbid obese volunteers (body mass index [BMI] ≥40) and 95 healthy individuals (BMI: 18.50-24.99) (23). In our study, CCT values measured by ultrasound pachymetry tended to increase in obese children and significantly difference was found compared to the control group in Turkish cohort for children obesity.

Optical coherence tomography as a noninvasive technique which has been frequently preferred recent years in terms of evaluating macular thickness and RNFL in patients with glaucoma has been used by physicians (24,25). Obese children were measured in our study and a significant differences were found to be in retinal parameters. Mean CFT and SFCT values were lower than control healthy children (p<0.05).

Glaucoma is an optical neuropathy characterized by progressive loss of visual field accompanied by degeneration in retinal ganglion cells and RNFL. The relation between BMI and cup-to-disc ratio is controversial in studies involving adults. Wider neuroretinal thickness and, a small optic nerve and cup-to-disc ratio have been determined in subjects with high BMI. It has been suggested that high BMI leads to increased cerebrospinal fluid pressure and thus an increment of neuroretinal rim area in patients with high BMI (26,27). However, other studies have been reported no association between BMI and cup-to-disc ratio (28,29). In a study conducted by Baran et al. has been reported alterations in ophthalmological parameters including IOP, RNFL, GCL, CMT, SFCT and cup-to-disc ratio in 61 obese children compared to 35 matched control children. IOP levels was higher in obese group than control healthy group (p = 0.008), whereas mean RNFL was significantly lower in obese group (p = 0.035). Also they found that there was a negative correlation among the mean RNFL and BMI (p = -0.044). There was no significant difference between the two groups in terms of RGC, C / D, CMT, and SFCT results (p>0.05). They suggested that high IOP and reduction of RNFL thickness may increase the risk of developing glaucoma at a younger age in obese children (30). In a study implemented by Demir et al., they aimed to compare the RNFL, thickness of the ganglion and inner plexiform layer analysis of peripapillary optic nerve head (PONH) and macula of two independent groups which were 85 obese children and 30 healthy children, respectively. RNFL thickness of temporal outer macula for obesity and control groups was 261.7 ± 13.7 and 268.9 ± 14.3 µm, respectively (p = 0.034). Apart from this, there was no significant difference between the two groups in other parameters (p>0.05) (31).

The advantages of our study includes child age group and detailed parameters compared to above studies. Its disadvantages are its retrospective design and small sample size.

To the best of our knowledge, only one study has considered the association between obesity and RNLF in children. In an investigation of RNLF with a mean age of 12 in China, Zhu et al (32) reported a mean RNLF of 103.08 µm, and determined no significant correlation between BMI and RNLF. Mean RNLF in our study was 108.9 µn in children of normal weight and 112.6 µm in obese children. RNLF had a tendency to elevation in obese children, although no statistically significant difference was determined compared to the control group. Our RNLF values being higher than those determined by Zhu et al. (32) may be attributed to variation in RNLF values between ethnic groups.

In conclusion, obesity in childhood has a significant effect on IOP, central retinal or RNLF values in Turkish cohort. Although CCT values were relatively higher in the obese group, no significant difference was observed compared to the healthy subjects. In current study, it should be kept in mind that elevated IOP and decrement of RNFL thickness on optic nerve head in children with obesity increased the risk of developing glaucoma, as well as decreased CFT and SFCT may form the basis for the development of macular diseases in future life. Future studies should assess whether there is any change with age and accompanying diseases in ocular parameters in obese children under long-term monitoring.

DECLARATIONS

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Conflict of Interest: No conflicting relationship exists for any author.

Ethical Approval: 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.

Informed Consent: Informed consent was obtained prior to every surgical procedure from all individual participants included in the study.

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Comparison of Mid-term Functional Outcomes of Midshaft Clavicle Fractures: Conservative versus Surgical Treatment

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ABSTRACT

Purpose: The aim of the present study was to compare the mid-term functional outcomes of midshaft clavicle fracture between surgical and conservative treatment methods.

Methods: Forty-six patients with a mean age of 33.9 years and a mean follow-up period of 62.1 months were treated open reduction and plate fixation (group 1), whereas 52 patients with a mean age of 32.1 years and a mean follow-up period of 58.7 months were treated conservatively (group 2) between January 2013 and January 2018. The conservative group divided into two groups (group 2A<2cm and group 2B ≥2 cm shortening). The shortening was calculated as the difference between the lengths of the two clavicles on bilateral clavicle anteroposterior (AP) radiograph at final visit. Functional evaluation was performed with the University of California at Los Angeles(UCLA) Shoulder score, Constant score, and Disabilities of the Arm, Shoulder and Hand(DASH) score.

Results: No significant difference in age, gender, and follow-up duration was observed between two groups. The mean shortening in group 1 was 1.7 ± 0.4 mm(0-2.8). The mean shortening in group 2 was 14.8 ± 5.1 mm(7-24). There was no significant difference with respect to the DASH, Constant, and UCLA scores between two groups. However, there was a statistically significant difference between group A (<2 cm shortening) and group B (≥2 cm shortening) with respect to the DASH score.

Conclusions: DASH, UCLA and Constant scores in the conservative group and the surgically treated group were similar in our study.

Keywords: clavicle shortening, shoulder function, midshaft fracture, functional score

Klavikula Diafiz Kırıklarının Orta Dönem Fonksiyonel Sonuçlarının Karşılaştırılması: Konservatif vs Cerrahi Tedavi

ÖZET

Amaç: Çalışma middiafizer klavikula kırıkları nedeni ile cerrahi ve konservatif olarak tedavi edilen hastaların ortalama 5 yıllık takip süresi sonundaki fonksiyonel sonuçları karşılaştırılmıştır.

Yöntemler: Ocak 2013-Ocak 2018 tarihleri arasında klavikula middiafizer kırıkları nedeni ile kayıtlı olan hastalar değerlendirildi. Ortalama yaşı 33.9 yıl olan 46 hasta açık redüksiyon ve plak fiksasyonu ile tedavi edildiği gözlendi (grup 1) ve ortalama takip süresinin 62,1 ay oldugu belirlendi. Ortalama yaşı 32.1 olan 52 hastaya ise konservatif tedavi uygulandı (grup 2). ortalama takip süresi 58,7 ay olarak belirlendi. Konservatif grup iki alt gruba ayrıldı (grup 2A<2cm ve grup 2B ≥2 cm kısalma). Kaynama saptandıktan sonra çekilen bilateral klavikula ön-arka (AP) grafisi ile ölçüm yapılarak kısalma ölçümü yapıldı. Fonksiyonel değerlendirme University of California at Los Angeles(UCLA) Omuz skoru, Constant skoru ve Disabilities of the Arm, Shoulder and Hand(DASH) skoru ile yapıldı.

Bulgular: İki grup arasında yaş, cinsiyet ve takip süresi açısından anlamlı fark gözlenmedi. Grup 1'de ortalama kısalma 1.7 ± 0.4 mm(0-2.8) idi. Grup 2'de ortalama kısalma 14,8 ± 5,1 mm(7-24) idi. DASH, Constant ve UCLA skorları açısından iki grup arasında anlamlı fark yoktu. Ancak grup A (<2 cm kısalma) ve grup B (≥2 cm kısalma) arasında DASH skoru açısından istatistiksel olarak anlamlı fark vardı.

Sonuç: Konservatif grup ile cerrahi tedavi uygulanan grupta DASH, UCLA ve Constant skorları çalışmamızda benzerdi. kısalma arttıkça hasta raporlu sonuçların kötüleştiği gözlendi.

Anahtar kelimeler: köprücük kemiği kısalması, omuz fonksiyonu, orta şaft kırığı, fonksiyonel skor

Clavicle fractures are common injuries, and up to 81% of these fractures are midshaft (1). Nonoperative treatment remains the main treatment for midshaft nondisplaced clavicular fractures (2,3). Displaced midshaft clavicle fractures can be successfully treated both operatively and conservatively. However, the selection of surgical or conservative methods is still controversial (4).

Due to the axial skeleton is connected to the shoulder and the upper extremity with the clavicle, posttraumatic shortening may change the scapulothoracic movements and biomechanics, as well as the muscle tension and balance; this may reduce the functional results of the shoulder and acromioclavicular (AC) joint (5,6). Different results were obtained in studies evaluating the relationship between clavicle shortening and shoulder functions. While some of the studies found no association between clavicle shortening and poorer functional outcomes (7,8), a previous study stated that greater shortening causes more pain, complaints, and dissatisfaction (9). The aim of the present study was to compare the mid-term functional outcomes of midshaft clavicle fractures between surgical and conservative treatment.

Patients & Methods

1.1. Study Design

This study was conducted in accordance with the ethical standards of the committee responsible for human experiments and the Declarations of Helsinki. The study was approved by the institutional review board (IRB Doc No. B.10.1.THK.4.34.H.GP.0.01). A total of 314 patients with clavicle midshaft fracture between the period of January 2013 and January 2018 were retrospectively determined from the hospital information system. Demographic data and clinical records were retrospectively examined to obtain patients' characteristics as well as information about the treatments of the patients. All fractures were classified according to the Neer classification (10), and type 1 (middle clavicle) fracture was selected for this study.

1.2. Eligibility Criteria

Patients diagnosed with acute clavicle midshaft fracture (within 14 days), minimum of 3 years of follow-up, and (3) available demographic and clinical data and patients with contralateral films of the clavicle were included in the study.

The exclusion criteria were: (1) patients <18 and >70 years old, (2) patients with chronic or sub-acute fractures (that occurred >14 days ago), (3) patients with open fracture, (4) patients with neurovascular injury, (5) patients with cognitive disorder, (6) patients with previous surgery in the affected clavicle or shoulder, (7) patients with pseudoarthrosis, and (8) patients with definite diagnosis of shoulder pathologies prior to trauma. A total of 98 (52 in the conservative group and 46 in the surgical group) patients were included in the study (Figure 1).

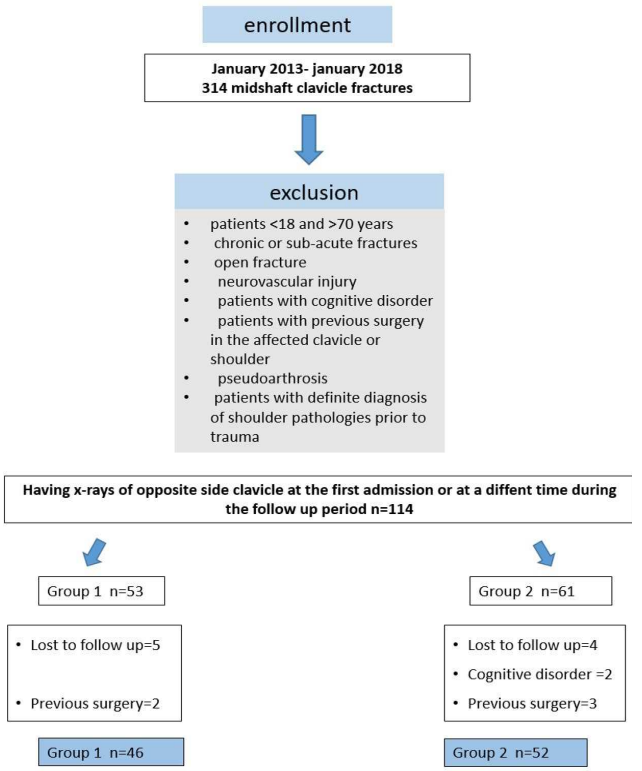

Fig. 1 Data collection and patient selection algorithm

1.3. Treatment Protocol and Follow-up Management

Patients in conservative group were treated with a clavicle bandage 6 weeks until radiological and especially clinical fracture healing is observed (group 1). Patients are referred to the physiotherapist for range of motion exercises in the fourth week of treatment. Strengthening exercises are started in the sixth week, and patients are advised to avoid contact sports for 4 months. The absolute operative treatment indications were displaced fracture with skin tenting and ≥ 2cm shortening fractures. Patients with absolute indications were offered operative treatment but patients who didn't accept the surgical treatment or could not be operated because of different concomitant comorbidities or pathologies were treated conservatively. Open

reduction and internal fixation (ORIF) is applied as standard with a 3.5-mm anatomical locking clavicle plate as the surgical technique (group 2). After the operation, patients use a sling for 3 weeks. As with conservative patients, patients are guided to the physiotherapist for movement exercises in the fourth week of treatment, strengthening is initiated at the sixth week, and patients are advised to avoid contact sports for 4 months.

1.4. Radiological Evaluation

Bilateral standard clavicle anteroposterior radiograph was obtained to evaluate the clavicle shortening. Both clavicles were measured from the center of the sternoclavicular joint to the center of the AC joint (Figure 2). The shortening was calculated as the difference between the lengths of the two clavicles. Both the primary (after initial trauma) and follow-up radiographs (after the union was completed) were examined for shortening, and the measurements were obtained in millimeters (9). All radiographic measurements were performed using a digital radiographic archiving system (GE pacs; GE Healthcare Systems, Barrington, USA) by three independent authors (KK, ME and SB).

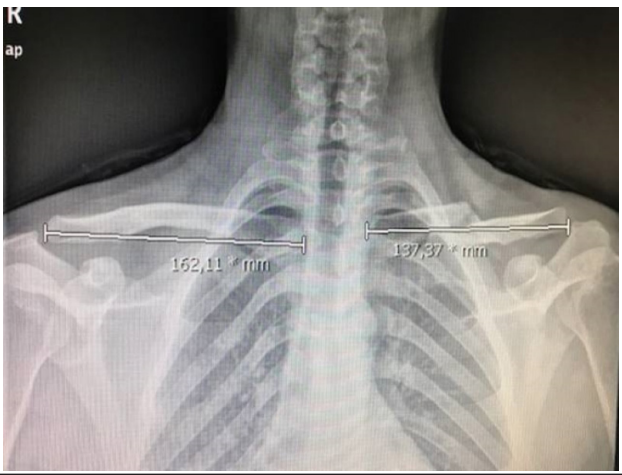

Fig. 2 Digital measurement of clavicle shortening on clavicular AP radiograph

1.5. Functional Evaluation

The patient-rated functional outcome was measured by the Quick Disabilities of the Arm, Shoulder, and Hand score, UCLA Shoulder Rating Scale score, and Constant score (11-13).

The radiological and functional evaluations were done at final follow-up visit.

1.6. Statistically Analysis

Statistical analyses were performed using IBM Statistical Package for Social Sciences for Windows, version 21.0 (*IBM Corp., Armonk, NY, USA*). Non-parametric Kruskal–Wallis H test was used for comparison of groups with non-normal distribution of data. The non-parametric Spearman's rank correlation test was used to calculate the correlation between the variables with non-normal data distribution. A p value <0.05 was considered to be statistically significant. Inter- and intraobserver reliability for radiographic measurements were assessed using the intraclass correlation coefficient (ICC). Each group was evaluated twice with repeat measurements on all radiographs with at least a one-week interval for each measurement by 3 independent observers (KK, ME and SB). Agreement was considered to be excellent for ICC values > 0.80.

Results

In the current study, 98 patients (n = 52 in the conservative group and n = 46 in the surgical group) were evaluated. There were 58 men and 40 women with a mean age of 32.5 (SD: 12.88) years. The age of the patients ranged from 18 to 69 years. The follow-up time ranged from 36 to 88 months, and the mean follow-up time for all patients was 62 (SD: 8.6) months (Table-1).

The mean DASH scores were 1.26 ± 1.18 in group 1 and 0.89 ± 1.2 in group 2. The mean UCLA Shoulder rating scale scores were 32.8 ± 2.7 in group 1 and 33.8 ± 3.2 in group 2. The mean Constant scores were 96.2 ± 3.1 in group 1 and 97.3 ± 4.2 in group 2. There was no significant difference with respect to the DASH score, Constant score, and UCLA score between two groups (Table-1).

All of the functional outcomes and radiological measurements had an ICC > 0.80 (range 0.86 to 0.94), indicating good agreement on all parameters assessed by the three independent observers. The clavicle shortening in group 2 ranged from 7 to 24 mm, and the mean value was 14.8 ± 5.1 mm. The range of shortening was 0–28 mm in group 1, and the mean value was 17 ± 4 mm ($p < 0.001$). The conservative group was divided into two groups according to the amount of shortening in itself. Group A (n = 30) comprises patients with <2 cm shortening, and group B (n = 22) includes patients with ≥2 cm shortening. There was a statistically significant difference between group A (<2 cm shortening) and group B (≥2 cm shortening) with respect to the DASH score ($p = 0.006$). However, there was no significant difference with respect to the Constant score ($p = 0.183$) and UCLA Shoulder rating scale score ($p = 0.704$).

Table-1: Comparison of demographic and functional results of both groups.

	Conservative Group		Surgical Group		
	Mean ± SD	Min – Max	Mean ± SD	Min – Max	p value
Age, years	32.1 ± 12	20 – 69	33.9 ± 11	18 – 66	0.658
Gender, F/M	28/25		25/21		0.418
Follow-up , months	58.7 ± 8	36 – 74	62.1 ± 9	36 – 88	0.219
DASH Score	0.89 ± 1.2	0 – 4.5	1.26 ± 1	0 – 3.3	0.825
UCLA score	33.8 ± 3.2	25 – 40	32.8 ± 2.7	30 – 40	0.782
Constant Score	97.3 ± 4.2	85 – 100	96.2 ± 3.1	90 – 100	0.912
Shortening, mm	14.8 ± 5.1	7 – 24	1.7 ± 0.4	0 – 2.8	<0.001*

SD: Standard deviation; Min: Minimum; Max: Maximum; F: Female; M: Male; mm: millimeter.

Discussion

The effect of clavicle shortening on shoulder functional outcomes has not been clearly demonstrated in the literature (4). The Canadian Orthopaedic Trauma Society reported clavicle shortening to be associated with higher DASH scores (14); on the other hand, Virtanen et al. reported no significant difference between the functional outcome of the conservative and operative groups in their series (15). In the present study, within 5 years following treatment protocol, we found no statistical difference between the surgical and conservative groups with respect to the DASH, UCLA, and Constant scores.

It is declared that clavicle shortening is associated with poor functions. In addition, Hill et al. reported that a final shortening of ≥2 cm is associated with unsatisfactory results ($p < 0.0001$). Neither of the two studies was able to define the absolute value of clavicle shortening that was acceptable for good shoulder function (4,14). In our study, there was a statistically significant difference between the conservative group A (<2 cm shortening) and group B (≥2 cm shortening) with respect to the DASH score ($p = 0.006$). However, there was no significant difference with respect to the Constant score ($p = 0.183$) and UCLA Shoulder rating scale score ($p = 0.704$). The Canadian Orthopaedic Trauma Society and some other studies had reported significantly higher patient satisfaction in the operative group than in the conservative group (14,16,17). In our study, patient satisfaction was similar in both groups (47/52 in the conservative group, 42/46 in the surgical group). In contrast to the studies we mentioned above, this finding is one of our results that differ from those reported by other studies. However, functional results may vary in situations where patient expectations differ. Satisfaction with this study may be similar as it was due to trauma, but it should be kept in mind that even minor shortnesses or rotations in elective situations will alter patient satisfaction.

Clavicle shortening was calculated by radiographs in most of the current studies. The major problem to calculate the shortening is the calibration of radiographs. Radiographs can be subject to error depending on the estimates made if the film is not calibrated (18). In addition to measuring the shortening directly, calculating the ratio of shortening to the length of the noninjured clavicle is another method. The main idea in this method is that the 2 cm threshold value will cause different biomechanical effects in the clavicle of different lengths. However, asymmetry of both clavicles may exist for individual cases. An asymmetry of >5 mm in the clavicular length in 28.5% uninjured and skeletally mature adults was reported (19). Omid et al. measured shortening using computed tomography (CT) scans, which have been demonstrated to be a more accurate method of assessing fracture shortening than plain radiographs (20). The radiation dose of the shoulder CT scan is approximately 21 times higher than that of a flat chest radiograph (20). Although more accurate results are obtained from radiographs, CT scan is not routinely recommended for midshaft clavicle fractures due to higher radiation rates and the lack of a clear relationship between shortening and functional scores. In our cases, we measured the shortening with radiographs and compared the intact side to calculate the shortening of the clavicle by using digital radiographic archiving system. For the reasons mentioned above, our radiological measurement method can be considered as one of the limitations of the present study.

The clavicle is the only bone that binds the upper extremity to the thorax. Considering the origin and insertion

regions of the shoulder girdle muscles, the shortening of the clavicle may cause a decrease in the strength of the shoulder muscles. The shortening of the clavicle causes increased sternoclavicular angle, which may reduce the range of overhead shoulder motion. It also changes the scapular position, and this may result in scapular dyskinesia as well as a change in the glenoid orientation–scapular rotation, which causes pain while the upper extremity is in motion (3,21). The relationship between changed shoulder biomechanics caused by shortening of the clavicle and functional outcome remains a controversial subject. Some studies have found inferior functional outcome in the presence of clavicular shortening after healing (5,7); on the contrary, another study has not demonstrated the existence of such a relationship (14). In our study, clavicle shortening had no statistically significant difference with respect to poorer functional outcomes. Teubner et al. proved that 1 cm shortening of the clavicle leads to a 40% more loading on the AC joint than usual, so arthritis becomes more likely (22). This result has been supported by some other studies showing abduction deficit and dysfunction in overhead mobility in patients with shortening of the clavicle (23). However, in asymptomatic patients, the prevalence of AC joint degeneration is reported to be between 48% and 82% in magnetic resonance imaging (24).

The current study has some limitations. Our study is a retrospective case series with a relatively small sample size. We did not evaluate functional scores before surgery or during treatment. On the other hand, scapulothoracic pathologies, silent AC joint degeneration, rotator cuff pathologies, or cervical disc pathologies that may occur simultaneously with the first trauma or at different times may also affect functional results in the long term. Making this distinction may yield more meaningful results, but the methodology of the study may not always be optimal in patients presenting with trauma. It should be kept in mind that all these shoulder-related pathologies can affect shoulder functional results as much as clavicle shortening.

Conclusions

After an average of 5 years of follow-up, the changes in DASH, UCLA and Constant scores in the conservative group and the surgically treated group were similar. However, the decrease of scores in cases with ≥2 cm predicts that providing the length of clavicle more successful functional results in the long term. Also, Satisfaction with this study may be similar as it was due to trauma, but it should be kept in mind that even minor shortnesses or rotations in elective situations will alter patient satisfaction.

Ethical Approval Section: This study was approved by our institutional review board (Istanbul Umraniye Training and Researh Hospital Ethic Committee).

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Approval Date: 22.01.2020.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Psychiatry / Psikiyatri

Evaluation of Anxiety, Burnout and Psychological Resilience Levels of Healthcare Workers in the COVID-19 Pandemic

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ABSTRACT

Purpose: The COVID-19 pandemic affects mental health as well as physical health. Many studies have shown that the pandemic has negative effects on the mental health of individuals. Determining the factors that play a role in the psychological resilience and burnout levels of healthcare workers, who are at the forefront of the pandemic, will play an important role in preventive and therapeutic planning in pandemic management. Our aim is to evaluate the anxiety-burnout levels and psychological resilience levels in healthcare workers and the factors affecting them.

Method: Sociodemographic data form, State-Trait Anxiety Scale (STAI), Connor-Davidson Psychological Resilience Scale (CD-RISC) and Maslach Burnout Inventory (MBI), were created in Google Documents and applied to the Healthcare workers via mail and message groups and social media groups. A total of 257 people were included in the study.

Results: In our study, high trait anxiety scores and increased working were associated with increased levels of burnout. Doctors and nurses showed more signs of burnout than auxiliary assistant staff. The emotional exhaustion and personal accomplishment were higher in females. Psychological resilience could predict personal accomplishment sub-dimension and total scores of MBI.

Conclusions: Healthcare workers are at risk for burnout. Working conditions should be regulated and psychosocial support programs should be established for healthcare workers who are at the forefront in pandemic.

Keywords: COVID-19, mental health, healthcare workers, burnout, resilience

COVID-19 Pandemisinde Sağlık Çalışanlarının Anksiyete, Tükenmişlik ve Psikolojik Dayanıklılık Açısından Değerlendirilmesi

ÖZET

Giriş ve Amaç: COVID-19 pandemisi, hem beden sağlığını hem de ruh sağlığını etkilemektedir. Bir çok çalışmada pandeminin bireylerin ruh sağlığı üzerine olumsuz etkileri olduğu gösterilmiştir. Pandeminin ön saflarında mücadele eden sağlık çalışanlarının psikolojik rezilyansları ve tükenmişlik seviyeleri üzerinde rolü olan etmenleri belirlemek, koruyucu ve terapötik önlemler almak ve pandemiyi yönetmek açısından önemlidir. Bu çalışmada amacımız, sağlık çalışanlarında anksiyete, tükenmişlik ve psikolojik rezilyans seviyelerini ve bunları etkileyen faktörleri değerlendirmektir.

Yöntem ve Gereçler: Google Dökümanlar üzerinden, sosyodemografik veri formu, Durumluk ve Süreklilik Anksiyete Ölçeği, Connor-Davidson Psikolojik Rezilyans Ölçeği, Maslach Tükenmişlik Envanterini (MTE) içeren anket oluşturularak sağlık çalışanlarına e-posta, mesaj grupları ve sosyal medya grupları aracılığıyla ulaştırıldı. İki yüz elli yedi kişi çalışmaya katıldı.

Bulgular: Çalışmamızda, sürekli kaygı skorlarında yükseklik ve artmış çalışma saatleri, tükenmişlik seviyelerinde artışla ilişkili bulundu. Doktorlar ve hemşireler, yardımcı sağlık personellerine göre daha çok anksiyete ve tükenmişlik belirtisi gösteriyordu. Emosyonel tükenme ve kişisel başarıda düşme, kadınlarda daha yüksekti. Psikolojik rezilyansın, MTE toplam skorlarını ve kişisel başarıda düşme düzeylerini predikte edebileceği bulundu.

Tartışma ve Sonuç: Sağlık çalışanları, tükenmişlik için risk altındadır. Pandemide ön safta çalışan sağlık çalışanlarının çalışma şartları düzenlenmeli ve psikososyal destek programları oluşturulmalıdır.

Anahtar Kelimeler: COVID-19, koronavirüs, ruh sağlığı, sağlık çalışanları, tükenmişlik, rezilyans, anksiyete

The new type of coronavirus (SARS-CoV-2), which emerged in Wuhan, China in December 2019, spread rapidly in a short time and affected the whole world. While COVID-19 disease caused by SARS-CoV-2 is seen as an upper respiratory tract infection with asymptomatic or mild symptoms in general, viral pneumonia may cause severe clinical manifestations that progress to acute respiratory failure in some cases. Depending on the clinical condition of the patients, outpatient or inpatient treatment may be required. The rapid spread of the virus, the variety of symptoms, and the absence of a definitive treatment have caused excessive intensity and burden in the health system.

Although the prevalence of COVID-19 among healthcare workers varies in different countries, it constitutes a significant proportion of those affected. According to some reports, 10% of confirmed COVID-19 cases involved healthcare providers(1). Healthcare workers' burden continues to increase due to the pandemic and the overload in the health system. Healthcare workers found themselves working at the vanguard of responding to the COVID-19 pandemic and exposed to various risks to their psychological and physical health (2).

The fatal and uncontrollable nature of COVID-19, with no known effective cure, is coupled with a relatively high infection rate and mortality among healthcare providers. Separation from the family, the risk of transmitting the virus to family members, mental and physical fatigue caused by excessive working hours, problems in accessing protective equipment and medical supplies, working in a field outside of their specialties have provoked feelings of anxiety and stress on healthcare workers than ever before (3).

Burnout is a psychological condition that is defined as a psychological, emotional, and physical stress state in response to prolonged exposure to occupational stress (4). Maslach et al described three subtitles of burnout as; emotional exhaustion, depersonalization, and decreased professional success (4). Emotional exhaustion represents the primary dimension of personal stress, the depletion of emotional resources required to communicate with other people. Desensitization represents the interpersonal context dimension of burnout. It refers to developing negative feelings and cynical attitudes towards the person to whom the person provides service or care. The individual skills-achievement reduction component is the self-assessment dimension of burnout and refers to feelings of inadequacy and lack of success and productivity at work(5).

Burnout can have severe outcomes for both patients and healthcare workers. It can cause dreadful physical and mental health consequences and reduce the quality of service provided by affected staff. Various systematic reviews in the literature have found that high burnout in healthcare workers is associated with less safe patient care (6,7).

Recognizing the anxiety and burnout levels of healthcare professionals can contribute to planning preventive mental health services and providing mental well-being for healthcare workers. Therefore, we aimed to determine the anxiety and burnout levels in healthcare workers of the COVID-19 pandemic in a pandemic hospital in Turkey and reveal the potential protective and risk factors.

METHODS

Sample

This study was conducted between June 1, 2020, and July 1, 2020, by applying an anonymous online questionnaire to people working at Ankara City Hospital during the COVID-19 outbreak. All participants were informed consent electronically before enrollment and were informed that they could withdraw their consent at any time. Those who completed the questionnaires incompletely were excluded from the study. Sociodemographic data form, State-Trait Anxiety Scale (STAI), Connor-Davidson Psychological Resilience Scale (CD-RISC), and Maslach Burnout Inventory (MBI), were created in Google Documents and applied to the healthcare workers via mail and message groups and social media groups. Two hundred fifty-six people agreed to participate in the study and fill out the forms completely.

Measurement tools

State-Trait Anxiety Inventory (STAI)

This scale was developed by Spielberger et al. It includes two separate scales measuring trait and situational anxiety levels(8). The first 20 items measure state anxiety, and the second 20 items measure trait anxiety. Turkish validity and reliability study was conducted by Öner and Le Compte (9).

Connor-Davidson Psychological Resilience Scale (CD-RISC)

It is a 5-point Likert-type scale with 25 items. It was developed by Connor and Davidson and measures psychological health (10). The higher scores on the scale mean higher psychological resilience. Turkish validity and reliability study was conducted by Karairmak (11).

Maslach Burnout Inventory (MBI)

Maslach and Jackson developed it to determine the level of burnout (12). This scale consists of 22 items. It has three sub-dimensions: emotional exhaustion, depersonalization, and personal accomplishment. The high score from the emotional exhaustion and depersonalization subdimensions and the low score from the personal accomplishment sub-dimension indicate the level of burnout. The Turkish validity and reliability study was conducted by Ergin (13). However, while using the "personal accomplishment" subscale in analysis and determining the total scores, the scores were calculated by reverse coding the answers given to the items. Thus, it was ensured that high scores in this subscale showed high burnout in those who received high scores.

Statistical Analysis

SPSS 22 program was used to analyze the data. For the distribution of normality, histogram, Skewness, and Kurtosis values were used in addition to the Kolmogorov-Smirnov test. The chi-square test was used to compare categorical variables, Pearson correlation was used for correlation analysis of values with a normal distribution, and Spearman correlation analysis was performed for those not showing normal distribution. Independent Samples T-Test was used for comparing the means of two independent groups showing normal distribution, and the Mann Whitney U test was used to compare the medians of two independent groups that did not show normal distribution. One Way ANOVA test was used for comparisons of 3 independent groups showing normal distribution. In comparing three independent groups, if the variants' distribution is not homogeneous (Levene's p <, 05), Welch statistics were used. The Kruskal Wallis H test was used for comparing three independent groups of scales that did not show normal distribution. In cases where there was a significant difference between the groups, two-group comparisons were made, and Bonferroni correction was applied to determine which groups the difference was between them. Stepwise multiple linear regression analysis was performed to determine potential risk and protective factors for burnout. The significance level was accepted as p <0.05.

RESULTS

257 people (mean age: 38.84 ± 8.53) participated in this study. 83.3% (n: 214) of the participants were female and 16.7% (n: 43) were male. Of the participants, 26.1% (n: 67) were doctors, 56.0% (n: 144) nurses, 17.9% (n: 46) health staff. Forty-seven point five percent (n: 122) were married, 52.5% (n: 135) were single / widowed. Sixty-one point five percent (n: 158) did not have children, 38.5% (n: 99) have children and 66.9% (n: 172) live with their family or friends, 33.1% (n: 85) live alone. While 49.4% (n: 127) people did not live with people at risk for COVID-19, 50.6% (n: 130) people were living with people at risk for COVID-19. The socio-demographic information of the sample is shown in Table 1.

The mean year of education was 15.02 ± 1.50. The participants' mean working period was 113.95 ± 111.83 months (min: 6, max: 456 months). Twenty-eight point four percent (n: 73) of the participants had a known chronic disease. Eighteen point three percent (n: 43) declared that they had psychiatric diagnosis and treatment before. While 48.2% (n: 124) of the participants worked in the COVID-19 service, 45.9% (n: 118) stated that their weekly working hours increased during the pandemic.

The differences between the CD-RISC, STAI-T, STAI-S, and total MBI score medians (IQR) of the healthcare workers are given in Table 2.

The emotional exhaustion median scores of the healthcare workers were higher in females (25.5 [13.3] vs 20 [15]; z = -2.885; P = 0.004), working in COVID-19 clinics (26[11] vs 24 [15]; z=-2,576; P =0,01), who had excessive weekly working hours (26[10,3] vs 23[12]; z=-3,492; P <0,001), and who had a psychiatric diagnosis before (27[12] vs 25[12]; z=-2,040; P =0,041). Emotional exhausting median scores were 26 (9), 26 (14.8) and 17 (12) in doctor, nurse and assistant staff, respectively. (x^2: 30,776; P<0.001) Median score of doctors (z = -4.706; P <0.001) and nurses(z = -5,314; P <0.001) were statistically higher than assistant staff.

Table 1: Sociodemographic characteristics of the healthcare workers participating in the study		
	N	%
Gender		
Female	214	83.3
Male	43	16.7
Marital status		
Married	122	47.5
Single	135	52.5
Professional status		
Doctor	67	26.1
Nurse	144	56.0
Assistant staff	46	17.9
Having children		
Yes	99	38.5
No	158	61.5
Living condition		
Alone	85	33.1
With friends or family	172	66.9
N: number of people; %: percentage		

Depersonalization median scores of the participants were higher in those who were not married (11 [5] vs 9 [5]; z = -2.616; P = 0.009), did not have children (11 [4] vs 8 [4]; z = -4,445; P <0.001), worked in the COVID-19 clinics (11 [6] vs 10 [5]; z = -2.656; P = 0.008), and had excessive weekly working hours (11 [5.3] vs 9 [5]; z = -4,065; P < 0.001). Depersonalization median scores were 11 (5), 10 (4) and 8 (6) in doctor, nurse, and assistant staff, respectively. (x^2: 10,825; P=0.004) Depersonalization median score of doctors was statistically higher than assistant staff. (z = -3,189; P = 0.001).

Personal accomplishment median scores of the participants were higher in females (21 [6] vs 19 [7]; z = -2.0366; P = 0.042), worked in the COVID-19 clinics (21 [5] vs 20 [8]; z = -2.342; P = 0.019) and and who had a psychiatric diagnosis before (22[6] vs 20[7]; z=-1,994; P =0,046). Personal accomplishment median scores were 22 (7), 20 (7) and 19,5 (7,25) in doctor, nurse, and assistant staff, respectively. (x^2: 7,096; P=0.029). Personal accomplishment median score of doctors was statistically higher than assistant staff. (z = -2,629; P = 0.009).

According to the participants' sociodemographic and working characteristics, the comparison of CD-RISC, STAI-T, STAI-S, and total scores of MBIis shown in Table 2.

A correlation analysis between sociodemographic variables, study characteristics, CD-RISC, STAI-T, STAI-S, MBI's subscales (emotional exhaustion, personal accomplishment, depersonalization), and total scores is shown in Table 3.

In the multiple regression analysis to predict the subscale and total scores of MBI, important regression equations were found for the MBI total (F (1,250) = 60,495; Adjusted R2: 0,538; p <0.001), the Emotional exhaustion (F (1.251) = 54.722; Adjusted R2: 0.457; p <0.001), Depersonalization (F (1.251) = 22.718; Adjusted R2: 0.254; p <0.001), and personal accomplishment (F (1,252) = 51,945; Adjusted R2: 0.375; p <0.001), and total MBI. These models are shown in Table 4.

DISCUSSION

In this cross-sectional study, we evaluated healthcare workers' burnout levels in the COVID-19 pandemic and revealed the factors that may affect burnout. We found that higher trait anxiety, working as a nurse or doctor, increased years of education and excessive weekly working hours are associated with increased burnout levels.

COVID-19 pandemic impacts the physical and psychological health of healthcare workers worldwide (14). Not surprisingly, it creates unprecedented challenges for healthcare professionals. Previous research on burnout has shown that the highest burnout rate is observed among hospital emergency departments (15). In the event of a pandemic that caused a crisis in healthcare provision, all healthcare workers tried to overcome this crisis by acting in collaboration. However, as the pandemic period extends, the burnout of healthcare workers is expected to increase.

Our findings reinforce the multidimensionality of burnout. The total and three dimensions of burnout are related to a set of variables. It can be thought that these three sub-dimensions may be necessary for terms of considering the future burnout prevention program.

We have determined that female gender, marital status, parental status, working status in the COVID-19 clinics, excessive working hours, and living alone may contribute to burnout.

Table 2: Comparison of CD-RISC, STAI-T, STAI-S, and MBI scores according to sociodemographic variables and working conditions								
	CD-RISC (Median,IQR*)	Statistical value	STAI-T (Median,IQR*)	Statistical value	STAI-S (Median,IQR*)	Statistical value	Bornout (Median,IQR*)	Statistical value**
Gender								
Female	81,5(22)	**Z:-3,823 p<0.001**	40(11)	**Z:-3,554 p<0.001**	41(14)	**Z:-4,042 p<0.001**	57(19)	**Z:-2,995** p:0,003
Male	96,0(67)		35(13)		31(15)		50(25)	
Marital status								
Married	84,5(25.5)	Z:-1,808 p:0.071	38,5(12)	Z:-1,399 p: 0.162	40(16.3)	Z:-0,614 p:0,539	53,5(19)	Z:-1,871 p:0,061
Single	81(23)		40(13)		41(15)		57(21)	
Professional status								
Doctor	83(22) [a]	**x^2:22,162 P<0.001**	39(10)	**x^2:12,910 P<0.001**	40(14)	**x^2: 17,312 P<0.001**	60(15) a	**x^2:26,596 p<0.001**
Nurse	79(23) [a]		41(12) a		42(13,8) a		57(23,5) a	
Health staff	92,5(27)		34,5(16,3)		31,5(21)		46 (14,5)	
Having children								
Yes	84(25)	Z:-0,883 p:0.377	38(12)	Z:-1,405 p:0,166	40(17)	Z:-0,738 p:0.460	52(18)	**Z:-2,443 p:0.013**
No	82,5(21,3)		40(12,3)		41(15)		57,5(16)	
Living conditions								
lived with friend or family	84,5(23)	**Z:-2,300 p:0.021**	39(11,8)	**Z:-2,080 p:0.038**	40(15,8)	Z:-1,214 p:0,225	54,5(19,75	**Z:-1,942 p:0.052**
Alone	78(26,5)		42(12)		41(15)		58(23,5)	
Having a psychiatric diagnosis in the past								
Yes	72 (19)	**Z:-3,571 P<0.001**	45 (10)	**Z:-4,088 p<0.001**	47 (13)	**Z:-3,825 p<0.001**	60 (27)	**Z:-2,191 p:0.028**
No	85 (26)		38 (12)		39 (15)		55 (20,25)	
Working in the COVID-19 clinics								
Yes	81(19,8)	Z:-1,473 p: 0,141	40(11,6)	Z:-1,811 p:0.070	42(14)	Z:-1,664 p:0,096	59,5(17,5)	**Z:-3,295 p:0,001**
No	85(28,5		39(12)		39(16)		52(20)	
Weekly working hours increased								
Yes	81(22)	Z:-1,673 p:0,094	40(12)	**Z:-1,949 p:0,051**	43(17)	**Z:-2,924 p:0,003**	60(17)	**Z:-3,944 p<0.001**
No	86(25)		38(12)		39(15)		52(19)	

a: after Bonferroni correction, higher than health staff; *:Interquartile range; **: Mann Whitney U Test was used in the comparison of two groups, and Kruskal Wallis test was used when there were more than two groups; MBI: Maslach Burnout Inventory, CD-RISC : Connor-Davidson Psychological Resilience Scale, STAI-T: State-Trait Anxiety Inventory-Tait STAI-S: State-Trait Anxiety Inventory-State

Table 3: Correlation between burnout, anxiety, resilience levels with working conditions and socio-demographic variables†

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Age	-																
2. Gender (female)	0,057	-															
3. Marital Status (Married)	-,514**	-0,054	-														
4. Education years	0,047	0,027	0,01	-													
5. Living condition (friend or family)	-,321**	-0,005	,387**	0,081	-												
6. Having children (no)	,646**	0,009	-,689**	-0,05	-,302**	-											
7. Working in the COVID-19 clinics (no)	-,247**	-0,036	0,107	,131*	,215**	-0,076	-										
8. Weekly working hours increased (no)	-,328**	0,005	,188**	0,042	,182**	-,248**	,189**	-									
9. Profession time (months)	,894**	-0,033	-,525**	-0,005	-,379**	,674**	-,162**	-,352**	-								
10. Having a psychiatric diagnosis in the past (no)	,184**	0,058	-0,034	-0,038	-0,033	0,101	0,007	-0,052	0,097	-							
11. CD-RISC	0,077	,239**	-0,113	0,005	-,144*	0,055	-0,092	-0,105	0,051	-,223**	-						
12. STAI-T	-,138*	-,222**	0,087	0,003	,130*	-0,088	0,113	0,122	-0,086	,255**	-,718**	-					
13. STAI-S	-0,083	-,253**	0,038	0,052	0,076	-0,046	0,104	,183**	-0,054	,239**	-,665**	,746**	-				
14. MBI total	-,161*	-,187**	0,117	,189**	0,121	-,153*	,206**	,247**	-0,107	,137*	-,589**	,666**	,610**	-			
15 Emotional exhaustion	-0,092	-,180**	0,09	,200**	0,044	-0,103	,161**	,218**	-0,034	,128*	-,493**	,598**	,594**	,900**	-		
16. Depersonalization	-,250**	-0,098	,163**	,131*	0,115	-,278**	,166**	,254**	-,180**	0,058	-,279**	,434**	,282**	,681**	,524**	-	
17. Personal accomplishment	-0,101	-,127*	0,047	0,084	,151*	-0,012	,146*	0,115	-0,086	,125*	-,567**	,483**	,437**	,647**	,349**	,269**	-

†: Spearman correlation analysis; * Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed) ;MBI: Maslach Burnout Inventory, CD-RISC : Connor-Davidson Psychological Resilience Scale, STAI-T: State-Trait Anxiety Inventory-Tait STAI-S: State-Trait Anxiety Inventory-State

Table 4: Multiple regression models of sub-dimensions and total scores of Maslach Burnout Inventory (MBI)

	Predictors	Regression coefficient (β)	S.E.	Standardized re-gression coeffi-cient (Beta)	t	p	95% confidence interval of β		Tolerance	VIF
Emotional exhaustion	(Constant)	-10,837	4,505		-2,405	0,017	-19,71	-1,963		
	STAI-T	0,367	0,071	0,368	5,148	<0,001	0,226	0,507	0,416	2,401
	Doctor or nurse	3,93	1,153	0,172	3,408	0,001	1,659	6,202	0,834	1,199
	STAI-S	0,215	0,059	0,265	3,648	<0,001	0,099	0,331	0,404	2,474
	Education years	0,633	0,285	0,109	2,219	0,027	0,071	1,195	0,888	1,126
Depersonalization	(Constant)	4,592	1,198		3,832	<0,001	2,232	6,952		
	STAI-T	0,178	0,023	0,416	7,587	<0,001	0,132	0,224	0,975	1,026
	Having children	-1,36	0,436	-0,175	-3,122	0,002	-2,217	-0,502	0,927	1,079
	Doctor	1,027	0,475	0,12	2,164	0,031	0,093	1,962	0,955	1,048
	Weekly working hours increased	0,851	0,428	0,113	1,987	0,048	0,008	1,695	0,911	1,098
Personal accomplishment	(Constant)	26,845	3,111		8,629	<0,001	20,718	32,972		
	CD-RISC	-0,134	0,021	-0,458	-6,459	<0,001	-0,175	-0,093	0,488	2,05
	Doctor	1,739	0,581	0,149	2,992	0,003	0,594	2,884	0,993	1,007
	STAI-T	0,108	0,042	0,185	2,609	0,01	0,027	0,19	0,486	2,059
MBI Total	(Constant)	15,739	9,553		1,647	0,101	-3,076	34,555		
	STAI-T	0,815	0,097	0,512	8,381	<0,001	0,623	1,006	0,485	2,062
	Doctor or nurse	3,645	1,746	0,1	2,087	0,038	0,206	7,085	0,789	1,268
	Weekly working hours increased	3,690	1,227	0,131	3,007	0,003	1,273	6,108	0,947	1,056
	Education years	1,239	0,421	0,133	2,944	0,004	0,41	2,067	0,885	1,13
	CD-RISC	-0,145	0,05	-0,181	-2,908	0,004	-0,242	-0,047	0,468	2,138

MBI: Maslach Burnout Inventory; CD-RISC : Connor-Davidson Psychological Resilience Scale; STAI-T: State-Trait Anxiety Inventory-Trait; STAI-S: State-Trait Anxiety Inventory-State

Although there were findings in previous studies that being married and having a child could increase burnout (16,17), Burnout scores were lower in those married and had children in our study. This can be explained by reducing the workload outside the hospital with the spouse's support in married couples. It has been shown that having a child significantly reduces the depersonalization subscale values in our study. By increasing the healthcare worker's empathy, having children decreases the depersonalization towards the patients in business life. Also, total burnout scores of those living alone were found to be higher. It can be thought that with social isolation, the loneliness of the healthcare workers can increase burnout.

Our study showed that working in the COVID-19 clinics increased all three dimensions of burnout. In a study conducted in China, burnout prevalence was high among frontline nurses (18). Another study in Switzerland showed a higher level of burnout in the group of healthcare workers who have direct contact with patients (19). In addition to the increase in healthcare workers' workload, the risk of being infected, increasing number of patients, increased disease severity, uncertainty in treatments, critical decision-making processes, the possibility of carrying the pathogen to their family was expected to increase burnout of healthcare workers.

A previous study conducted with healthcare professionals in Italy showed that weekly working hours predicted three MBI sub-dimensions (20). In our study, both state anxiety and total burnout scores were higher in the group with excessive weekly working hours. Physical and mental fatigue and excessive working hours increased their anxiety and ultimately increased emotional exhaustion and depersonalization sub-dimensions.

A significant positive correlation was found in our study between the duration of education (years) and the emotionally exhausting and depersonalization sub-dimension. It has also been shown that it can predict emotional exhausting sub-dimension and total MBI score. As the years of education increase, the role and responsibilities of individuals in critical decision-making processes increase. It can be thought that this may contribute to mental fatigue and burnout.

When we examined the burnout sub-dimensions and total scores according to professional status in our study, we found that doctors were affected more than assistant staff in the depersonalization and personal accomplishment sub-dimensions. In terms of emotionally exhausting and total MBI score, we found that doctors and nurses were affected more than assistant staff. In addition to previous studies showing that nurses are at higher risk for burnout (20,21), in a study by Jalili et al., residents are at higher risk than nurses (23). Working as a doctor was found as a predictor in the depersonalization and personal accomplishment sub-dimensions in our study. Here, it can be thought that the uncertainty in COVID-19 treatment and the variability in response to treatment and prognosis may be compelling.

Resilience is defined as the power to cope with risk, trouble, and stress, even though an individual is subjected to a severe strain that can lead to various physical, behavioral, cognitive, and emotional symptoms (24,25). Studies have shown that there tend to be lower resistance rates to infectious disease outbreaks (26). It also suggests that those affected by deterrent events may, over time, overcome adversity and become resilient (27). The traumatic experience created by the pandemic is continuing on society and healthcare workers. In our study, we showed that resilience could predict personal accomplishment sub-dimension and total scores of MBI. We consider it a potentially protective factor against burnout, as shown in previous studies (16,28).

While anxiety can be protective for people at a certain level and time, it becomes harmful by disrupting functionality as its severity and duration increase. COVID-19 pandemic period can be assumed as an example of this. The uncertainty in the treatment and the pandemic's prolongation laid the groundwork for the potentially harmful effects of anxiety.

Limited data are available regarding the mental consequences of the COVID-19 pandemic on healthcare workers with a history of psychiatric disorders. In a study conducted in Australia, it has been shown that those with psychiatric disorders in the past are associated with anxiety, depression, and burnout (29). In our study, consistent with the above study, the STAI-T, STAI-S, and total MBI scores were higher in the group with a history of psychiatric disorders.

According to Spielberger, anxiety is divided into trait anxiety and state anxiety. Trait anxiety is the sensitivity of a person to anxiety, that is, the level of perceiving stressful situations as threats, and state anxiety is the response given after being regarded as threatening to a situation (30).

In our study, trait anxiety-related to anxiety sensitivity was higher in women, individuals living alone, nurses (according to health staff), and those with a history of psychiatric disorders. It was also shown in the regression analysis that it could predict total MBI and its three sub-dimensions. State anxiety was higher in women, nurses (according to health staff), those with a history of psychiatric disorders, and those whose weekly working hours increased. It has been shown that state anxiety predicts emotional exhaustion.

Individuals with high trait anxiety levels are more likely to experience state anxiety than those with low trait anxiety (in terms of intensity, frequency, duration) (31). In our study, there is a positive high-degree correlation between the trait and state anxiety. We can say that trait anxiety, which is related to the level of anxiety sensitivity determined by biological, environmental, and other factors, is more critical for burnout than state anxiety. However, the continuation of the pandemic and the prolongation of uncertainty causes the anxiety levels to continue increasing. As a result, the emergence of dysfunction and psychiatric disorders will be inevitable.

CONCLUSIONS

In conclusion, many studies have been conducted on burnout in COVID-19. However, our study is the first to

examine which subcomponents play a role in burnout and their relationship with resilience.

Our study has some limitations. Firstly, the participants were evaluated cross-sectionally. In hospitals, depending on the pandemic pace, patient density and workload are different. This can affect burnout levels and resilience. In future studies, longer follow-ups evaluating the relationship between state anxiety changes and burnout and resilience can be planned. Secondly, in our study, people who are not interested in internet applications may have been excluded from the sample because the surveys were conducted online. However, in the COVID-19 pandemic, many studies have been conducted online, as face-to-face interviews are risky for the infection.

Ethical considerations

Ethical approval was obtained from the Ethics Committee of the Ankara City Hospital, Ankara, Turkey with protocol number: E1-20-701. The study was conducted according to the criteria set by the declaration of Helsinki.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Psychiatry / Psikiyatri

What does YouTube® say about schizophrenia: Is it a reliable source of information?

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ABSTRACT

Purpose: The quantitative and qualitative characteristics of YouTube® videos on schizophrenia were examined. The quality of the information provided by the videos, which videos are watched the most, whether there is a relationship between the popularity and quality of the videos was evaluated.

Methods and Materials: A search was performed on YouTube® on using the keyword "schizophrenia". The duration of the videos, the number of views,the number of like-dislike, the contents of the videos were recorded. To assess the popularity of the videos, view ratio, like ratio and the video power index (VPI) were used. The quality of information was assessed with DISCERN, Global Quality Scale (GQS) and YouTube Schizophrenia-Specific Score (Y-SSS).

Results: Most of the videos were of low quality. 20% of the videos were fair and above according to DISCERN, 12.9% of the videos were fair and above according to Y-SSS. View ratio, like ratio and VPI of the videos categorized in patient/their relatives were the higher than the other categories. Although, the GQS, DISCERN and Y-SSS scores were lower than the others.The only predictive for like ratio was view ratio.

Conclusion: Most of the videos about schizophrenia were personal experiences videos, and these were the most watched ones. Unfortunately, the quality of these videos was low. This may cause the development of wrong attitudes about the disease and its treatment. Also, incorrect information may contribute to the stigma surrounding the disorder. There is a need for mental health professionals to be more visible and to present qualified information in videos.

Keywords: Schizophrenia, mental disorder, internet, YouTube, patient education

YouTube Şizofreni hastalığı için ne söylüyor: Güvenilir bir bilgi kaynağı mı?

ÖZET

Amaç: Şizofreni ile ilgili YouTube® videolarının nicel ve nitel özellikleri incelenmiştir. Videoların sağladığı bilgilerin kalitesi, en çok hangi videoların izlendiği, videoların popülerliği ile kalitesi arasında bir ilişki olup olmadığı değerlendirilmiştir.

Yöntem: YouTube®'da "şizofreni" anahtar kelimesi kullanılarak bir arama yapıldı. Videoların süreleri, izlenme sayıları, beğenilme-beğenilmeme sayıları, videoların içerikleri kaydedildi. Videoların popülerliğini değerlendirmek için görüntülenme oranı, beğeni oranı ve video güç indeksi (VGİ) kullanıldı. Bilgi kalitesi DISCERN, Global Quality Scale (GQS) ve YouTube Şizofreniye Özgü Skor (Y-ŞÖS) ile değerlendirildi.

Bulgular: Videoların çoğu düşük kalitedeydi. DISCERN'e göre videoların %20'si orta ve üzeri, Y-ŞÖS'ye göre videoların %12.9'u orta ve üzeriydi. Hasta/yakınları kategorisine giren videoların izlenme oranı, beğeni oranı ve VGİ'si diğer kategorilere göre daha yüksekti. Bu videoların GQS, DISCERN ve Y-ŞÖS puanları ise diğer kategorilerden olanlardan daha düşüktü. Beğeni oranı için tek yordayıcı görüntülenme oranıydı.

Sonuç: Şizofreni ile ilgili videoların çoğu kişisel deneyim videolarıydı ve bunlar en çok izlenenlerdi. Ne yazık ki, bu videoların kalitesi düşüktü. Bu durum hastalık ve tedavisi hakkında yanlış tutumların gelişmesine neden olabilir. Ayrıca, yanlış bilgi hastalığı çevreleyen damgalamaya katkıda bulunabilir. Ruh sağlığı profesyonellerinin YouTube videolarında daha görünür olmalarına ve nitelikli bilgileri videolarda sunmalarına ihtiyaç vardır.

Anahtar Kelimeler: Şizofreni, ruhsal bozukluk, internet, YouTube, hasta eğitimi

Schizophrenia is a chronic mental disorder that affects approximately 1% of the world population (1). There is a large literature on schizophrenia. However, it is not known to what extent this data is included in the constantly growing internet resources used to provide information about the disease. Many studies show that the internet is increasingly used by people to get information about health (2,3). It may be beneficial for individuals to obtain high-quality and reliable information on the epidemiology, etiology, symptoms and treatment of the disease from the internet in order to affect their attitudes in the process of disease and treatment. In the case of schizophrenia, this detailed information can make an important contribution to understanding of the schizophrenia of both the patients and the society, and in improving the negative attitudes towards the patients and the disease.

YouTube® (http://www.youtube.com) is one of the most popular social networking sites for sharing video content and has become a great resource for health information and its use is increasing day by day (4). There is no application that checks the accuracy of the health information in the videos uploaded to YouTube®. Researchers from different specialties investigated to what extent diseases in their field provide reliable data to people in YouTube® videos (5-7).

The evaluation of the information about mental disorders obtained on the internet has a special importance. Non-professionals, who do not have sufficient knowledge and experience in the field of mental health, can present scientifically unproven data to individuals as treatment. As in the diagnosis and treatment of other diseases, diagnosis and treatment of mental disorders must be applied by professionals trained in this field in line with scientific data and ethical principles. These non-ethical practices related to psychological problems may prevent patients from accessing treatment or cause negative attitudes towards patients.

Previously, Nour et al. conducted a study on YouTube® to analyze the accuracy of psychosis depictions in diagnosing schizophrenia and to evaluate the usefulness of these videos as educational tools to teach medical students to recognize the clinical features of schizophrenia (8). Athanasopoulou et al. investigated attitudes towards schizophrenia and schizophrenia patients in YouTube® videos (9). In another study, YouTube® videos on psychosocial interventions in schizophrenia were evaluated. According to our current knowledge, there is no study about what kind of videos they come across when a user searches for the word "schizophrenia" on YouTube®, and how reliable information they contain about the disease. In our study, it was aimed to determine who is included in the videos about schizophrenia on YouTube® and the level of sufficiency-quality of the information about the disease. In addition, which videos are watched the most, whether there is a relationship between the popularity and quality of the videos was investigated in our study.

MATERIAL AND METHODS

Search Strategy

This study was exempt from ethical approval of the study institution because it involved the use of public access data only.

A search was performed on YouTube® (http://www.youtube.com) on March 18, 2021 using the keyword "schizophrenia". In order to prevent past searches from affecting the current search, a search was made with a new browser that was not used before. Standard YouTube® filters were used to display all videos by relevance. Since users are generally assumed to not go beyond the first five pages in any search, it was seen in previous studies that 100 videos (20 videos / page × 5 pages) were searched for each keyword (10,11). On the other hand, we analyzed a total of 200 videos in the first 10 pages, thinking that a larger video evaluation would give a more accurate result. A document containing URLs and headers of all 200 videos was recorded for browsing and backup. The following videos were excluded: non-English (n: 18), soundless (n: 2), less than a minute (n: 1), the number of views is unknown because it was uploaded live (n: 1). There was no duplicate video or using the word schizophrenia outside of illness (metaphorical uses such as TV series and movie titles). A total of 178 videos were evaluated in our study. All videos were independently viewed by two experienced psychiatrists to increase reliability (GA, ACK). Statistical analysis was done by taking the average of the scores of the two researchers.

Video Evaluation

The duration of the videos (minutes), the time since upload (days), the number of views, the number of like-dislike, the contents of the videos were recorded. To assess the popularity of the videos, view ratio ($\frac{number\ of\ view}{since\ upload\ time}$),

like ratio ($\frac{like}{like + dislike}$ x100) and the video power index (VPI: $\frac{like\ ratio\ x\ view\ ratio}{100}$) were used. The quality of information was assessed with three measurement tools.

DISCERN

It consists of three sections including 16 questions, and a higher score indicated better quality. The first eight questions are related to reliability and source of information about treatment choices. The next seven questions focus on the specific details of the treatments. The last question consists of the overall quality. Each question is rated on a 5-point scale (13). Videos were grouped into excellent (63–75 points), good (51–62 points), fair (39–50 points), poor (27–38 points), and very poor (16–26 points) quality according to the DISCERN. GQS has previously been used in many studies to determine the quality of YouTube videos for other diseases (11,14).

Global Quality Scale (GQS)

GQS is a scoring system defined by Bernard et al. and was used to assess a video in terms of its instructive aspects for patients. It based on a scale of one to five, which was used to assess the overall quality of all selected videos. While a score of one point indicates the poorest quality, a score of five points indicates the excellent quality. It allows to evaluate the video quality, streaming and the ease of use of the information presented in online videos (15). GQS has previously been used in many studies to determine the quality of YouTube videos for other diseases (10,12).

YouTube Schizophrenia-Specific Score (Y-SSS)

The YouTube Schizophrenia-Specific Score has been developed by the researchers since there is no specific measurement tool for determining the quality of the videos about schizophrenia on YouTube®. A score system has been developed based on the scales used to determine the quality of YouTube® videos of other diseases (10,11). In this scoring system, which includes a total of 13 questions, the following evaluations about the disease are included: diagnosis (question 1-2), epidemiology (question 3-4-5), etiology (question 6-7), symptoms (question 8-9-10) treatment (question 11-12) and prognosis (question 13). Each question was given 0 points if the relevant information was not included in the video, 1 point if there was missing information, and 2 points if full information was given. Video quality is grouped according to the total score as very poor (0-5), Poor (6-10), Fair (11-15), Good (16-20), Excellent (21-26). The questions used in the scoring system are in Table 1.

Table 1: YouTube Schizophrenia Specific Score (Y-SSS)
Diagnosis
Q1. Psychiatric interviews in diagnostic evaluation
Q2. Differential diagnosis information
Epidemiology
Q3. The age range of the disease
Q4. Gender differences
Q5.Knowledge about prevalence
Etiology
Q6. Biological risk factors
Q7.Psychosocial risk factors
Symptoms
Q8. Delusions or hallucinations
Q9. Disorganized speech/behaviors
Q10. Negative/cognitive symptoms
Treatment
Q11. Pharmacological treatment
Q12. Non-pharmacological treatment
Prognosis
Q13. Information on the course of the disease (eg. chronicity)

Y-SSS questions the quality of knowledge on different areas of Schizophrenia. However, if there is no information about that field in the video, a low score can be obtained from the questionnaire. Therefore, the correlation between Y-SSS and GQS was also evaluated in our study.

Statistical Analysis

SPSS for Windows version 22.0 package program was used for statistical analysis. Kolmogorov Smirnov test was used to check the compliance of variables to normal distribution. The relationship between categorical variables was tested using chi-square analysis. For the variables showed normal distribution, student-t test was used in two independent group comparisons. The Spearman correlation test was used to analyze the relationships between quantitative variables. In comparing three independent groups, if the variants' distribution is not homogeneous (Levene's p <, 05), Welch statistics were used. The Kruskal Wallis H test was used for comparing three independent groups of scales that did not show normal distribution. In cases where there was a significant difference between the groups, two-group comparisons were made, and Bonferroni correction was applied to determine which groups the difference was between them. Stepwise multiple linear regression analysis was performed to determine like ratio of videos, $p<0.05$ was considered statistically significant.

RESULTS

A total of 178 videos were evaluated in our study. The median duration of the videos was 7.75 minutes (min: 1, max: 108.50, IQR: 9.60), the median time since upload was 730.0 days (min: 38, max: 23304, IQR: 1625.0). Like ratio was median 97.3 (IQR: 3.45) and view ratio was median 44.05 (IQR: 215.5). The number of views of the most watched video was 12,716,737 and the number of views of the videos was median 34,422 (IQR: 122994).

According to the DISCERN score, four (2.2%) videos were excellent, eight (4.5%) were good, 24 (13.5%) were fair, 86 (48.3%) were poor, and 56 (31.5%) were very poor. YSSS showed that 5(2.8%) videos were excellent, 6 (3.4%) videos were good, 12 (6.7%) were fair, 29 (16.3%) were poor, and 126 (70.8%) were very poor. There were 29 (16.2%) videos with a GQS score of three or more.

The videos were divided into five categories according to their content. Videos that convey information and experience about the disease involving patients and their relatives constituted 41.0% (n: 73) of all videos. Psychologists or psychiatrists were present in 23% (n: 41) of the videos. 12.9% (n: 23) of them were videos with other health professionals (internal scientists, nurses, family physicians etc.) informing about the disease. Course videos prepared for a purpose such as academic/professional exams or medical faculty internship exam preparation were 11.2% (n: 20). Lastly, 11.8% (n: 21) were anonymous videos prepared as public spots about the disease in the "medical-related" category. The features of the videos according to their fields are given in Table 2.

When the video durations were examined according to the video categories, there was a significant difference between the groups (p: 0.027, x^2: 10.995). In the post hoc tests conducted to find out where this difference originated, it was determined that the videos involving psychiatrists/psychologists were longer than the medical-related group (p: 0.015, x^2: 43.879).

When VPI was analyzed according to video categories, there was a significant difference between the groups (p< 0.001, x^2: 30.371). In post hoc analyzes, VPI of the videos with patients/their relatives were significantly higher than psychiatrists/psychologists (p< 0.001, x^2: 41.961), education (p: 0.012, x^2: 41.654), other healthcare professionals (p< 0.001, x^2: 50.993).

When the view ratio of the videos was examined by categories, there was a significant difference between the groups (p< 0.001, x^2: 28.895). View ratio of videos involving patients/their relatives were significantly higher than education (p: 0.018, x^2: 40.653), psychiatrists/psychologists (p<0.001, x^2: 41.119) and other healthcare professionals (p< 0.001, x^2: 50.362).

There was a significant difference between the groups when the like ratio of the videos were analyzed by categories (p: 0.001, x^2: 18.594). Like ratio of patients/their relatives were significantly higher than psychiatrists/psychologists (p: 0.001, x^2: 38.269) and education (p: 0.043, x^2: 36.632).

When GQS scores were examined according to video categories, there was a significant difference between groups (p <0.001, x^2: 31.015). GQS scores of the videos with the patients/their relatives were significantly lower than the other groups (psychiatrists / psychologists; p <0.001, x^2: -36.048), (medical-related videos; p: 0.001, x^2: -42.495), (education; p: 0.008, x^2: -36.528), (other healthcare professionals; p: 0.034, x^2: -30.242).

When the Y-SSS scores were examined according to the video categories, there was a significant difference between the groups (p <0.001, x^2: 32.159). The Y-SSS scores of the patients/their relatives were significantly lower than other categories (psychiatrist/psychologist; p: 0.001, x^2: -39.953), (other healthcare professionals; p: 0.008, x^2: -40.796), (medical-related; p <0.001, x^2: - 56.157).

When DISCERN scores were examined according to video categories, there was a significant difference between the groups (p <0.001, x^2: 41.631). DISCERN scores of patients/their relatives were significantly lower than psychiatrists/psychologists (p <0.001 x^2: -59.336), medical-related (p: 0.002, x^2: -47.421) and education (p: 0.012, x^2: -42.197).

There was no difference between Y-SSS, GQS and DISCERN scores given by the two viewers (Y-SSS: z: – 0.513, p: 0.608; GQS: z: – 0.577, p: 0.564, DISCERN: z: – 1.387, p: 0.166). The Y-SSS used to evaluate quality and developed by researchers was found to be good reliability (α:**0.912**). Internal consistency and inter-rater reliability for quality scores are given in Table 3.

Table 2: Comparison of VPI, Quality and Quantitative Features of Videos According to Video Content							
	Patient/their relatives n:73	**Psychologist/ psychiatrist n:41**	**Other healthcare professionals n:23**	**Education n:20**	**Medical-related n:21**	**TOTAL**	**Statistical value***
Duration (minutes), (Median,IQR)	8.33 (IQR:8.21)	10.45 (IQR:26.29)	6.85 (IQR:10.50)	5.92 (IQR:10.19)	5.40 (IQR:3.82)	7.75 (IQR:9.60)	p:0.027 x^2:10.995
Like ratio (Median,IQR)	98.58 (IQR:2.45)	95.98 (IQR:3.62)	97.02 (IQR:4.35)	96.59 (IQR:4.32)	97.38 (IQR:4.28)	97.30 (IQR:3.50)	p:0.001 x^2:18.594
View ratio (Median,IQR)	98.81 (IQR:601.12)	14.59 (IQR:74.51)	13.62 (IQR:32.60)	26.33 (IQR:57.73)	62.27 (IQR:269.85)	44.05 (IQR:215.50)	p<0.001 x^2:28.895
VPI (Median,IQR)	103.08 (IQR:607.30)	13.90 (IQR:72.01)	12.80 (IQR:32.11)	25.73 (IQR:49.88)	46.32 (IQR:284.1)	43.00 (IQR:211.40)	p<0.001 x^2:30.371
Y-SSS (Median,IQR)	1.00 (IQR:2.50)	4.00 (IQR:8.00)	4.00 (IQR:8.00)	3.50 (IQR:10.00)	6.00 (IQR:6.25)	4.40 (IQR:5.40)	p<0.001 x^2:32.159
GQS (Median,IQR)	1.00 (IQR:0.00)	1.00 (IQR:1.75)	1.00 (IQR:1.00)	1.25 (IQR:2.00)	2.00 (IQR:2.00)	1.00 (IQR:1.00)	p<0.001 x^2:31.015
DISCERN (Median,IQR)	26.00 (IQR:7.00)	34.00 (IQR:21.50)	29.00 (IQR:3.00)	31.00 (IQR:5.75)	33.00 (IQR:12.75)	29.00 (IQR:10.10)	p<0.001 x^2:41.631
Y-SSS: YouTube Schizophrenia Specific Score; GQS: Global Quality Scale; VPI: Video Power Index; IQR: Interquartile Range							
*: The Kruskal Wallis H test is used							

Table 3. Internal Consistency and Inter-rater Reliability for Quality Scores			
	Global Quality Scale	**DISCERN**	**YouTube Schizophrenia-Specific Score**
κ	0.967	0.941	0.948
α	N/A	0.894	0.912
κ: Kappa α: Cronbach's alpha			

In the Stepwise regression analysis (independent variables: duration, video categories, view ratio, GQS, DISCERN, Y-SSS) performed to predict the like ratio of videos, view ratio was found to be only a predictor (F = 10,677, Adjusted R2: 0.053, p <0.001).

A positive correlation was found between the video's durations and DISCERN (p <0.01, r: 0.497), YSSS (p <0.01, r: 0.439) and GQS scores (p <0.01, r: 0.425) in Spearman correlation analysis. There was also a statistically significant positive correlation between GQS and DISCERN, GQS and YSSS, YSSS and DISCERN scores. Correlation of quantitative values of videos with quality scores is given in Table 4.

Table 4: Correlation of Quantitative Values of Videos with Quality Scores								
		Duration	DISCERN	Y-SSS	GQS	VPI	Like ratio	View ratio
Duration	r†	1	**,497****	**,439****	**,425****	-,023	,012	-,022
DISCERN	r	**,497****	1	**,678****	**,682****	,029	,040	,020
Y-SSS	r	**,439****	**,678****	1	**,918****	,016	,055	,003
GQS	r	**,425****	**,682****	**,918****	1	,006	,045	-,008
VPI	r	-,023	,029	,016	,006	1	**-,212****	**,992****
Like ratio	r	,012	,040	,055	,045	**-,212****	1	**-,241****
View ratio	r	-,022	,020	,003	-,008	**,992****	**-,241****	1
†: correlation coefficient, in Spearman correlation analysis								
*: Correlation is significant at the 0.05 level (2-tailed) **: Correlation is significant at the 0.01 level (2-tailed)								
Y-SSS: YouTube Schizophrenia Specific Score; GQS: Global Quality Scale; VPI: Video Power Index								

DISCUSSION

The main findings of our study:

a. The data presented by most of the videos on schizophrenia was inadequate.

b. View ratio, like ratio and VPI of videos categorized in patient/their relatives were the higher than the other categories.

c. The GQS, DISCERN and Y-SSS scores of the videos categorized in patient/their relatives were lower than the other categories.

d. There was no correlation between the duration of the videos and like ratio/view ratio.

e. There was a positive correlation between the GQS, DISCERN, Y-SSS scores and the duration of videos.

f. Features about video quality were not a predictor for like ratio, the only predictive was view ratio.

Most previous studies to determine the quality of YouTube® videos for different medical illnesses or conditions have reported that the videos provide insufficient information on the subject (11,12,16). Celik et al. reported that 84% of the videos were poor or very poor in their study on Rotator Cuff Repair (11). Gray et al. evaluated YouTube® videos about plastic surgeries and reported that the video content was insufficient, and the video quality was low. They also warned the audience that they should question the information they acquired (17). In our study, it was found that most of the videos were insufficient to provide information about schizophrenia. When these videos are used as a source of information about the disease, it is possible to obtain false information about the disease by generalizing personal experiences. This can cause negative attitudes about the disease and negatively affect treatment processes.

The source of the video is an important issue. Previous studies have found that the quality of videos uploaded by physicians is higher (11,12). In a study in which videos about atopic eczema were evaluated, it was reported that the majority of the videos consisted of personal experiences, only 32% of which consisted of dermatologists or scientists (14). In the same study, 11% of the videos according to DISCERN and 13% according to GQS were evaluated as "useful or very useful". Professionals have been advised to be more visible on health information. In our study, videos containing the experiences of patients/their relatives constituted 41% of the total videos. However, these videos were the lowest quality videos on all three of the GQS, DISCERN and Y-SSS scores. Our study also supports the view that the quality of information decreases as the video resources other than professionals on the subject increase and personal experiences are shared more.

To determine the popularity of videos for users, view ratio, like ratio and VPI are used (12,18). In previous studies, it has been reported that the most viewed and powerful videos are generally patient-experience videos. In our study, the videos with the highest viewing rates, liking rates and VPI were the videos of the patients / their relatives. This makes us think that while watching videos, people expect to learn what people with the same disease experience rather than learning medical information about the disease. Professional videos with medical information about the disease may not be sufficiently understood by patients and therefore may not be of interest.

It has been reported that video durations might be related to view ratio and VPI (11,16). In our study, no relationship was found between video durations and VPI, view ratio. Videos that convey personal experiences in the form of a story seem to attract the attention of viewers, albeit long. It has been reported that the higher the video quality, the longer the video duration (19,20). In our study, a positive correlation was found between GQS, DISCERN and Y-SSS scores and video duration. The need for a longer time to explain the disease-related information such as diagnosis, epidemiology, treatment options and prognosis, therefore, a positive correlation between video quality and duration is expected.

Our study should be evaluated with some limitations. First, Y-SSS is designed by researchers similar to those previously developed for other diseases. Its internal consistency is very high, and it showed excellent correlation with GQS and DISCERN. However, it needs to be validated with further studies. Secondly, information is changing rapidly in digital environments, and our study was conducted using video data obtained at a point-by-point date. After a certain period of time, similar searches can be done again to watch the changes and make better suggestions about the conscious use of YouTube® videos. Finally, in our study, unlike many other studies, a wider page scan was made, and more videos were evaluated. Nevertheless, not

all YouTube® videos about schizophrenia have been examined, and this is a limitation.

CONCLUSION

Most of the videos about schizophrenia on YouTube were personal experiences videos, and these were the most watched ones. Unfortunately, the quality of these videos was low. This may cause the development of wrong attitudes about the disease and its treatment. Also incorrect information may contribute to the stigma surrounding the disorder. There is a need for mental health professionals to be more visible and to present qualified information about the disease in YouTube® videos.

DECLARATIONS

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None

Disclosure of Interest

The authors declare that they have no competing interest.

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Ethics Committee Approval

This study was exempt from ethical approval of the study institution because it involved the use of public access data only.

Data-sharing Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions

Concept – A.C.K., H.K. G.A.; Design – A.C.K., H.K., Y.H.; Supervision – Y.H.; Resources – A.C.K, G.A.; Materials – H.K., A.C.K.; Data Collection and Processing - A.C.K., H.K.; Analysis and/or Interpretation – A.C.K, Y.H.; Literature Review – A.C.K.; Writing – A.C.K., H.K.; Critical Review - A.C.K., H.K., G.A., Y.H.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Public Health / Halk Sağlığı

Analysis of the Natural Disasters in the Last Century and the People Who Were Consequently Displaced

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ABSTRACT

Purpose: Natural Disasters are complex events which expose people to various risks and dangers.

Methods: The data for our research, which was designed to be a descriptive one, was obtained from Emergency Events Database (EM-DAT) and Internal Displacement Monitoring Centre (IDMC) database. Target population of our study consists of 287,913,123 people who were displaced in consequence of 15,406 natural disasters which occurred in the world between the years of 1920 (January) - 2020 (August) and natural disasters which occurred between the years 2008 (January) - 2019 (December).

Results: It was determined that in the 5 continents examined (Africa, America, Asia, Europe, Oceania), there has been a rapid growth in hydrological and meteorological disasters after the year 1980. On the other hand, with regards to displacements due to disasters, flood and storm related disasters were determined to cause displacement more than others.

Conclusion: Ultimately, the natural disasters related to the climate change have increased over the years and caused displacement, death, and financial damage.

Keywords: Natural Disasters, Displacement People, Climatological Disasters

Son Yüzyılda Meydana Gelen Afetler ve Yerinden Edilen Kişilerin Analizi

ÖZET

Amaç: Doğal afetler, insanların çok sayıda risk ve tehlikeye maruz kaldığı karmaşık olaylardır.

Gereç ve yöntem: Tanımlayıcı tipte tasarlanmış araştırmamızın verileri EM-DAT (Emergency Events Database) ve IDMC (Internal Displacement Monitoring Centre) veri tabanından alınmıştır. Çalışmamızın evrenini, EM-DAT veri tabanında yer alan 1920 (Ocak)-2020 (Ağustos) yılları arasında dünyada meydana gelen 15.406 farklı doğal afetler ve 2008 (Ocak)-2019 (Aralık) yılları arasında doğal afetlerden kaynaklı 287.913.123 yerinden edilen kişiler oluşturmaktadır.

Bulgular: İncelenen 5 kıtada 1980 sonrasında (Afrika, Amerika, Asya, Avrupa, Okyanusya) hidrolojik ve meteorolojik afetlerde hızlı bir artış olduğu tespit edilmiştir. Afetlerden kaynaklı yerinden edilmeler afet alt grupları şeklinde incelendiğinde ise; sel ve fırtınadan kaynaklı afetlerin diğerlerine göre daha fazla yerinden edilmeye neden olduğu saptanmıştır.

Sonuç: Sonuç olarak yıllar içerisinde iklim değişikliği ile ilgili afetler artarak yerinden edilme, ölüm ve maddi hasara sebep olmuştur.

Anahtar Kelimeler: Doğal Afetler, Yerinden Edilen Kişiler, Klimatolojik Afetler

A disaster may be defined as an unexpected incident which exceeds local capacity, requires national or international aid, causes either death or injury for people, results in loss of property, affects the society economically and socially and threatens the security, spoils its functionality, and often occurs due to natural reasons, however may also occur due to human related causes (1-3).

On the other hand, natural disasters are caused by hydrometeorological, climatic, geophysical, and biological incidents (e.g., earthquake, landslide, tsunami, windstorm, flood, or drought) which affect the natural and built environment of the region affected (Table 1) (1).

Table 1: Typology of Natural Hazards

Category	Sub-category	Type
Geophysical	Geophysical	Earthquake, mass movement, volcanic activity, tsunamis, rockfall,
Meteorological	Weather-related	Storm, extreme temperature, fog
Hydrological		Flooding, landslide, wave action
Climatological		Drought, wildfire, glacial lake outburst
Biological		Epidemic, Insect infestation, animal accident

Natural disasters are complex incidents which expose people to many risks and dangers. Each disaster scenario is unique in its own way and presents new and unusual difficulties both for the victims and the rescue emergency personnel. Negative result of disasters in people's lives is the situation of migration from the region where the disaster occurred to another location. Displacement within the context of disasters is a global and increasing phenomenon. According to a study conducted by the Internal Displacement Monitoring Center (IDMC), since 2008, natural disasters have caused displacement of approximately 24,6 million people each year (this equals to one person per second) (2). Displacement due to natural disasters is defined as "Situations where people are forced or coerced to leave their homes or places of habitual residence as a result of a disaster or to avoid the effects of an urgent and predictable natural disaster"(3). Majority of this sort of displacements are caused by a limited number of mega-disasters. Among the latest examples are the combination of earthquake, tsunami, and nuclear disaster in Japan; big floods in Australia and Pakistan; big forest fires in Greece and Russia; droughts in China and East Africa; and a catastrophic earthquake in Haiti. Climatic changes are expected to have a stronger effect on populations movements as well. In a date as early as 1990, Intergovernmental Climate Change Panel has warned about how human migration might become the ultimate effect of the climate change (4). People who get displaced due to natural disasters face similar difficulties with those who escape from conflict and violence. Many lose their homes, properties, and income, and their access to basic needs and services such as water, food, health, and education reduces, and they also face with interruption of social networks (5).

In this study, we wanted to make an assessment of the natural disasters that occurred in the last century and people who were consequently displaced.

MATERIALS AND METHODS

The data of our descriptive study was taken from the Emergency Events Database (EM-DAT) and IDMC (Internal Displacement Monitoring Center). EM-DAT is one of the databases of the non-profit organization with an international status called The Center for Research on the Epidemiology of Disasters (CRED) within the Université Catholique de Louvain (UCL) School of Public Health in Brussels. It is a reliable data source that keeps the types of disasters occurring in countries and the effects of these disasters on people (death, injury, material damage, etc.) with a historical and specific systematic. According to this database, in order for an event to be considered as a disaster, at least one of the criteria for the death of at least 10 people, affecting at least 100 people, declaration of a state of emergency and international calls for assistance by the relevant state must have been fulfilled (6). IDMC, on the other hand, as part of the Norwegian Refugee Council (NRC) and working internationally since its establishment in 1998, has been providing data and analysis of internal displacement. They work with national governments, UN agencies and expert centers to find effective and durable solutions to internal displacement issue (7).The universe of our study consists of 15,406 natural disasters that occurred in the world between 1920 (January) -2020 (August) in the EM-DAT database. Natural disasters are composed of "Biological, Climatological, Geophysical, Hydrological, Meteorological" main groups in the EM-DAT database. In the IDMC database, it is classified as Geophysical and Weather-related (including climatological, hydrological and meteorological disasters). The distribution of the main and subgroups of Natural Disasters is shown in Table 1. It consists of 287,913,123 internally displaced persons due to natural disasters between the years 2008 (January) -2019 (December). Disasters and displacements at different times and places; disaster subgroups are grouped on the basis of years (decades), continents and countries. The data are presented as frequency distributions and

calculated using the Statistical Package for the Social Sciences (SPSS) 25.0 package program.

RESULTS

It was determined that a total of 15,406 natural disasters occurred in the world between 1920 and 2020. Of natural disasters, 39.1% were hydrological (n = 6,025), 31.8% meteorological (n = 4,894), 11.2% geophysical (n = 1,732), 10.2% biological (n = 1,577), and 7.6% climatological (n = 1,178) disasters. When disaster groups are examined on the basis of subgroups, the most occurring subgroup among hydrological disasters is flood (n = 5,267) with 34.2%, the most occurring subgroup among meteorological disasters is storm (n = 4,296) with 27.9%, the most occurring subgroup among geophysical disasters is earthquake (n = 1,445) with 9.4%, the most occurring subgroup of biological disasters is epidemic with 9.6% (n = 1,481), the most occurring subgroup among the climatological disasters is determined as drought (n = 733) with 4.8%. In addition, among all disaster subgroups, wildfire 2.9%, volcanic activities 1.6%, Insect infestation 0.6%, Mass movement (dry) 0.3%, Animal accident 0.01%, Fog 0.01% were found to be the least common disaster types in 1920-2020 (Figure 1).

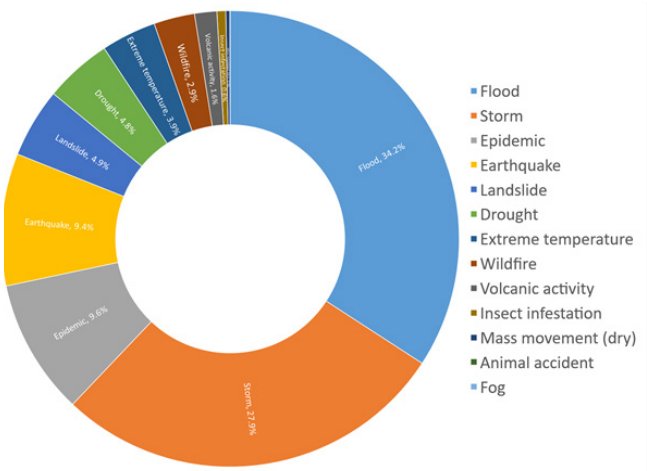

Figure 1. Distribution of Natural Disasters Subgroups that Occurred in the World between 1920-2020

When the natural disasters are evaluated in terms of the disaster group over time, there are less than 50 disasters per year in terms of natural disaster types until 1980. After 1980, a rapid increase was found in hydrological and meteorological disasters. In addition, it is noteworthy that two different peaks occurred in the early 2000s in terms of biological disasters (Figure 2).

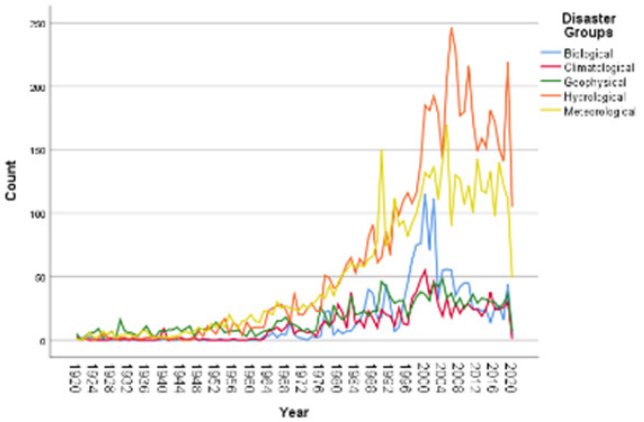

Figure 2. Time Curve Graph of Natural Disasters that Occurred in the World between 1920-2020

When the situation of the continents in the last 10 decades according to disaster types is evaluated; the rate of increase in hydrological and meteorological disasters in the last two decades in the five continents studied is remarkable. In addition, it is seen that the number of disasters in the Asian continent is more than the other four continents in terms of geophysical and hydrological disaster types. It is observed that biological disasters are more common in Africa than other continents (Figure 3).

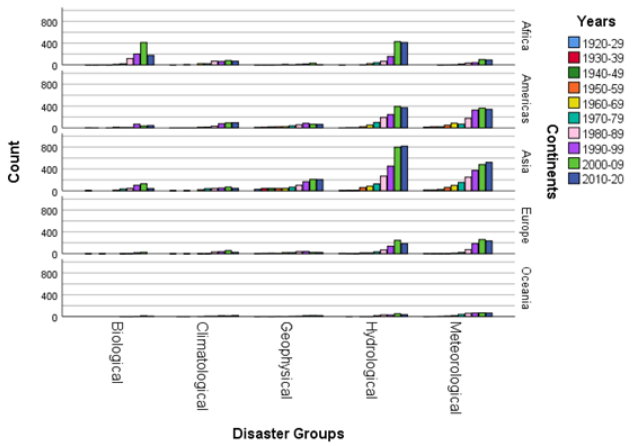

Figure 3. Frequency of Natural Disasters that Occurred in the World between 1920-2020 in Continents by Decades

When the shares of total financial damage caused by disaster types in the last 100 years in total financial damage caused by natural disasters are examined, it is seen that it constitutes 44.7% of meteorological disasters. It is seen that the type of disaster that has the largest share in terms of death is climatological disasters with 42.2%. In terms of death / material damage ratio, biological disasters have the highest rate with 1,460 times, while meteorological disasters them last place with a rate of 0.1 (Figure 4).

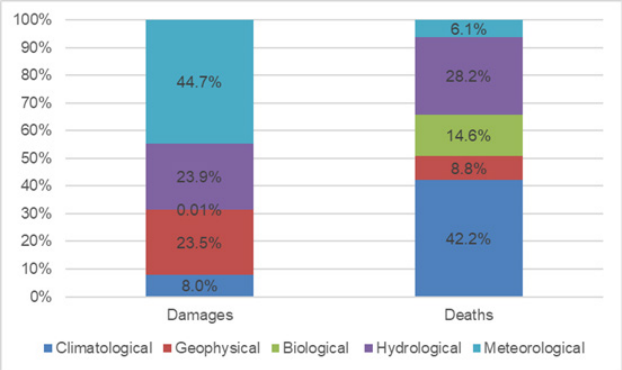

Figure 4. Share of Natural Disaster Types that Occurred in the World between 1920-2020 in Total Financial Damage ($) and the Share of Deaths

When we compare the share of deaths and material damage of disasters in the last 100 years in particular for continents; It is seen that the continents where geophysical disasters have the largest share in property damage are Africa, Asia, and Oceania. Hydrological disasters seem to have the greatest impact on the European continent in terms of material damage. In the American continent, meteorological disasters have the biggest share in property damage. It is seen that climatological disasters in Africa, Asia, and Europe and Geophysical disasters in America and Oceania have the largest share in terms of their share in total deaths (Table 2).

When we look at the countries where natural disasters are most common, we see that they are America (n = 1,019), China (n = 947) and India (n = 734).

A total of 287,913,123 people were internally displaced between 2008-2019. The highest number of displacement was in 2008 (n = 38,240,828), in 2010 (n = 42,349,514) and in 2012 (n = 30,145,960); The least displacement occurred in 2011 (n = 15,015,954) (Figure 5).

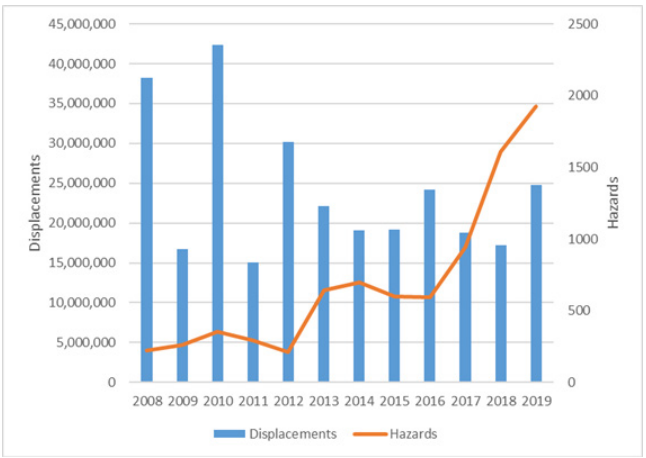

Figure 5.Distribution of People Internally Displaced and Hazards Occurred in the World between 2008-2019 by Years

When internal displacements (according to database classification) are divided into weather-related displacement and geophysical displacement; It was determined that the most displacement was related to weather-related (n = 253,199,368; 87.9%). When we examine the subgroups of weather-related displacement; It was determined that people were internally displaced mostly due to floods (n = 142,029,072; 56.0%), storm (n = 104,656,593; 41.3%) and drought (n = 2,320,529; 0.9%).

Table 2. Distribution of Natural Disaster Types in the World between 1920-2020 in Material Damage and Death of Disaster Types by Continents

	Damages ($) (%)					Deaths (%)				
Continents	Biological	Climatological	Geophysical	Hydrological	Meteorological	Biological	Climatological	Geophysical	Hydrological	Meteorological
Africa	<0.1	19.9	34.4	25.3	20.3	26.3	67.8	2.1	3.1	0.7
Americas	<0.1	9.8	8.0	10.3	71.9	3.8	0.1	62.9	18.1	15.1
Asia	<0.1	4.6	37.7	33.6	24.1	15.4	39.6	7.2	31.9	5.8
Europe	<0.1	10.5	21.4	37.3	30.9	<0.1	77.9	10.2	1.7	10.1
Oceania	0.1	19.6	32.0	18.4	29.8	3.5	7.6	64.6	7.1	17.2

Table 3. Distribution of Subgroups of Weather-Related Internal Displacements (Air-related Displacement) by Years between 2008-2019 in the World

Years	Whethear Related Displacements								Total
	Flood	Storm	Drought	Wildfire	Extreme temperature	Wet mass movement	Mass movement	Severe winter condition	
2008	$11.5x10^6$	$10.0x10^6$	*	$50x10^3$	$0.8x10^6$	$30x10^3$	*	*	$22.5x10^6$
2009	$7.4x10^6$	$7.8x10^6$	*	$8.3x10^3$	$20x10^3$	$20x10^3$	*	*	$15.2x10^6$
2010	$36.2x10^6$	$2.0x10^6$	*	$16x10^3$	*	$0.8x10^6$	*	*	$38.3x10^6$
2011	$10.3x10^6$	$3.1x10^6$	*	$4.3x10^3$	$90x10^3$	$0.4x10^6$	*	*	$13.9x10^6$
2012	$19.8 x10^6$	$9.6x10^6$	*	$60x10^3$	3,507	$50x10^3$	*	*	$29.5x10^6$
2013	$6.1x10^6$	$14.1x10^6$	*	$90x10^3$	$10x10^3$	$5x10^3$	*	*	$20.3x10^6$
2014	$8.2x10^6$	$9.1x10^6$	*	$50x10^3$	6	$60x10^3$	*	*	$17.4x10^6$
2015	$8.3x10^6$	$6.3x10^6$	*	$90x10^3$	1,231	$44x10^3$	4.891	807	$14.7x10^6$
2016	$10.2x10^6$	$12.9x10^6$	*	$0.3x10^6$	$90x10^3$	2.485	*	*	$23.5x10^6$
2017	$8.6x10^6$	$7.5x10^6$	$1.3x10^6$	$0.5x10^6$	$5x10^3$	$20x10^3$	*	*	$18.0x10^6$
2018	$5.4x10^6$	$9.3x10^6$	$0.8 x10^6$	$0.4x10^6$	$20x10^3$	$20x10^3$	*	*	$16.1x10^6$
2019	$9.9x10^6$	$13.0x10^6$	$0.3x10^6$	$0.5x10^6$	$20x10^3$	$60x10^3$	*	*	$23.9x10^6$
2008-2019	$142.0x10^6$	$104.7x10^6$	$2.3x10^6$	$2.1x10^6$	$1.1x10^6$	$1.0x10^6$	4.891	807	$253.2x10^6$

Abbreviation: * No Data

It was determined that internal displacement caused by forest fires has increased rapidly since 2016. Geophysical Internal Displacements accounted for 12.9% (n = 34,713,446) of displacements. When the subgroups of geophysical internal displacements were examined, it was found that earthquakes (n = 33,381,177; 96.2%) and volcanic eruptions (n = 1,208,515; 3.5%) caused the most internal displacement (Table 4).

When we examine the internal displacement caused by natural disasters on the basis of continents between 2008 and 2019, it is calculated that it is the most common in Africa (27.2%), Asia (23.0%), America (22.0%). While the internal displacements in the continents of Africa, Europe, and Oceania are mostly based on weather-related; it is seen that geophysical internal displacements come to the fore in America and Asia (Table 5).

Table 4. Distribution of Geophysical Displacements by Subgroups in the World between 2008-2019

Years	Geophsical Displacements						Total
	Earthquake	Volcanic eruption	Dry mass movement	Volcanic activity	Wet mass movement	Mass movement	
2008	$15.7x10^6$	$50x10^3$	$20x10^3$	*	*	*	$15.7x10^6$
2009	$1.4x10^6$	$60x10^3$	991	*	*	*	$1.5 x10^6$
2010	$3.7x10^6$	$0.4 x10^6$	*	*	*	*	$4.0 x10^6$
2011	$1.1x10^6$	$10x10^3$	*	*	*	*	$1.1 x10^6$
2012	$60x10^3$	$40x10^3$	80	*	*	*	$0.7 x10^6$
2013	$1.8x10^6$	$50x10^3$	500	*	*	*	$1.8 x10^6$
2014	$1.5x10^6$	$0.2x10^6$	2,772	*	*	*	$1.7 x10^6$
2015	$4.4x10^6$	*	*	$30x10^3$	4,049	183	$4.5 x10^6$
2016	$0.7x10^6$	$20x10^3$	$10x10^3$	*	*	*	$0.7x10^6$
2017	$0.6x10^6$	$0.2x10^6$	$10x10^3$	*	*	12	$0.8 x10^6$
2018	$0.9x10^6$	$0.2x10^6$	$20x10^3$	*	*	1,000	$1.1 x10^6$
2019	$0.9x10^6$	$20x10^3$	2,858	*	*	150	$0.9 x10^6$
2008-2019	$33.4x10^6$	$1.2x10^6$	$0.09x10^6$	$30x10^3$	4,049	1,345	$34.7x10^6$

Abbreviation: * No Data

Table 5. Distribution of Internal Displacement Types by Continents between 2008-2019 in the World				
Continent		Weather related Displacements	Geophysical Displacements	Total Displacements
Africa	Sum	23.1x106	0.08x106	23.2 x106
	% of Total n	27.2%	23.3%	27.2%
Americas	Sum	25.8x106	6.2x106	32.1x106
	% of Total n	22.0%	23.30%	22.0%
Asia	Sum	202.9x106	28.1x106	231.0x106
	% of Total n	23.0%	34.2%	23.0%
Europe	Sum	0.7x106	0.2x106	0.9x106
	% of Total n	18.30%	11.0%	18.3%
Oceania	Sum	0.6x106	127257	0.8x106
	% of Total n	9.4%	8.2%	9.4%
Total	Sum	253.2x106	34.7x106	287.9x106
	% of Total n	100.0%	100.0%	100.0%

When the countries are examined in terms of the number of internal displacements; it was found that displacements due to natural disasters are the most common in China (n = 81,672,141), India (n = 44,657,133) and Philippines (n = 43,563,870).

DISCUSSION

The frequency and intensity of natural disasters are gradually increasing. In our study, a rapid increase in hydrological and meteorological disasters was found after 1980. According to a published report (1980-2008), it has been found that hydrological and meteorological disasters increased rapidly compared to geophysical disasters; although the relationship between climate change and natural disasters is not fully understood, the frequency of natural disasters due to climate has increased. Examples of deadly climate-related disasters include the massive floods in Thailand in 2011, Hurricane Sandy in the United States in 2012, and Typhoon Haiyan in the Philippines in 2013 (8). Similar to our study, it was determined in previous studies that Asia was the region most affected by floods, which accounts for approximately 50% of flood deaths in the last quarter of the 20th century (9,10). The frequency and impacts of floods are expected to increase due to population increases, economic growth and climate change (11).

In our study, it was determined that the most common subgroup of meteorological disasters was storm with 27.9% . In a published report, it was determined that 396 disasters and 95 million people were affected in 2019, it was stated that storms that made up 35% of the total and affected the highest number of people. Of the 91 storms that occurred in the last year (2019), the 2 deadliest storms; Hurricane Idai affected Mozambique and Zimbabwe (March, over 1200 deaths), and the Dorian storm affected the United States and the Bahamas (September, at least 358 deaths) (12).

In our study, it can be said that the geophysical activity in the Asian continent is relatively high compared to other continents. As an example of major earthquakes in Asia; Tangshan earthquake in China in 1976, the Great Hanshin-Awaji earthquake in Japan that occurred in 1995, 2011 and Tohoku Earthquake can be shown (12-14). It was determined that 1.8 million people were left homeless and 65,000 to 300,000 people died in the earthquake that occurred in 2010 in Haiti, which is an island country in the Caribbean Sea in the United States, which also has a great impact (14-16).

In our study, the most common subgroup of biological disasters was epidemic with 9.6%. The Spanish flu epidemic in the first decades of the twentieth century (1918-1920) was the first truly global epidemic, and it was also the first epidemic to occur in the modern medical environment where specialties such as infectious diseases and epidemiology had developed (17,18). The first epidemic of the twenty-first century was the Severe Acute Respiratory Syndrome (SARS) epidemic that started in China in 2002. It was reported that the epidemic caused 8,422 cases and 916 deaths in 37 countries (19). In our study, 2 peaks observed in biological disasters in the 2000s; it can be attributed to the SARS and H1N1 outbreaks. In addition, in our study, it was determined that biological epidemics are more common in the African continent. Following the first

Ebola virus case reported in 1970 in Africa, the frequency of recognizable outbreaks increased especially in sub-Saharan Africa in the 1990s, and the most severe epidemic was documented in 2014; around 14,100 cases have been reported worldwide, causing about 5,200 deaths (overall mortality rate 37%) (20).

In our study, when we examine the subgroups of weather related displacement, where the most displacement is caused by Weather related disasters; It was determined that people were mostly displaced due to flood (56%), storm (41.3%) and drought (0.9%). In a published report, it was determined that between 2008 and 2014, a total of 184.4 million people were displaced due to disasters, and an average of 26.4 million people each year, and the vast majority of these people, such as 22.5 million, were displaced due to weather and climate-related disasters (3,21). In another study, it was determined that 16.1 million of 17.2 million displacement cases that occurred in 2018 were due to weather-related disasters (displacement due to, respectively; 9.3 million storm, 5.4 million floods, and 764,000 draughts), while 1.1 million were due to geophysical related disasters (915,000 earthquakes and 186,000 volcanic eruptions) (22).In our study, most displacement cases were seen in 2010. Major disasters seen this year include floods that destroyed millions of homes in China and Pakistan, torrential rains associated with El Niño in Latin America and the Caribbean, and a devastating earthquake in Haiti. The earthquake in Haiti alone caused 1.5 million people to become homeless (22).

Limitations

In our study, we examined natural disasters (1920-2020) and displaced persons (2008-2019) that occurred in a certain time period. Since we could not find these two types of data in the same organization's database, we used the databases of two different organizations. This is due to the fact that statistics on displaced persons that have started to be kept can be considered new. Unfortunately, the knowledge of the displaced people does not go back a century. This may be considered as a limitation of our study.

CONCLUSION

Weather-related hazards account for more than 87 percent of all disaster displacements, and the effects of climate change and increasing population density in regions exposed to storms and floods mean more and more people are affected. Including disaster resilience in national growth strategies for each country, budget allocation, careful and logical urban management (physical planning, environmental planning), national planning for climate crisis returns are precautions to increase the resilience of the people to disasters and reduce their vulnerability.

Ethical considerations

To conduct the present study, the ethical principles for medical research on human subjects established by the Declaration of Helsinki were followed. Istanbul University Clinical Research Ethics Committee was endorsed this study as in Minutes No. 218949.

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The Relationship between Sleep Quality and Fear of Death and Socio-Demographic Factors in Middle-Age and Above Individuals Applied to the Hospital

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ABSTRACT

Objective: In this study, it was aimed to reveal the relationship between sleep quality, fear of death and socio-demographic factors in middle-aged and older individuals who applied to the hospital.

Materials and Methods: This descriptive study was conducted by applying a questionnaire to middle-aged and older individuals who were hospitalized in the Health Practice and Research Center of a state university and agreed to participate in the study. Data Collection Form, Thorson-Powell Death Anxiety Scale and Pittsburgh Sleep Quality Index (PUKI) were used for all middle-aged and older individuals who agreed to participate in the study. Student t test, Anova and analysis of variance were used to compare the scores obtained from the scales.

Results: 38% of the individuals participating in the study are in the 45-64, 36% are in the 65-74, and 26% are in the 75 and over age group. In the correlation analysis, a weak linear correlation was found between DAS score (high score indicates increased fear of death) and PUKI in the opposite direction (r=-0.216) and economic level perception (r= 0.238). In the correlation analysis, there was an inverse relationship between PUKI score (high score indicates increased sleep problem) and DAS, poor (r=-0.216), perception of quality of life, perception of health status, perception of adaptation to life, perceived age, education level and perception of economic level.

Conclusion: According to the correlation analysis, there is a weak correlation between death anxiety and sleep quality in the opposite direction.

Keywords: Aging, Death Anxiety, Sleep Quality

Hastaneye Başvuran Orta Yaş ve Üzeri Bireylerde Uyku Kalitesi ile Ölüm Korkusu ve Sosyo-Demografik Faktörler Arasındaki İlişki

ÖZET

Amaç: Bu çalışmada, hastaneye başvuran orta yaş ve üzeri bireylerde uyku kalitesi ile ölüm korkusu ve sosyo-demografik faktörler arasındaki ilişkinin ortaya çıkarılması amaçlanmıştır.

Yöntem: Tanımlayıcı tipteki bu araştırma bir devlet üniversitesine bağlı Sağlık Uygulama ve Araştırma Merkezi'nde yatan orta yaş ve üzerinde olup araştırmaya katılmayı kabul eden bireylere soru formu verilerek gerçekleştirilmiştir. Araştırmaya katılmayı kabul eden tüm orta yaş ve üstü bireylere Veri Toplama Formu, Thorson-Powell Ölüm Kaygısı Ölçeği ve Pittsburgh Uyku Kalitesi İndeksi (PUKİ) kullanılmıştır. Ölçeklerden alınan puanlarının karşılaştırılması için student t testi, Anova ve varyans analizi kullanılmıştır.

Bulgular: Araştırmaya katılan bireylerin %38'ini 45-64 yaş grubu, %36'sını 65-74 yaş grubu ve %26'sını 75 ve üzeri yaş grubu bireyler oluşturmaktadır. Korelasyon analizinde, DAS puanı (yüksek puan ölüm korkusunun arttığını gösterir) ile PUKI arasında zıt yönde zayıf (r=-0,216) ve ekonomik düzey algısı (r= 0,238) arasında doğrusal yönde zayıf bir ilişki bulunmuştur. Korelasyon analizinde, PUKI puanı (yüksek puan uyku sorununu arttığını gösterir) ile DAS arasında zıt yönde zayıf (r=-0,216), yaşam kalitesi algısı, sağlık durumu algısı, yaşama uyum algısı, algılanan yaş, öğrenim düzeyi ve ekonomik düzey algısı arasında zıt yönde, zayıf bir ilişki bulunmuştur.

Sonuç: Korelasyon analizine göre ölüm kaygısı ve uyku kalitesi arasında zıt yönde zayıf bir ilişki mevcuttur.

Anahtar Kelimeler: Yaşlılık, Ölüm Kaygısı, Uyku Kalitesi

In the aging process; Irreversible functional losses occur within the scope of tissues, cells and systems in the organism (1). With the aging of the population in the world and in our country, many biological and psychological diseases arise (2). Especially among the psychosocial problems they experience, intense sadness, unhappiness, anger towards the environment and themselves, loss of role in the family, the feeling of not being self-sufficient due to their current illness, fear of death, and social isolation are common (3). When the studies in the literature are examined, it is seen that death anxiety has multiple dimensions. In particular, the fear of uncertainty and being alone, the fear of losing loved ones, the unknown after death, the fear of losing control and personal identity can be counted. The idea and perception of the individual about the concept of death and death anxiety differ according to the society, culture, personality structure and religion of the individual. The attitude, balance and harmony of the society in which the individual lives in the face of death are important. In case of loss of balance and harmony, the anxiety in the individual increases and it becomes difficult for the individual to adapt to the environment (4). It is possible to define death anxiety as a feeling that makes its presence felt in all people, is seen as the basis of all fears throughout life, and develops as a result of the awareness that one can lose himself and everything around him, that he will be nothing, in short, that he may disappear completely (5). The concept of death anxiety is considered multidimensional. Dimensions such as age, gender, education level, marital status, culture, beliefs, close losses, religion and death thoughts may vary in the dimensions of the concept of death anxiety. It is thought that accepting one's own death will increase courage, add integrity to one's life and enrich it (6,7). Sleep is an important physiological requirement for human life. It covers approximately 1/3 of a person's life (8). There are studies that have concluded that there is a relationship between death anxiety and sleep (9). There are many factors that cause sleep problems. Such as pain, anxiety, depression, physical problems and advancing age (10). Sleep problems in the elderly are mainly seen as Insomnia or Hypersomnia. These disorders can be the main disease (primary) or a symptom (secondary) of a disease. Sleep disturbance in old age is considered primary if it does not change according to mental illnesses, drugs used, a stimulant such as coffee or tea or the environment, but if it continues continuously, it is considered as a secondary sleep disorder if the numbers vary according to the circumstances (11,12).

MATERIALS AND METHODS

Working Group

The population of the research consists of middle-aged and older individuals hospitalized in Yozgat Bozok University Health Application and Research Center located in the center of Yozgat province. The study sample consists of middle-aged and older individuals who were hospitalized in Yozgat Bozok University Health Application and Research Center between 01.06.2018 and 01.09.2018 and accepted to participate in the research. Data Collection Form, Thorson-Powell Death Anxiety Scale and Pittsburgh Sleep Quality Index (PUKI) were applied to all middle-aged and older individuals who agreed to participate in the study at the beginning of the data collection process. The questionnaire to be applied to each participant took approximately 15 minutes and was carried out by face-to-face interview technique. A total of 100 people were reached. In the study, the data were evaluated in computer environment using SPSS 18 package program. The socio-demographic characteristics of the elderly who participated in the study were indicated by numbers and percentages. Death anxiety and PSQI scales were calculated separately, the average and standard deviation of the scores obtained from the scales were calculated and student t-test, Anova and variance analysis were used to compare the scores. Factors associated with PUKI score in univariate tests were analyzed by multivariate linear regression. In addition, correlation analysis between DAS Score and PUKI was evaluated.

Data Collection Tools

Data Collection Form: The Data Collection Form, which was created by the researchers by examining the relevant literature, consists of 22 questions related to the socio-demographic characteristics of individuals (8 questions), chronic diseases (9 questions), and measuring the level of self-health perception (5).

Thorson-Powell Death Anxiety Scale (TP DAS)

The Turkish adaptation of the Thorson-Powell Death Anxiety Scale was first performed by Karaca and Yıldız (13). In this study, four dimensions called "loss of physical and spiritual functions", "anxiety about other worlds", "decay and deterioration" and "death process and suffering" were determined. Thorson-Powell Death Anxiety Scale consists of 25 items prepared in a 5-point Likert format. A score between 0 and 100 is obtained from the scale, and high scores indicate high death anxiety. Items 4, 10, 11, 13, 17, 21, 23 and 25 in the scale are scored in reverse (13).

Death Anxiety Scale (SCA)

17 items of the "Death Anxiety Scale" (Thorson-Powell's Death Anxiety Scale) developed by Thorson and Powell (14) and consisting of 25 items are in the form of positive sentences and the other 8 items are in the form of negative sentences. The scale was scored from 0 to 4, from weak to strong, using a 5-point Likert format (very agreeable to my opinion; agreeable to my opinion; undecided; contrary to my opinion; very contrary to my opinion). Items placed in the scale in negative sentence structure are scored by reversing. The lowest 0 and the highest 100 points can be obtained from SCA, and high scores indicate a high level of anxiety. There are 25-item questions that can be answered as true or false in the scale. Thus, the lowest score that can be obtained from the scale is 25 and the highest score is 75. A high score indicates high death anxiety. This scale, which was previously applied with a true-false format for the convenience of elderly subjects, was converted to 5-point Likert format in later studies, and the final form of the scale remained in 5-point Likert format after it was observed that the elderly did not have much problems in filling out the scale (14).

Pittsburgh Sleep Quality Index (PUKI) Scale

PUKI was accepted in determining sleep quality, and in 1989 Buysse et al. (15) and its validity and reliability were determined (Cronbach's alpha=0.80). In our country, the validity and reliability study was carried out by Ağargün et al. (16) and the Cronbach alpha value of the scale was found to be 0.80. The scale is a four-point Likert type and contains a total of 24 questions; subjective sleep quality (component 1), sleep latency (component 2), sleep duration (component 3), habitual sleep efficiency (component 4), sleep disturbance (component 5), use of sleeping pills (component 6) and daytime dysfunction (component 3) 7) consists of 7 components. The sum of the seven component scores gives the total PUKI score. The response of each is scored between 0-3 according to symptom frequency. The total score has a value between 0-21. High values indicate poor sleep quality and high level of sleep disturbance. A total score above 5 indicates clinically poor sleep quality. The nineteenth question is also not taken into account in scoring. Six questions are answered by the spouse or a friend of the individual. These 6 questions are used only for clinical information and are not taken into account in determining the total and component scores of the scale.

Ethics committee permission: In order to conduct the study, Yozgat Bozok University Clinical Research Ethics Committee Approval (dated 30.05.2018 and numbered 2018-05-118 and decision number 2017 -KAEK-189_2018.05.30_15) and Yozgat Bozok University Health Practice and Research Center Institutional permission has been obtained. In addition, before the research, the participants were informed about the research and their consent was obtained.

RESULTS

In the correlation analysis, a weak linear correlation was found between DAS score (high score indicates increased fear of death) and PUKI in the opposite direction (r=-0.216) and economic level perception (r= 0.238). In other words, as the sleep problem decreases and the economic level increases, the fear of death increases. There was no significant relationship between DAS score and perception of quality of life, perception of health status, perception of adaptation to life, perceived age, age, BMI, education level and number of chronic diseases (Table 4).

In the correlation analysis, there was an inverse relationship between PUKI score (high score indicates increased sleep problem) and DAS, poor (r=-0.216), perception of quality of life, perception of health status, perception of adaptation to life, perceived age, education level and perception of economic level. There was a weak linear correlation between the number of chronic diseases (r= 0.301) and the number of chronic diseases ($p<0.05$). There was no significant relationship between PUKI score and age and BMI (Table 4).

When the factors associated with the DAS score are analyzed with multivariate linear regression, the increase in the economic level and having a child increase the fear of death. BMI and PUKI, which were significant in the univariate test, were not statistically significant in the regression analysis (Table 5).

When the factors associated with PUKI score in univariate tests were analyzed with multivariate linear regression, in order of importance, the level of education decreased (β= -0.323), the number of chronic diseases increased (β= 0.249), negative perception of health status (β= -0.195) and the decrease in the economic level (β= -0.180) increases the sleep problem.

The variables of DAS, age, BMI, perception of quality of life, perception of adaptation to life, perceived age, visiting a doctor in the last 6 months, and assessing old age were not found to be statistically significant in the regression analysis (Table 5).

Table 1. DAS and PUKI mean scores by socio-demographic variables

		N=100	DAS		t/F	PUKI		t/F
		%	Mean	SD	P	Mean	SD	P
PUKI Group	no problem	31	46,8	17,82	1,69	3,5	1,36	8,00a
	There is problem	69	40,9	15,06	0,094	9,9	3,05	**<0,001**
Gender	Woman	48	44,5	15,21	1,06	8,5	4,14	1,38
	Boy	52	41,1	16,87	0,293	7,4	3,79	0,171
Age Group	45-64	38	41,9	14,31	0,41	7,3	3,98	0,83
	65-74	36	41,9	15,92	0,663	8,4	3,79	0,441
	75+	26	45,2	18,97		8,2	4,26	
Education Status	illiterate	20	42,9	11,35	1,45	10,2	3,86	5,88
	literate	31	38,1	19,00	0,234	8,4	3,45	**0,001**
	primary school	30	45,0	16,09		7,6	3,82	
	middle school +	19	46,6	14,50		5,3	3,81	
Marital Status	married	80	43,0	16,79	0,31	7,7	3,88	1,31
	widow	20	41,7	13,32	0,759	9,0	4,31	0,193
Child	there is	93	43,7	15,77	2,19	7,9	3,97	0,16
	none	7	30,1	16,29	**0,031**	8,1	4,38	0,873
Economical situation	income less than expense	17	41,9	11,94	7,26	10,1	4,40	5,75
	income equal to expense	70	40,2	15,23	**0,001**	7,8	3,70	**0,004**
	more income than expense	13	57,6	18,34		5,4	3,52	
Income Source	pension	71	43,0	14,15	0,24	7,7	3,58	2,27
	Other income	29	42,1	20,39	0,809	8,5	4,85	**0,026**
BKI (kg/m^2)	Normal	18	45,7	15,40	3,60	7,1	3,22	0,93
	slightly fat	37	46,3	15,40	**0,016**	7,8	3,99	0,427
	1st degree obese	31	35,2	16,72		7,8	4,58	
	2nd degree obese	14	46,5	12,74		9,4	3,34	
Chronic Disease	no	6	51,5	15,83	1,43	7,0	2,97	4,56
	1 piece	52	44,4	14,92	0,238	6,7	3,46	**0,005**
	2 piece	26	40,2	16,86		9,7	4,51	
	3 or more	16	38,2	18,00		9,4	3,76	
Continuous Medication	there is	78	41,4	16,91	1,53	8,2	4,22	1,22
	none	22	47,4	12,07	0,129	7,0	2,89	0,226
	Total	**100**	**42,7**	**16,10**		**7,9**	**3,98**	

Table 2. PUKI results for socio-demographic variables

		PUKI						
		No Problem Sleeping		Sleep Problems Have		Total		x^2
		n	%	n	%	n	%	p
Gender	Woman	12	25,0	36	75,0	48	100,0	1,55
	Boy	19	36,5	33	63,5	52	100,0	0,213
Age Group	45-64	17	44,7	21	55,3	38	100,0	5,41
	65-74	8	22,2	28	77,8	36	100,0	0,067
	75+	6	23,1	20	76,9	26	100,0	
Education Status	illiterate	2	10,0	18	90,0	20	100,0	25,50
	literate	4	12,9	27	87,1	31	100,0	**<0,001**
	primary school	11	36,7	19	63,3	30	100,0	
	middle school +	14	73,7	5	26,3	19	100,0	
Marital Status	married	26	32,5	54	67,5	80	100,0	0,42
	single	5	25,0	15	75,0	20	100,0	0,517
Child	there is	28	30,1	65	69,9	93	100,0	0,49
	none	3	42,9	4	57,1	7	100,0	0,482
Economical situation	income less than expense	4	23,5	13	76,5	17	100,0	3,81
	income equal to expense	20	28,6	50	71,4	70	100,0	0,149
	more income than expense	7	53,8	6	46,2	13	100,0	
Income Source	pension	23	32,4	48	67,6	71	100,0	0,22
	Other income	8	27,6	21	72,4	29	100,0	0,637
BKI (kg/m^2)	Normal	7	38,9	11	61,1	18	100,0	2,67
	slightly fat	11	29,7	26	70,3	37	100,0	0,445
	1st degree obese	11	35,5	20	64,5	31	100,0	
	2nd degree obese	2	14,3	12	85,7	14	100,0	
Chronic Disease	no	2	33,3	4	66,7	6	100,0	5,48
	1 piece	21	40,4	31	59,6	52	100,0	0,140
	2 piece	6	23,1	20	76,9	26	100,0	
	3 or more	2	12,5	14	87,5	16	100,0	
Continuous Medication	there is	24	30,8	54	69,2	78	100,0	0,01
	none	7	31,8	15	68,2	22	100,0	0,925
	Total	**31**	**31,0**	**69**	**69,0**	**100**	**100,0**	

Table 3. PSQI results according to some health attitudes and behaviors

		N=100	PUKI		x^2	PUKI		t/F
		%	Yok	Var	p	Mean	SD	p
Seeking a doctor in the last 6 months	Yeah	69	26,1	73,9	2,51	8,4	4,10	2,00
	no	31	41,9	58,1	0,113	6,7	3,47	**0,049**
Regular check up	Yeah	52	26,9	73,1	0,84	8,6	4,18	1,77
	no	48	35,4	64,6	0,359	7,2	3,66	0,080
Hospitalization in the last 1 year	Yeah	44	22,7	77,3	2,51	8,9	4,02	0,44
	no	56	37,5	62,5	0,113	7,2	3,82	0,661
Using assistive devices	Yeah	33	27,3	72,7	0,32	8,8	4,11	1,61
	no	67	32,8	67,2	0,572	7,5	3,87	0,110
Evaluation of old age	usual situation	48	39,6	60,4	3,18	6,8	3,48	2,68
	adverse situation	52	23,1	76,9	0,075	8,9	4,18	**0,009**
Detecting your own age	youth	7	28,6	71,4	12,15	7,0	4,93	3,62
	middle age	33	51,5	48,5	**0,007**	6,5	3,84	**0,016**
	old	50	24,0	76,0		8,4	3,59	
	too old	10	,0	100,0		10,6	4,22	
	Total	100,0	31,0	69,0				

Table 4. Correlation

	DAS	PUKI	Perception of quality of life	Health perception	Perception of adaptation to life	Detecting your own age	Age	BKI	Education level	Economic level perception
DAS	1									
PUKI	**-0,216***	1								
Perception of quality of life	0,121	**-0,248***	1							
Perception of health status	0,185	**-0,359****	0,833**	1						
Perception of adaptation to life	0,183	**-0,353****	0,714**	0,772**	1					
Detecting your own age	0,140	**-0,289****	0,416**	0,443**	0,422**	1				
Age	0,000	0,178	-0,024	-0,014	-0,062	0,330**	1			
BKI	-0,047	0,167	0,072	0,069	0,062	-0,174	-0,156	1		
Education level	0,144	**-0,414****	0,161	0,175	0,229*	-0,327**	-0,335**	-0,189	1	
Economic level perception	**0,238***	**-0,325****	0,344**	0,337**	0,407**	-0,278**	0,000	-0,137	0,250*	1
KH top	-0,183	**0,301****	-0,134	-0,188	-0,200*	0,251*	0,174	0,097	-0,049	0,005

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Table 5. Analysis of Factors that May Affect DAS and PUKI by Linear Regression

	Unstandardized Coefficients		Standardized Coefficients			95,0% Confidence Interval for B	
DAS [a]	B	Std. Error	β	t	Sig.	Lower Bound	Upper Bound
(Constant)	29,803	5,740				18,410	41,196
Economic level	7,101	2,818	,242	2,520	,013	1,508	12,693
Are there children = no	-13,861	6,032	-,221	-2,298	,024	-25,834	-1,889
PUKI [b]							
(Constant)	13,746	1,566		8,779	,000	10,637	16,854
Education status	-1,071	,288	-,323	-3,722	,000	-1,643	-,500
Economical situation	-1,304	,659	-,180	-1,978	,051	-2,613	,005
Current Health assessment	-,041	,019	-,195	-2,144	,035	-,079	-,003
KH top	1,061	,363	,249	2,924	,004	,341	1,782

a Independent variables: PUKI, BKI, economic level perception, presence of children
b Independent variables: DAS, BKI, Age, Education level, Perception of economic level, Evaluation of quality of life, Perception of current health status, Evaluation of adaptation to lifestyle, Perception of own age, KH number, Application to a doctor in the last 6 months, Evaluation of old age

DISCUSSION

Our research is a study planned to examine the relationship between death anxiety and sleep quality and the factors affecting it. According to our correlation analysis (Table 4), there is a weak opposite relationship between death anxiety and sleep quality. No study has been found examining this relationship, and the general opinion is that sleep problems are related to psychological problems (17). It was determined that there was a very low positive correlation between the number of children and death anxiety of the elderly who participated in our study (Table 5). Accordingly, it was concluded that as the number of children increases, death anxiety will also increase. While this finding is in parallel with Kalaoğlu Öztürk's 2010 (18) and Kurt Magrebi and Akçay's 2020 (19) studies in the literature, it differs with Top et al.'s 2010 (20). The fact that death anxiety is positively related to having a child can be associated with the obligations of the person and the anxiety of being isolated from his family.

Not feeling financially secure can negatively affect older people. The weak correlation found in our study that perceiving low income level increases death anxiety (Table 5) is consistent with the literature (19,20). This may be due to the fact that the elderly feel needy and unprotected.

In our study, the PUKI score increases as the education level decreases (Table 5). In the study of Fadıloğlu et al. (21) it was shown that education level has no effect on sleep quality.Arslan et al.(22) also reported that there was no relationship between sleep quality and education level. Our study differs from the literature. It can be thought that a high level of education allows the elderly to communicate more comfortably and openly in their environment, thus causing them to be less affected by the environment by causing them to maintain their social well-being.

The presence of chronic disease is encountered in many studies as a factor affecting sleep quality, the presence of the disease affects sleep, and sleep disturbance can cause the disease to be experienced more intensely. In our study, it was found that the presence of a chronic disease and the negative perception of the health status of the individuals decreased their sleep quality (Table1, Table 4). Ekici (23) found that pain reduced sleep quality in patients suffering from chronic pain. In addition, Ersoy and Mercan (24) found that being 50 years old and over and having comorbidity increased sleep apnea according to the logistic regression analysis in a study they conducted in the adult group. In addition, difficulty in sleeping in the menopausal period is one of the most important complaints after night sweats and hot flashes. The prevalence of sleep difficulties in women in the menopausal period ranges from 14% to 53% (25).

When the relationship between environmental factors, income level and sleep complaints was investigated, it was observed that sleep complaints were more common in those with low income (Table 1). The relationship between sleep problems and socioeconomic indicators has been investigated in different studies, and a statistically significant relationship was found between low income level and sleep problems, similar to this study (26,27).

Health-related quality of life is a concept that is perceived by the individual and focused on health and happiness. Sleep disorders in the elderly should be carefully examined as they will reduce the quality of life of the elderly. It has been shown that quality of life in the elderly is associated with activity level in daily life and healthy lifestyle behaviors (28,29). In a study conducted on adults with cancer, it was found that quality of life decreases with an increase in the PUKI score (22). Similar to our study, Pekçetin and İnal (30) found that an increase in the quality of life and sleep quality in the elderly decreased the quality of life.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Radiology / Radyoloji

Increased Incidence of Acute Ischemic Stroke in COVID-19 Patients

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ABSTRACT

Purpose: The coronavirus disease 2019 (COVID-19) is an active epidemic that is rapidly spreading globally with various complications. Although there are publications on the frequency of thromboembolic complications with COVID-19, the number of publications showing a strong relationship with acute ischemic stroke is few. We aimed to evaluate the link between COVID-19 and acute ischemic stroke.

Methods: One hundred and six patient were screened retrospectively who were underwent brain diffusion MRI with the suspicion of acute stroke in our institution between April and August 2020 when the COVID-19 pandemic intense. The data on diagnosis of COVID-19 infection were analyzed according to patient demographics and risk factors; patients are separated into two groups as with and without acute ischemic stroke findings. A univariate analysis was performed to show the relationship of risk factors and the presence of COVID-19 with acute ischemic stroke.

Results: Acute stroke imaging findings were detected in 39 of 106 patients; and 67 patients without signs of acute ischemic stroke were considered as the control group. The mean age for subjects and controls was 61.8±4.8 and 61.2±4.9 years, respectively. Seventeen (43.6%) of the patients with acute ischemic stroke findings had COVID-19 infection. In the control group, 12 (17.9%) were positive for COVID-19 ($p<0.05$). No significant relationship was found for age, gender and other risk factors. However, COVID-19 infection had a significant independent association with acute ischemic stroke compared to control subjects (OR 3.5; 95% CI 1.4–8.6; $P < 0.005$).

Conclusion: COVID-19 infection poses an increased risk for acute ischemic stroke, and therefore, it is necessary to be careful in terms of acute ischemic stroke in patients followed up for COVID-19, and imaging with diffusion MRI in suspected cases.

Keywords: COVID-19, Ischemic Stroke, Magnetic Resonance Imaging, Diffusion Weighted Imaging

COVID-19 Hastalarında Akut İskemik İnme Sıklığında Artış

ÖZET

Amaç: Koronavirüs hastalığı 2019 (COVID-19), çeşitli komplikasyonları olan küresel olarak hızla yayılan aktif bir salgındır. COVID-19 ile tromboembolik komplikasyonların sıklığına yönelik yayınlar bulunmakla birlikte akut iskemik inme ile güçlü bir ilişki gösterilen yayın sayısı azdır. Bu çalışmada COVID-19 ile akut iskemik inme arasındaki bağı değerlendirmek amaçlanmıştır.

Metodlar: COVID-19 pandemisinin yoğun olduğu Nisan - Ağustos 2020 döneminde kurumumuzda akut iskemik inme şüphesi ile beyin difüzyon MRI yapılan hastalar retrospektif olarak tarandı. Yaş ve risk faktörleri göz önünde bulundurularak belirlenmiş, 106 hasta çalışmaya dahil edildi. Difüzyon MRI bulgularına göre hastalar akut iskemik inme bulguları olan ve olmayan iki grup olarak belirlendi. Tüm hastalar için COVID-19 enfeksiyonu tanısı, hasta demografisi ve risk faktörleri ile ilgili veriler toplandı. Risk faktörlerinin ve COVID-19 varlığının, akut iskemik inme ile ilişkisini gösterebilmek amacı ile tek değişkenli bir analiz yapıldı.

Bulgular: Çalışmaya dahil edilen 106 hastanın 39'unda akut inme görüntüleme bulguları mevcuttu. Akut iskemik inme bulgusu saptanmayan 67 hasta kontrol grubu olarak değerlendirildi. Olgular ve kontroller için ortalama yaş sırasıyla 61.8±4.8 ve 61.2±4.9 yıldı. Akut iskemik inme bulgularına sahip hastaların 17'sinde (%43.6) COVID-19 enfeksiyonu vardı. Kontrol grubunun ise 12'sinde (%17.9) COVID-19 pozitif idi ($P < 0.05$). Yaş, cinsiyet ve diğer risk faktörleri için anlamlı bir ilişki saptanmadı. Ancak COVID-19 enfeksiyonu, kontrol deneklerine kıyasla akut iskemik inme ile anlamlı bağımsız bir ilişkiye sahipti (OR 3,5; % 95 CI 1,4 –8.6; $P < 0.005$).

Sonuç: COVID-19 enfeksiyonunun, akut iskemik inme için artmış risk oluşturduğu ve bu nedenle COVID-19 nedeniyle takip edilen hastalarda akut iskemik inme yönünden dikkatli olunması ve şüpheli durumlarda difüzyon MRI ile görüntülemenin gerektiği görülmektedir.

Anahtar Kelimeler: COVID-19, İskemik İnme, Manyetik Rezonans Görüntüleme, Difüzyon Ağırlıklı Görüntüleme

In December 2019, a new Severe Acute Respiratory Syndrome coronavirus-2 (SARS-CoV-2) disease emerged in Wuhan, China (1). Coronavirus disease 2019 (COVID-19), the clinical manifestation of SARS-CoV-2 infection, has led to a worldwide pandemic characterized by viral pneumonia and its complications. A significant number of patients experienced fever, cough, abdominal pain and diarrhea. According to the World Health Organization (WHO), over 169 million confirmed cases of COVID-19 have been identified worldwide as of May 2021, and at least 3.5 million patients have died from COVID-19 pneumonia and its complications (2).

With the identification of the disease, it was reported that the transmission was by respiratory droplets; and initially fever, shortness of breath and cough were the first symptoms. In the following period, symptoms such as gastrointestinal disease, headache, anosmia and confusion have been described (3,4). Prior to COVID-19, it was known that respiratory tract infections increased the risk of short-term ischemic stroke (5-10). In reports from China, it is notified that neurological symptoms are seen in approximately one-third of patients hospitalized with COVID-19 (10). It has been reported that chronic diseases such as hypertension, coronary artery disease and diabetes mellitus adversely affect the prognosis of COVID-19 infection (11). It has been reported that SARS-CoV-2 virus, which causes COVID-19 infection, attaches to cells via the angiotensin converting enzyme (ACE) 2 receptors, which are mostly found in lung alveolar epithelial cells, small intestinal enterocytes and vascular endothelium (12). It has been suggested that the virus that binds to the cell wall may cause a cytokine storm, leading to an increased incidence of vascular thrombosis in patients (13,14). There is increasing evidence that thrombosis is the leading cause of multi-organ failure including respiratory system (15). A number of studies have shown that coagulation disorders related to COVID-19 are associated with increased morbidity and mortality (16,17).

Although an increased thromboembolic risk has been identified with COVID-19, the number of studies evaluating the incidence of acute ischemic stroke associated with COVID-19 seems to be limited (18). Our institution is one of the stroke centers of the Anatolian part of Istanbul province, and an increased incidence of acute ischemic stroke in COVID-19 patients compared to the normal population was noted as of April 2020, when the COVID-19 pandemic intensified. Therefore, the study was planned to determine whether there is a relationship between COVID-19 infection and the risk of acute ischemic stroke, and any possible risk factors.

MATERIAL and METHODS

The study was conducted as a retrospective case-control study in one of the few hospitals operating as a stroke center in the city of Istanbul, which has a large population. This retrospective study was approved by the scientific research commission established by the Ministry of Health of the Republic of Turkey for COVID-19 research. The study protocol was made in accordance with the Declaration of Helsinki and was approved by the ethics committee of Haydarpasa Numune TRH (HNEAH-KAEK-KK/182). During the period of April-August 2020, when the COVID-19 pandemic was intense, patients who underwent brain diffusion MRI with the suspicion of acute stroke in our institution were scanned retrospectively. In order to limit the risk factor created by age, 123 patients between the ages of 40-70 were included in the study. As the inclusion criteria of the patients in the study; The conditions were required to have clinical findings suggestive of acute ischemic stroke, to have had diffusion cranial MR imaging obtained with this suspicion, and to have Reverse-Transcriptase Polymerase Chain Reaction (RT-PCR) test results for SARS-CoV-2. COVID-19 infection was confirmed by in vitro reverse transcriptase polymerase chain reaction (RT-PCR) with patient's nasopharyngeal swabs. If the RT-PCR test findings were negative, the patients were considered negative for COVID-19. Patients with a history of bleeding, tumor, and vasculitis were excluded from the study (n = 6). Patients without clinical data (n = 8), poor quality or suspicious imaging findings (n = 3) were not included in the study. Thus, a total of 106 patients were obtained (Figure 1). According to diffusion MRI findings, patients were divided into two groups with and without acute stroke imaging findings. The patients were evaluated for the presence of diffusion-limiting focus consistent with acute ischemic stroke on MR imaging by two radiologists with 16 and 18 years of experience (Figure 2 and Figure 3).

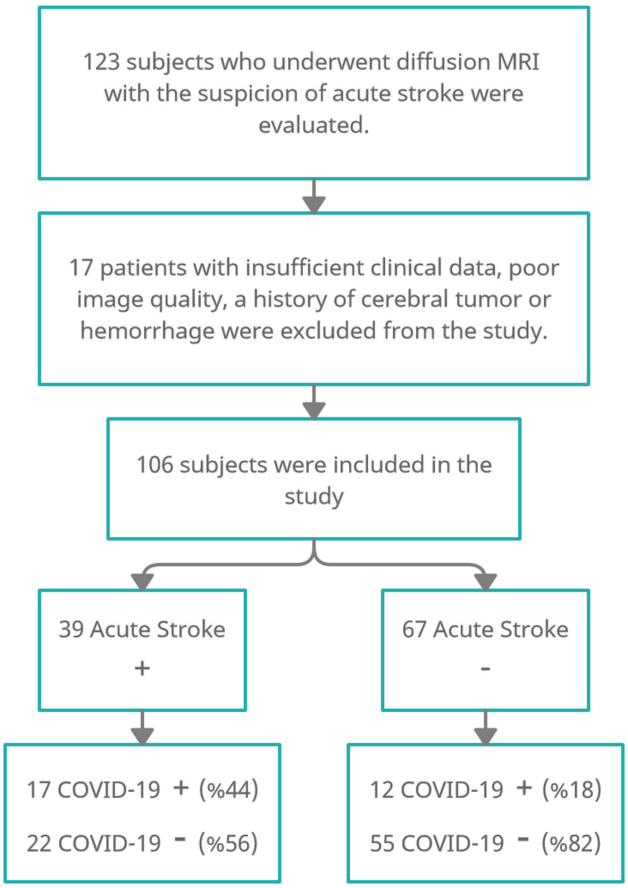

Figure 1 Flow chart of the study

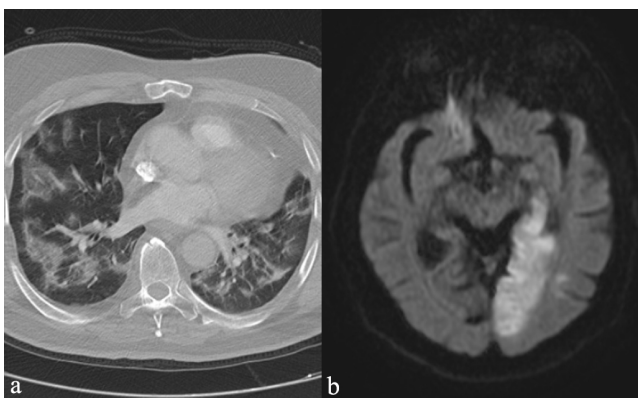

Figure 2 MR images of diffuse COVID-19 pneumonia in both lungs (a) and diffusion restriction showing left temporooccipital acute ischemic stroke in the same patient

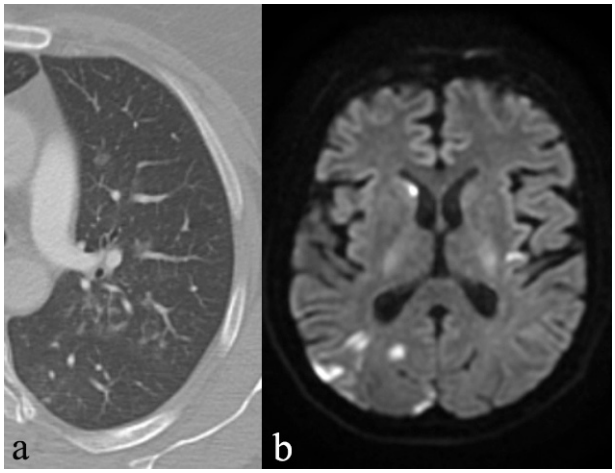

Figure 3 Focal ground-glass opacities in the left lung of COVID-19 infection (a), cranial diffusion MR image of the same patient (b) foci showing diffusion restriction from acute ischemic stroke

Presence of hypertension, history of coronary artery disease, diabetes mellitus type 2, history of congestive heart failure as possible vascular risk factors obtained from medical records were questioned and recorded. A univariate analysis was performed to show the relationship of risk factors and the presence of COVID-19 with acute ischemic stroke.

Statistical Analysis

Patients with imaging findings consistent with acute ischemic stroke versus controls with imaging findings not compatible with acute ischemic stroke were compared according to age, gender, and major vascular risk factors. Pearson x2 test was used to compare categorical variables. Student t test was performed for continuous variables. Statistical difference between acute ischemic stroke and control group was evaluated. All tests were 2-tailed and $p < 0.05$ was considered statistically significant. While evaluating the findings obtained in the study, IBM SPSS Statistics 22 (IBM SPSS, Turkey) program was used for statistical analysis.

RESULTS

Patients presented with findings such as hemiplegia, unilateral sensory loss, dysarthria, facial asymmetry, aphasia, and acute mental status changes were evaluated as acute stroke suspicion. Because of this suspicion, 106 patients who underwent cranial diffusion MR imaging were included in the study. Acute stroke imaging findings were present in 39 of 106 patients included in the study. 67 patients without signs of acute ischemic stroke were considered as the control group. The mean age for subjects and controls was 61.8±4.8 and 61.2±4.9 years, respectively *($p < 0.05$)*.

Seventeen (43.6%) of the patients with acute ischemic stroke findings had COVID-19 infection. In the control group, 12 (17.9%) were positive for COVID-19 (p <0.05). While 23 (58.9%) of the patients with acute ischemic stroke findings were male, 37 (55.2%) of the control group were male (p <0.05). There was no statistically significant difference between the ischemic stroke group and the control group for other risk factors such as type 2 diabetes mellitus, hypertension, coronary artery disease and heart failure (Table 1).

COVID-19 infection was found to be independently and significantly associated with patients with acute ischemic stroke compared to control subjects (OR 3.5; 95% CI 1.4–8.6; *p <0.05*).

Table 1. Comparison of Demographic and Clinical Characteristics of Cases and Controls

	Group 1 Acute Ischemic Stroke Present	Group 2 Control – No ischemic stroke	*p value*	Total
Number (n)	39 (%37)	67 (%63)		106
Age (years)	61.8±4.8	61.2±4.9	0.521	61.4±4.9
Gender male (n)	23 (%58.9)	37 (%55.2)	0.710	60
COVID-19 (+)	17 (%43.6)	12 (%17.9)	0.004	29
Diabetes Mellitus (+)	12 (%30.8)	14 (%20.9)	0.255	26
Hypertension (+)	16 (%41)	20 (%29.9)	0.241	36
Coronary Heart Dis. (+)	9 (%23.1)	12 (%17.9)	0.520	21
Heart failure (+)	9 (%23.1)	11 (%16.4)	0.398	20

DISCUSSION

We evaluated the association of COVID-19 with traditional vascular risk factors with acute ischemic stroke as evidenced by imaging findings and found that COVID-19 is an independent risk factor for acute ischemic stroke. This finding supports that thromboembolic complications associated with COVID-19 infection are associated with increased morbidity and mortality.

It has been observed that underlying vascular problems are effective in the morbidity and mortality of many patients affected by COVID-19. In a meta-analysis of 6 studies published from China, it was reported that co-morbid conditions such as diabetes (9.7%), cardiovascular disease (16.4%), and hypertension (17.1%) affect the prognosis of the disease in 1527 COVID-19 patients (19). In particular, patients with severe COVID-19 reported a three times higher incidence of cardiovascular disease than those with mild-to-moderate disease.

It is known respiratory tract infections increase the risk of acute ischemic stroke independent of COVID-19 infection (5-10). Grau et al. (7) reported that bacterial and viral infections are risk factors for the development of thromboembolism. In a study conducted in Wuhan, it was reported that 11 (5%) of 221 COVID-19 patients developed acute ischemic stroke, and high C-reactive protein and D-dimer levels and increased coagulation tendency were mentioned in these patients (19).

In the report published by The International Society of Thrombosis and Haemostasis, fulminant activation of coagulation, depleting coagulation factors, was reported in patients with severe COVID-19 disease (20). Hypercoagulation and thromboembolic complications may be related to the severity of inflation and the extent of the disease. Different theories have been proposed regarding the mechanisms that increase the risk of ischemic stroke in systemic or respiratory tract infections. The most well-known ones are associated with changes in lipid metabolism and platelet aggregation, changes in endothelial function, and plaque instability and rupture (21,22). It is known that in COVID-19 infection, SARS-CoV-2 virus attaches to cells via ACE 2 receptor, which is abundant in the vascular endothelium. It is thought that the cytokine storm that occurs after attachment to the receptors triggers hypercoagulation (13,14). In addition, high D-dimer levels and platelet counts are often seen in severe cases of COVID-19. This may predispose patients to the development of acute ischemic stroke (23).

In this study, we wanted to evaluate the effect of COVID-19 on acute ischemic stroke, independent of other vascular risk factors, in patients within a certain age range. Our study shows that the incidence of acute ischemic stroke is significantly higher in patients with COVID-19 infection compared to those without infection. The presence of COVID-19 infection was associated with significantly more stroke cases than control subjects.

Our study has some limitations. First of all, as this was a retrospective study, there were some limitations in the clinical evaluation of the patients. In order to reduce the possible effects of age, cases between the ages of 40-70 were taken, demographic and some cardiovascular risk

factors were included in the evaluation. However, risk factors as history of TIAs (transient ischemic attacks), smoking, hyperlipidemia, lack of exercise, excessive alcohol use and heredity and genetics for acute ischemic stroke could not be evaluated. Another limitation is our small sample size of 106 patients. In addition, the RT-PCR test, which can give false negative and false positive results, which can be considered a problem for all studies related to COVID-19, can be counted.

CONCLUSION

The incidence of thromboembolic complications is increased in COVID-19 patients, and the possible mechanism of these complications is the procoagulant pattern and endothelial thrombo-inflammatory syndrome, which may result in multisystemic thrombotic disease. Studies on the frequency of thromboembolic complications in COVID-19 patients, especially pulmonary embolism, are increasing; this study is showed an increased incidence of radiological imaging-proven acute ischemic stroke in COVID-19 patients. Future studies evaluating large populations together with the pathophysiological mechanisms present in COVID-19 will provide useful information. In addition, a wide evaluation of risk factors, organ and system-based evaluations in thromboembolic complications are needed. In conclusion, patients with COVID-19 should be carefully evaluated in terms of acute neurological changes and the possibility of acute ischemic stroke should not be overlooked and radiological imaging should not be delayed in order to reduce morbidity and mortality.

DECLARATIONS

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Authors' contributions:

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; ANK, AV

Drafting the work or revising it critically for important intellectual content; AV, ANK

Final approval of the version to be published; ANK, AV

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; ANK, AV

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Radiology / Radyoloji

Incidental Extrapulmonary Findings in Low-Dose CT of the Thorax

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ABSTRACT

Purpose: The aim of the study is to evaluate the prevalence of extrapulmonary findings in low-dose computed tomography (LDCT) of the thorax.

Methods: Patients who were referred to the radiology department by the department of pulmonary medicine between June 2016 and January 2018 for LDCT examination to assess either a certain or a potential pulmonary disease were identified. Images were retrospectively re-evaluated and findings were categorized according to organ system (Total of 8 groups including cardiac, vascular, mediastinal, abdominal, skeletal, thyroidal, breast and muscular-soft tissue). The LDCT was performed by using a 64-detector CT scanner with scanning parameters standardized as 120 kVp and 20 mAs with 3 mm slice thickness.

Results: 102 patients (41 female, 61 male) aged between 25 and 90 years (mean age: 54.5±14.3 years) were included in the final assessment. 87 (85.3%) out of 102 patients had total 245 incidental extrapulmonary findings. Abdominal pathologies were the most common findings (62 patients (60.8%)). Overall, 26 extrapulmonary findings led to further work-up or consultation.

Conclusion: Incidental extrapulmonary findings can be detected commonly in LDCT of the thorax. Radiologists should be aware of evaluating all the structures in the scanning area by following a systematic approach in the reading of such studies in order to identify possible pathologies and guide the clinician for the accurate management of patients.

Keywords: Low dose computed tomography, thorax, extrapulmonary findings, incidental.

Düşük Doz Toraks BT'de İnsidental Ekstrapulmoner Bulgular

ÖZET

Amaç : Çalışmanın amacı toraksın düşük doz bilgisayarlı tomografisinde (DDBT) ekstrapulmoner bulguların prevalansını değerlendirmektir.

Yöntemler: Haziran 2016 - Ocak 2018 tarihleri arasında göğüs hastalıkları anabilim dalı tarafından belirli veya olası bir akciğer hastalığını değerlendirmek amacıyla radyoloji bölümüne DDBT incelemesi için yönlendirilen hastalar belirlendi. Görüntüler retrospektif olarak yeniden değerlendirildi ve bulgular organ sistemine göre sınıflandırıldı (Kardiyak, vasküler, mediastinal, abdominal, iskelet, tiroid, meme ve kas-yumuşak doku olmak üzere toplam 8 grup). DDBT, 120 kVp ve 3 mm kesit kalınlığında 20 mA olarak standartlaştırılmış tarama parametrelerine sahip 64 dedektörlü bir BT tarayıcı kullanılarak gerçekleştirildi.

Bulgular : Değerlendirmeye 25-90 yaşları arasında (ortalama yaş: 54,5 ± 14,3 yıl) 102 hasta (41 kadın, 61 erkek) dahil edildi. 102 hastanın 87'sinde (% 85,3) toplam 245 insidental ekstrapulmoner bulgu vardı. Abdominal patolojiler en sık görülen bulgulardı (62 hasta (% 60,8)). Toplamda, 26 ekstrapulmoner bulgu için ileri tetkik veya konsültasyon istendi.

Sonuç: İnsidental ekstrapulmoner bulgular, toraksın DDBT'sinde yaygın olarak izlenebilmektedir. Radyologlar, olası patolojileri belirlemek ve doğru hasta yönetimi için klinisyene rehberlik etmek amacı ile bu tür incelemelerin okunmasında sistematik bir yaklaşım izlemeli ve tarama alanındaki tüm yapıları değerlendirmelidir.

Anahtar kelimeler: Düşük doz bilgisayarlı tomografi, toraks, ekstrapulmoner bulgular, insidental.

With the advance of imaging technology, the introduction of multidetector CT has revolutionized the diagnostic process. However radiation dose especially for follow-up examinations still remains as an issue. Incorporating the LDCT based on reduced radiation dose via reducing the tube current principle into the diagnostic algorithm without compromising image quality of lung, have reduced the unwanted effects of radiation (1).

LDCT is commonly used in long term follow-up of pulmonary parenchymal nodules especially in young patients (2, 3). A randomized multicenter controlled trial showed that imaging with LDCT reduces lung cancer and all-cause mortality by 20 % and 6.7 % , respectively(4).

Presence of different structures other than lungs in the thoracic imaging with LDCT which has reduced image quality than diagnostic CT raises the question of how frequently incidental findings might be seen in other extraparanchymal tissues and organs in the scanning area. Thus, patients may require further imaging, follow-up, or biopsy to characterize these unexpected findings, or additional treatments may be added to clinical management. There are also opposing views in the literature about the necessity of systematically searching incidental extrapulmonary findings (5, 6).

The aim of this study is to analyze the prevalence and distribution of extrapulmonary findings in LDCT with the purpose of contribution to the literature.

MATERIAL AND METHODS

Study Design and Patient Selection

The local institutional review board approved this retrospective study. The study population was consisted of 102 consecutive patients (41 female, 61 male) aged between 25 and 90 years (mean age: 54.5±14.3 years) who were referred to the radiology department by the department of pulmonary medicine between June 2016 and January 2018 for LDCT of the thorax to evaluate either a certain or a potential pulmonary disease.

Low-dose-CT Imaging

LDCT examinations of thorax were performed using a 64-detector CT scanner (Definition, Siemens, Forcheim, Germany) with following imaging parameters without IV or oral contrast material: acquisition 24x1.2 mm, slice collimation 1.2 mm, slice width 3 mm, pitch 1.2, tube current 20 mA; voltage 120 kVp. Scanning was performed in supine position and images were obtained from the lower neck to the upper abdomen in a single breath hold. Axial imaging data were postprocessed (Leonardo workstation, Siemens Medical Solutions) and coronal reconstructions were performed.

Image Analysis

LDCT images of chest were retrospectively reevaluated for extrapulmonary findings by a 10-year experienced thoracic radiologist. In our study, extrapulmonary findings were defined as pathologies to be seen outside the lung parenchyma. Extrapulmonary findings were categorized in 8 groups as follows: cardiac, vascular, mediastinal, abdominal, skeletal, thyroidal, breast and muscular-soft tissue. In each group detected pathologies were recorded and subgrouped accordingly.

Further assessment options were provided for follow-up modalities or repeated imaging intervals by the radiologist (eg: progression of lung nodule, PET follow-up may be considered, semi-solid renal mass, ultrasound follow-up is recommended).

Statistical Analysis

Data were expressed as frequencies for categorical variables. Categorical variables were compared via Chi-square test in SPSS software (version 16.0; SPSS; Chicago, Illinois, USA). Statistical significance was interpreted when p values were below 0.05.

RESULTS

85.3% of the study population (n= 87) had at least one incidental extrapulmonary finding. 245 incidental extrapulmonary findings were observed in all patients. Involvement of more than one organ system was noted in 72.5 % (n=74) of the patients.

Abdominal pathologies were the most common extraparenchymal findings found in 60.8% of the patients (n: 62). Hepatosteatosis and sliding hiatal hernia were seen in 37.3% (n: 38) and 11.8% of all patients with extrapulmonary findings (n: 12) respectively (Table 1). The breakdown of cumulative extrapulmonary findings are provided in Table 1.

Table 1: Distribution of incidental extrapulmonary findings in LDCT of chest in 102 patients. Finding were aligned according to descending frequency in each category

Category	Incidental extrapulmonary findings in LDCT of chest	Number of patients (n)
ABDOMINAL	Hepatosteatosis	38
	Sliding hernia	12
	Renal cysts	10
	Cystic hepatic lesions	6
	Hepatic parenchymal calcifications	5
	Splenic calcifications	4
	Adrenal hyperplasia	3
	Adrenal adenoma	2
	Liver masses	2
	Bochdalek hernia	2
	Cholelithiasis	1
	Gastric diverticulum	1
	Misty mesentery with mesenteric lymph nodes	1
	Abdominal aortic aneursym	1
	Splenic artery aneurysm	1
	Renal angiomyolipoma	1
	Renal stone	1
	Renal parenchymal thinning	1
SKELETAL	Degeneration	59
	Scoliosis	6
	Hemangioma	3
	Diffuse idiopathic skeletal hyperosteosis (DISH)	3
	Sclerotic lesions	2
	Lytic lesions	2
	Simple bone cysst	2
	Old healed fractures	2
	Compression fracture	1
CARDIAC	Coronary artery calcifications	34
	Valvular calcifications	9
	Increased cardiothoracic ratio	7
	Pericardial effusion	6
	Pericardial cyst	2
	Pericardial thickening	2
	Increased pericardial fat tissue thickness	1
VASCULAR	Thoracic aortic atherosclerosis	40
	Ascending aortic dilatation	8
	Dilatation of pulmonary artery	2
THYROIDAL	Thyroid nodule	7
	Thyroid gland hyperplasia	4
BREAST	Tumoral masses	4
	Breast calcifications	3
	Gynecomastia	3
	Postoperative change	2
	Asymmetry in breast tissue	1

Table 1: Distribution of incidental extrapulmonary findings in LDCT of chest in 102 patients. Finding were aligned according to descending frequency in each category (continuation of Table 1)

Category	Incidental extrapulmonary findings in LDCT of chest	Number of patients (n)
MEDIASTINAL	Mediastinal lymphadenopathy	8
MUSCULAR -SOFT TISSUE	Tumoral mass	2
	Skin thickening	1
	Subcutenous edema	1
	Axillary lymphadenopathy	1

In the female population (n: 41, 40.2%) the most common extraparenchymal findings were skeletal (65.9%) and abdominal (51.2%) pathologies. The categoric distribution of other extrapulmonary findings in females were 58.5% cardiac, 48.8% vascular, 17.1% breast, 14.6% thyroidal, 9.8% mediastinal and 7.3% muscular-soft tissue.

For the male population (n: 61, 59.8%) the most common extraparenchymal findings were abdominal pathologies (67.2%) followed by bone pathologies (55.7%). The other extrapulmonary findings in males in descending order were in vascular (36.1%), cardiac (34.4%), mediastinal (11.5%), thyroidal (6.6%), breast (4.9%) and muscular-soft tissue (1.6%) categories.

While most of those incidental findings were age related/degenerative changes, in 24 patients, extrapulmonary findings were deemed significant enough to warrant additional consultations/imaging studies. 4 patients with breast findings (tumoral masses) (Figure 1), 9 cardiovascular findings (ascending aorta dilatation, pericardial masses etc.), 3 patients with renal masses (apart from simple cysts), 2 patients with surrenal nodules were among those patients. 14 patients had progression of known lung nodule. Mean age for patients with clinically significant findings was 57±14.9 vs 52.3±13.5 without (p=0.051). 4 patients had both progression of known nodule and clinical significant extrapulmonary finding.

DISCUSSION

Globally increasing rates of pulmonary diseases including lung cancer necessitated new advances in the radiological assessment of the patients who were referred to radiology clinics for CT scan. LDCT is also being used as a lung cancer screening tool for a certain subset of patients, improving the prognosis greatly (4). All those practices increase the prevalence of the LDCT together with the diagnoses of "incidentalomas".

Incidental findings have been classified according to clinical significance by many authors (5-8) but "potentially significant" and "insignificant" terms are open to interpretation and differs among investigators. In this study, we not only included reported incidental findings, the LDCT images were also reevaluated for incidental extrapulmonary findings regardless of reports by a radiologist specialized in thoracic imaging. Thus, some low-risk extrapulmonary findings were not recorded by different radiologists and the possible differences between the reports or uncorrect interpretations were tried to be minimized by this standardization as analysis of incidental findings was the primary aim of this retrospective study.

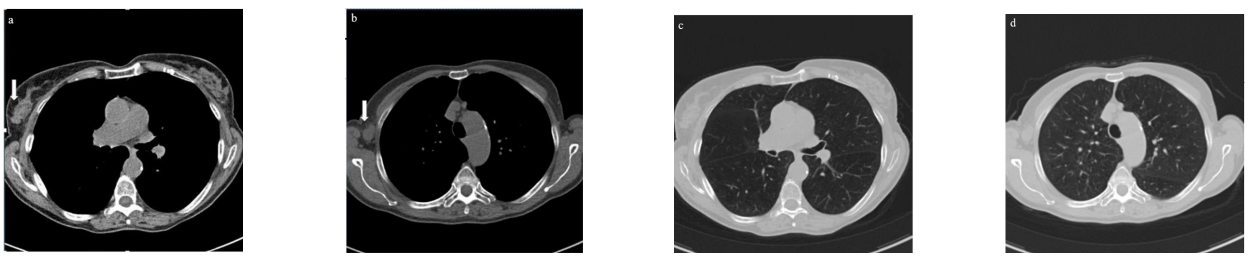

Figure 1a-d: Axial LDCT image in mediastinal window setting showing a lobulated tumoral mass in right breast (a) accompanied by right axillary LAP (b) of a 43 years old female. In the lung window setting of same image the lesion in right breast (c) and right axillary LAP (d) were not so distinguishable. Later the lesion was confirmed as invasive ductal carcinoma histopathologically.

Weng et al reported that the performance of LDCT was comparable to standard-dose CT and LDCT was superior to digital radiography for detection of pulmonary nodule, mediastinal lymphadenopathy (>10 mm in the short axis) and pleural effusion (9). Naidich et al, in their preliminary observations, showed that at all levels of the thorax, visualization of parenchymal structures was not affected by decreasing the milliamperage in LDCT protocol especially in the pediatric population, as well as for screening patients at high risk for developing lung cancer (3, 10). In another study thoracic non-osseous lesions were detected in cancer patients in LDCT images acquired as a part of skeletal SPECT/CT examinations (11). In the literature, it also stated that the image quality of LDCT was satisfactory for both mediastinal and lung windows in the follow-up of lung cancer (12).

Dinkel et al reported that, during follow-up of patients with malignant lymphoma and extrapulmonary primary tumors, the impact of the thorax LDCT on image quality and lesion conspicuity was as high as standard-dose CT (13). In our study only baseline LDCT imaging were performed without additional postprocessing which improves image quality of LDCT.

Since the field of view in CT exams includes several additional organ systems, it is important to evaluate all of those structures for potential abnormalities. In our study abdominal pathologies were by far most common incidental finding seen in 60,8% (n: 62) of patients and among those hepatosteatosis was the most common extraparenchymal finding. While our study did not reveal a definite case of an incidental cancer, Pinsky et al reported 104 cases of renal carcinoma in a cohort of more than 26000 patients who received LDCT for National Lung Screening Trial (enrollment from 2002-2004)(14). They also concluded that incidental abnormal abdominal findings were common (39.1%) in screens with renal cancer versus 4.1% in screens without.

Incidental thyroid carcinoma was also found to be a not-so-rare entity in a different secondary analysis study done on the National Lung Screening Trial (enrollment from 2002-2004), 35 thyroid cancers were found with a 7, 8 fold increased risk in patients with any above-diaphragm abnormality (15).

Thoracic radiology experience in interpretation of LDCT is an important factor affecting diagnostic assessment. In our study, a 10-year experienced radiologist specialized in thoracic imaging retrospectively re-evaluated the images of LDCT rather than a general radiologist as commonly seen in the literature (8).

In the study of Nguyen et al extrapulmonary findings were assigned to five organ systems (cardiovascular, thyroid, adrenal, renal, and hepatobiliary) among prospectively acquired data on 17,309 participants who underwent chest LDCT. In their study, extrapulmonary findings were noted in 58.7% of the study group (16). In our study, among the 102 patients who underwent LDCT incidental extrapulmonary findings were observed in 85,3% of the patients which was a relatively high rate as additional categories were added (skeletal, breast and muscular-soft tissue).

The category "S" in Lung-RADS reporting system defines other findings than those pertaining to lung cancer and can be scored between 0–4. In a retrospective investigation that involved 581 patients who received baseline LDCT for lung cancer screening, 141 incidentalomas were described in reports but were not labelled with the S modifier. Since incidental findings were commonly identified on chest CT for lung cancer screening, the authors concluded that usage of the S modifier within Lung-RADS is inconsistent (17).

Relatively small sample size and retrospective design are the main limitations of this study. In a prospective study with larger study population diversity of encountered extrapulmonary findings would be much higher.

CONCLUSION

Our study highlighted that with LDCT of the thorax incidental extrapulmonary findings could be frequently detected. Radiologists reading LDCT of the thorax should be aware of possible incidental findings that occur outside the lung parenchyma and, therefore, should systematically evaluate all the structures in the scanning area, not only with the lung window settings but also with mediastinal and bone window settings. It is critical that radiologists should provide clear and appropriate recommendations to clinicians on how to manage incidental findings. Thus, this will prevent under-diagnosis, necessary clinical management is provided and unnecessary follow-up and possible medicolegal issues are avoided.

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Evaluation of the Relationship Between Chronic Obstructive Pulmonary Diseases and Pulmonary Artery Diameter on Computed Tomography

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ABSTRACT

Purpose: To study that how the chronic obstructive pulmonary diseases (non-asthma-COPD) affect pulmonary artery diameters.

Methods: The main pulmonary artery diameter (MPAD), right and left main pulmonary artery diameter (RPAD-LPAD), and the ratio of MPAD to ascending aorta diameter (AAD) (MPAD/AAD) in all subjects of the sample were assessed. Cases with non-asthma-COPD were classified as Group 1; those who were not was categorized into Group 2. The link between non-asthma-COPD and diameters of pulmonary artery and also the ratio of MPAD/AAD was evaluated statistically according to the groups.

Results: In the study in which a total of 905 cases were evaluated, 138 in Group 1; 767 in Group 2. The patients' average age was 44.82±16.53 (18-82). It was discovered that there is a statistically significant relationship between MPAD, RPAD and LPAD values and non-asthma-COPD, and it was higher in Group 1 (p=0.049, p=0.011, p=0.022; p<0,05, respectively). The MPAD/AAD value of the cases in Group 1 was discovered to be slightly higher than Group 2 (p=0.006; p<0,01). While the cut-off value for MPAD is ≥23.5 mm, the odds ratio was 1.573 (95% CI: 1.092-2.267); while the cut-off value for MPAD/AAD was ≥0.88, the odds ratio was 1.918 (95% CI: 1.253-2.938). According to ROC analysis, MPAD values were more specific for non-asthma-COPD than MPAD/AAD ratio, but MPAD/AAD ratio was more sensitive.

Conclusion: While there is a relationship between non-asthma-COPD and MPAD, RPAD, LPAD; the ratio of MPAD/AAD is more sensitive for the diagnosis of non-asthma-COPD.

Keywords: pulmonary hypertension, chronic obstructive pulmonary disease, emphysema, bronchiectasis, main pulmonary artery, chest CT

Kronik Obstrüktif Akciğer Hastalıkları ile Pulmoner Arter Çapı Arasındaki İlişkinin Bilgisayarlı Tomografide Değerlendirilmesi

ÖZET

Amaç: Astım dışı kronik obstrüktif akciğer hastalıklarının (astım dışı-KOAH) pulmoner arter çaplarını nasıl etkilediğini araştırmak.

Yöntemler: Çalışmaya dahil edilen tüm olguların ana pulmoner arter çapı (MPAD), sağ ve sol ana pulmoner arter çapı (RPAD-LPAD) ve MPAD'nin çıkan aort çapına oranı (AAD) (MPAD / AAD) değerlendirildi. Astım dışı KOAH'lı vakalar Grup 1 olarak sınıflandırıldı; olmayanlar Grup 2 olarak adlandırıldı. Astım dışı KOAH ile pulmoner arter çapları arasındaki bağlantı ve ayrıca MPAD / AAD oranı gruplara göre istatistiksel olarak değerlendirildi.

Bulgular: Toplam 905 olgunun değerlendirildiği çalışmada Grup 1'de 138; Grup 2'de 767 vardı. Hastaların yaş ortalaması 44,82 ± 16,53 (18-82) idi. MPAD, RPAD ve LPAD değerleri ile astım dışı KOAH değerleri arasında istatistiksel olarak anlamlı bir ilişki olduğu ve Grup 1'de daha yüksek olduğu tespit edildi (p=0,049, p=0,011, p=0,022; p<0,05, sırasıyla). Grup 1'deki vakaların MPAD/AAD değerinin Grup 2'den anlamlı olarak daha yüksek olduğu bulundu (p=0,006; p<0,01). MPAD için limit değeri ≥23.5 mm iken, olasılık oranı 1.573'tü (% 95 CI: 1.092-2.267); MPAD/AAD için limit değeri ≥0.88 iken, olasılık oranı 1.918 idi (% 95 CI: 1.253-2.938). ROC analizine göre, MPAD değerleri astım dışı KOAH için MPAD/AAD oranına göre daha spesifik, ancak MPAD / AAD oranı daha duyarlıydı.

Sonuç: Astım dışı KOAH ile MPAD, RPAD, LPAD arasında bir ilişki olmasına rağmen; MPAD/AAD oranı astım dışı KOAH tanısında daha duyarlıdır.

Anahtar Kelimeler: pulmoner hipertansiyon, kronik obstrüktif akciğer hastalığı, amfizem, bronşektazi, ana pulmoner arter, toraks BT

Chronic obstructive pulmonary disease (COPD) is a chronic lung disease with rapidly increasing deaths worldwide (1). Although its main reason is smoking, some congenital and genetic conditions such as bronchiectasis may also lead to COPD. Although the diagnosis can be made basically by respiratory function tests, it can also be diagnosed by the computed tomography (CT) examinations, which are widely used nowadays, with its parenchymal findings (1,2). It causes irreversible changes in lung histopathology that associated with clinical findings as a result of the inflammatory damage it causes in the chronic period. The most important of these is pulmonary hypertension (pHT) which emerges as a result of the resistance it creates in the pulmonary vascular bed. (1). In this study, pulmonary artery diameters were measured on CT examinations in patients with COPD and their relationship with possible parenchymal findings was evaluated. In this way, in cases with significant parenchymal findings in terms of COPD, pulmonary arterial structures will also be evaluated, clinicians and patients will be shed light on the treatment and the way to follow in terms of pHT, which is the most serious complication of the disease.

MATERIALS AND METHODS

The research was carried out with retrospective measurements on chest CTs taken in our hospital between 2019-2020. Patients with a diagnosis of non-asthma chronic small airway disease (COPD, emphysema, bronchiectasis) and patients with small airway disease findings (mosaic pattern, centrlobuler pattern, bronchiectasis) on chest CT were subjects of the study (Group 1). Patients with normal or almost normal lung parenchyma without obvious signs of infiltration in the lung parenchyma were selected as the control group (Group 2).

The control group consisted of those who had nodules smaller than 1 cm and no other parenchymal findings.

Patients with pleural effusion, consolidation, and infiltration were not included in the study. Patients who received radiotherapy to the chest region and patients with hypertension were also not included in the study. In addition, patients with known asthma, restrictive lung diseases and connective tissue disease were excluded from the study. The local institutional oversight board accepted this retrospective study (2021/07, 07.04.2021), and informed consent forms were obtained prior to CT acquisition.

Imaging Methods: All CT scans were done with Siemens Somatom Sensation-Syngo CT 2009 device. The acquisition parameters were standardized as; tube voltage:140 kV, tube current:40 mA, pitch:1,4, FOV:455 mm, slice thickness:64x0,6 mm. The isolation rules were applied during and after the scanning had complied. All measurements were calculated by an experienced radiologist on chest CT.

*Measurement Methods:*The widest diameter perpendicular to the long axis of the main pulmonary artery diameter (MPAD) was measured with computer calipers at the level of the pulmonary artery (PA) bifurcation (Figure 1a). The diameters of the right and left pulmonar arteries (RPA-LPA) were measured at the widest portion, nearly 2 cm before the branching of the lobar arteries (Figure 1b-1c) (3). The largest transverse diameter of the ascending diameter (AAD) was measured at the level of pulmonary bifurcation at the same level with MPAD measurement (3).

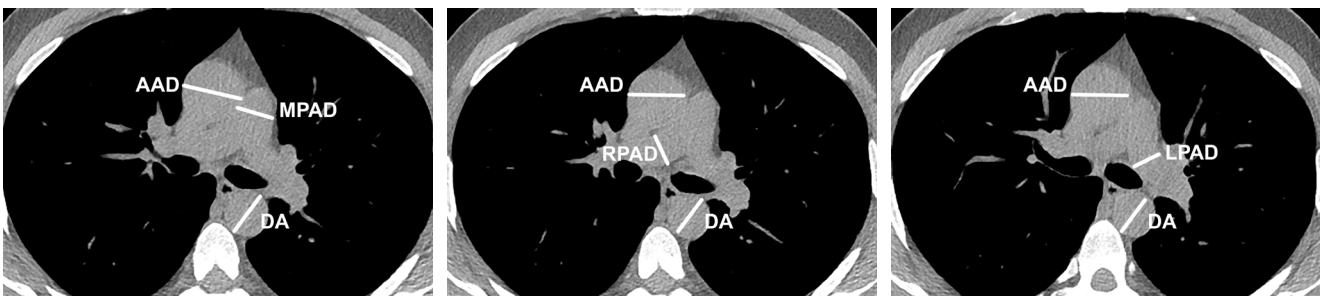

Figure 1: a) MPAD and AAD, b) RPAD, c) LPAD measurement location and method

Statistical Analysis: Statistical analysis was performed using the NCSS (Number Cruncher Statistical System) software. The study data were evaluated using descriptive statistical methods (mean, standard deviation, median, frequency, percentage, minimum, maximum). The Shapiro-Wilk test and graphical analysis were used to determine if quantitative data are suitable for normal distribution. The Student-t test was used to compare normally distributed quantitative variables between two groups, while the Mann-Whitney U test was used to compare non-normally distributed quantitative variables between two groups. The predictive value for the parameters was determined using diagnostic screening tests (sensitivity, precision, positive predictive value (PPV), negative predictive value (NPV), and ROC analysis. The threshold for statistical significance was set at p0.05.

RESULTS

The study involved a total of 905 cases, with 53.1% (n=481) being male and 46.9% (n=424) being female. The average age of the study participants was 44.82±16.53 (18-82) years. 44.6% of the cases (n=404) were under the age of 40, while 55.4% (n=501) were 40 and up. 15% (n:138) of 905 patients had non-asthma COPD with imaging findings or according to the medical history (Group 1). 85% (n:767) of cases had normal/close to normal CT findings and no history of COPD (Group 2).

A significant increase was found in MPAD, RPAD, and LPAD values according to the presence of COPD (p=0.049, p=0.011, p=0.022; p<0.05, respectively) (Table 1). In terms of MPAD/AAD ratios, a significant increase was found in patients with COPD (p=0.006, p<0.05) (Table 1) (Figure 2). Mean MPAD/AAD ratio was 0.83±0.18 in Group 1; and 0.79±0.15 in Group 2.

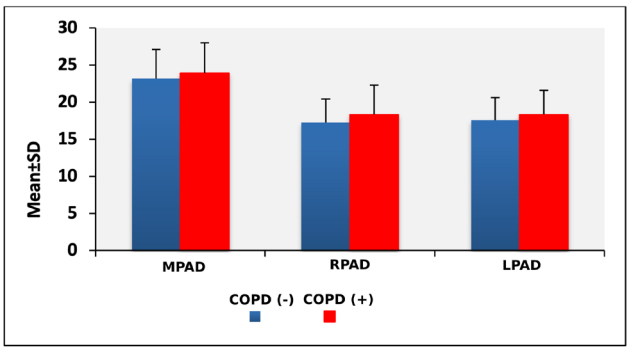

Figure 2: Graphical demonstration of pulmonary artery diameters according to the presence of COPD

According to the presence of COPD, the cut-off point for MPAD was found to be 23.5 mm. For 23.5 mm cut-off value of MPAD; the sensitivity was 57.25%, specificity 54.11%, positive predictive value (PPV) 18.3%, and negative predictive value (NPV) 87.6%. The standard error was 2.6 percent, when the area under the ROC curve was 55.3 percent (Table 2).

A correlation was found between COPD and MPAD for 23.5 mm cut-off value (p=0.015; p<0.05). When the MPAD value ≥ 23.5 mm, COPD was 1.573 times higher in cases. The odds ratio for MPAD was 1.573 (95% CI: 1.092-2.267).

According to the presence of COPD, the cut-off value for MPAD/AAD was ≥0.88. For the 0.88 cut-off value of MPAD/AAD; the sensitivity was 77.54%, specificity 35.72%, PPV 17.80%, and NPV 89.80%. The area under the ROC curve was 57.3% and the standard error was 2.6%.

Table 1: Pulmonary Artery Diameters According to the Presence of COPD

		non-astma COPD	Control	p
		Group 1-(+) (n=138)	Group 2-(-) (n=767)	
MPAD (mm)	Min-Maks (Medyan)	15-40 (24)	14-40 (23)	[a]0.049*
	Mean±SD	23.91±4.07	23.19±3.91	
RPAD (mm)	Min-Maks (Medyan)	12-30 (17)	10-30 (17)	[b]0.011*
	Mean±SD	18.33±3.94	17.24±3.16	
LPAD (mm)	Min-Maks (Medyan)	12-30 (18)	10-37 (17)	[b]0.022*
	Mean±SD	18.31±3.26	17.58±3.01	
MPAD/AAD	Min-Maks (Medyan)	0.43-2.42 (0.81)	0.49-1.36 (0.78)	[b]0.006**
	Mean±SD	0.83±0.18	0.79±0.15	

[a]Student-t Test [b]MannWhitney U Test *p<0.05 **p<0.01
MPAD: main pulmonary artery diameter; RPAD:right pulmonary artery diameter; LPAD: left pulmonary artery diameter;AAD:ascending aorta diameter

Table 2. Diagnostic screening tests and ROC curve results for MPAD according to the presence of COPD								
	Diagnostic Scan					ROC Curve		p
	Cut-off	Sensitivity	Specificity	Positive Predictive Value	Negative Predictive Value	Area	95% Confidence Interval	
MPAD	≥23,5	57,25	54,11	18,30	87,60	0,553	0,503-0,604	0,045*

A correlation was found between COPD and the MPAD/AAD cut-off value of 0.88 (p=0.002; p<0.01). In cases with MPAD/AAD is ≥ 0.88, the probability of having COPD was found to be 1.918 times higher. The odds ratio for MPA/AAD was 1.918 (95% CI: 1.253-2.938) (Figure 3).

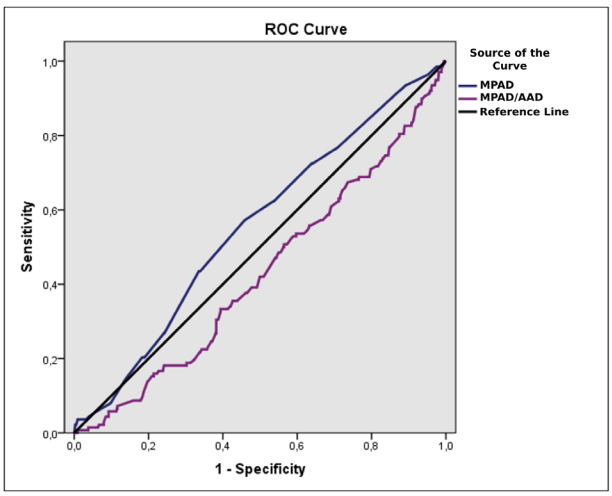

Figure 3: ROC Curve for MPAD only vs MPAD/AAD ratio by COPD presence

DISCUSSION

In our single-center retrospective study with a large patient population that evaluating the relationship between pulmonary artery diameters and MPAD/AAD ratios in patients with a diagnosis of COPD with parenchymal findings detectable by CT, as compared to the control group, all values (MPAD, LPAD, RPAD diameters, and MPAD/AAD ratio) were found to be significantly higher in COPD patients. Although MPAD/AAD is more sensitive in predicting COPD, MPAD values were obtained more specifically.

Pulmonary hypertension, which is an important complication in the course of COPD, is a leading cause of morbidity and mortality (1,4). pHT is a common condition in patients with advanced stage COPD, it is usually moderate and progresses slowly (5). However, it is blamed for the dyspnea experienced by the patients by significantly affecting the quality of life (1). Impaired nitric oxide-prostaglandin balance in COPD as a result of chronic inflammation causes proliferation of pulmonary vascular intimal smooth muscle cells and accumulation of collagen and elastin fibers, thus playing a predisposing role for pHT (1,6). Patients generally present with dyspnea, especially during exercise, as a result of inadequate expansion of vascular structures with impaired elasticity (6). This situation can be confused with dyspnoea caused by COPD. Therefore, in these patients, pulmonary artery pressures should be measured with echocardiography (1).

With the widespread use of CT, the diagnosis of parenchymal and vascular pulmonary diseases has become widespread (7). The diagnostic accuracy of CT in pulmonary diseases has been increased, as in all other areas, with improved image quality, new technological software programs and post-processing reformatted images (8). In our study, the relationship between parenchymal findings and pulmonary arterial vascular structures was mainly evaluated. As in our study, Chen et al. reported that MPAD, RPAD and LPAD in the COPD group had significantly higher values than the control group. (2). Similar values with our study were shown as MPAD ≥27.5 mm, sensitivity 54%, and specificity 80% (2). In the same study, while MPAD/AAD cut-off value was ≥0.8586, sensitivity was 58%, and specificity was 69%. In our study, while MPAD/AAD was ≥0.88, sensitivity was higher with 77.54% and specificity was lower with 35.72%. Similarly, Shin et al. showed that MPAD/AAD ratios for those with pulmonary hypertension and those without were 1.05 and 0.87, respectively. (p=0.0003) (8). The values in the group without pHT development were consistent with our study. The MPAD/AAD ratio was found to be an independent risk factor in the same reportin terms of pHT related mortality (9).

One of the major limitations of our retrospective study is that pulmonary artery pressure cannot be evaluated by echocardiography in patients included in the study. Although the overall number of patients who took part

in the study is significantly higher than similar studies, the number of patients in the control group is much higher than the target group is another limitation of the study. Not to evaluate the clinical findings and the symptoms of the cases with imaging findings is a limitation, too.

This study showed that all pulmonary artery diameters and MPAD/AAD ratio were significantly higher in patients with COPD. It would be possible in this way to guide patients and clinicians in terms of early diagnosis of complications such as pHT before becoming symptomatic due to COPD with direct MPAD measurement or its ratio to AAD.

DECLARATIONS

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Conflicts of Interest

The author declares that there is no conflict of interest

Ethics Approval

The study protocol was approved by localethics committee (Date: 07.04.2021No: 2021/07).The study complied with the Declaration of Helsinki.

Availability of Data and Material

The materials described in the manuscript will be freely available to any scientist wishing to use them for non-commercial purposes, without breaching participant confidentiality.

Authors' Contributions

Concept – D.E.T.Ş.; Design - D.E.T.Ş.; Supervision - D.E.T.Ş.; Resource - D.E.T.Ş.; Materials - D.E.T.Ş.; Data Collection and/or Processing - D.E.T.Ş.; Analysis and/or Interpretation - D.E.T.Ş.; Literature Search - D.E.T.Ş.; Writing - D.E.T.Ş.; Critical Reviews - D.E.T.Ş.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Surgery / Cerrahi

Laparoscopy Assisted Management of Urachal Anomalies In Children; A Relief for The Surgeon and the Patient?

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ABSTRACT

Introduction: Anomalies of the urachus constitute a challenge for the physcian and a source of anxiety for the parents. As the significance of the condition and borders between normal and abnormal are not clear, management is controversial. Although not universal, common indications for surgery are presence of symptoms (infection, pain etc) and fear of malignant transformation.

Materials And Methods: The children who underwent a laparoscopic surgery for a condition related to urachal remnants between 2007 and 2019 are enrolled in the study. Demographics of the patients, intraoperative complications and histological results were retrospectively evaluated and surgical procedure is described.

Results: A total 13 patients were included in the study. Seven patients had urachal cyst (53%),3 had urachal sinus (23%), 1 patent urachus (8%), 1 omphalomesenteric band remnant (8%) and could not be classified in 1 (8%). Three ports were employed in 6 patients, 4 ports in 4 and 1 port in 2 and 2 ports in 1.Peritoneal contamination could not be avoided in 1 patient with infected urachal cyst during the operation, but postoperative course was uneventful in this patient.

Conclusion: Although surgical excision is the most commonly recommended management modality for urachal remnants, both parents and physicians hesitate due to the mysterious nature and insufficient data about the long term consequences of the condition. Choosing the best incision is also an issue and physicians may regret for any of the incisions as they may be 'too extensive' or 'insufficient'. Laparoscopic approach provides satisfactory identification of the condition, superior exposure and cosmesis, and at the worst scenario, a chance to select the most appropriate incision.

Keywords: Urachus, Remnant, Laparoscopy, Child, Surgery

Çocuklarda Urakal Anomalileri Laparoskopik Tedavisi: Hem Cerrah Hem Hasta İçin Kolaylık Sağlayabilir mi?

Giriş: Urakus anomalileri, hekimler için pek çok yönden zorlayıcı, aileler içinde kaygı verici durumlardır. Anomalinin önemi ve normal ile anormal durumlar arasındaki sınırların net olmamasından dolayı tedavi yaklaşımları tartışmalıdır. Evrensel olmasa da, temel cerrahi endikasyonları semptom varlığı (enfeksiyon, ağrı vb) ve malignite gelişme korkusudur.

Gereç ve Yöntemler: Urakal kalıntılar ile ilgili bir durumdan dolayı 2007 ile 2019 yılları arasında laparoskopik cerrahi uygulanmaış hastalar çalışmaya dahil edildi. Hasta demografikleri, cerrahi sırasındaki komplikasyonlar ve histolojik inceleme sonuçları geriye dönük olarak incelendi ve cerrahi yaklaşımımız tariflendi.

Bulgular: Çalışmaya toplam 13 hasta dahil edildi. Yedi hastada urakal kist (%53), 3 hastada urakal sinüs (%23), 1 hastada patent urakus (%8), 1 hastada omfalomezenterik kanal artığı (%8) bulunurken 1 hastanın patolojisi belirsiz (%8) olarak tanımlandı. Altı hastada 3 port, 4 hastada 4 port, 2 hastada tek port ve 1 hastada da 2 port kullanıldı. Enfekte urakal kisti olan bir hastada cerrahi esnasında peritoneal kontaminasyon gelişmekle birlikte, cerrahi sonrası süreç sorunsuz geçti.

Sonuç: Her ne kadar urakal kalıntıların tedavisinde cerrahi eksizyon en sık kullanılan yöntem olsa da, hem hekimler hem de hastalar, bu patolojilerin doğasının belirsiz olması ve uzun dönem sonuçları hakkında yetersiz bilgi olmasından dolayı kararsız kalabilmektedirler. En uygun insizyonun seçimi de önemli bir meseledir ve hekimler tercih ettikleri insizyonun 'gereksiz büyük' yada 'yetersiz' olabilmesinden dolayı pişman olabilmektedirler. Laparoskopik yaklaşım, patolojinin tatminkar şekilde ortaya konmasını, cerrahi alana daha hakim olunabilmesini, ve en kötü senaryoda, en uygun insizyonu seçilmesine olanak sağlamaktadır.

Anahtar sözcükler: Urakus, Kalıntı, Laparoskopi, Çocuk, Cerrahi

Urachal remnant anomalies are rare and heterogenous conditions in children and their clinical significance is a major source of confusion. As a result, rationals of management and indications for surgery are controversial. Common indications for surgery are persistent discharge, infection, urachal diverticulum and potential for malignant transformation. Moreover,as the margins of the anomaly are not clear on imaging studies in a significant proportion of patients, the extent of the exploration and excision is decided during surgery. Although theoretical classification of urachal anomalies is quite clear, it is pretty hard to fit a condition into these classes in daily practice as radiological and clinical findings are usually inconclusive. In this retrospective study, our aim is to evaluate our results of the laparoscopic management of urachal anomalies and describe our laparoscopic approach.

MATERIALS AND METHODS

The patients who underwent a laparoscopic or laparoscopy-asisted surgery for an urachal condition between 2007 and 2019 are enrolled in the study. The patients who were operated by pure open surgery were excluded. The admitting symptoms, histological results, age at surgery and complications were retrospectively evaluated. Main principles and extraordinary surgical details are described.

Institutional ethical board approval board was obtained for the study (Ondokuz Mayıs University Ethical Board For Clinical Studies Approval No:2020/502)

RESULTS

A total of 13 patients were eligible for evaluation. Six (46%) were boys and 7 (%54) were girls. The admitting symptoms were abdominal pain (n=6), umbilical discharge (n=3), vomiting (incarcerated umbilical hernia) (n=1), umbilical polip (n=1) while 2 patients were diagnosed incidentally (1 during laparoscopy for acute abdomen and the other during follow up of Wilson's disease). Three ports were employed in 6 patients, 4 ports in 4 and 1 port in 2 and 2 ports in 1. Seven patients had urachal cyst (53%) (3 infected), 3 had urachal sinus (23%), 1 had patent urachus (8%) and 1 had omphalomesenteric band remnant (8%). The condition could not be classified satisfactorily as radiological, surgical and histological findings were not coherent in 1 patient (8%). Median age of the patients were 7.7 years (range; 0.3-15.3 years). Six of the patients had infection and 3 received at least 1 cycle of antibiotics before the surgery. Periton was contaminated by the infected content in 1 patient but postoperative process was uneventful in this patient. Peritoneal contamination could be avoided during surgery in 2 patients with an infected condition (Figure 1). In 1 patient, the urachal abscess was drained by a periumbilical incison under laparoscopic guidance to confirm the diagnosis and to assure the avoidance of peritoneal contamination. Histological examinations revealed urothelial epithelium in 7 patients, nonspecific fibromuscular tissue in 4, chronic inflammation in 1 and mucinous glands in 1. No malignancy was observed in any of the patients. Median follow up duration was 1 month (range; 1-39 months).

Surgical Technique

Insertion of the first port is an important step of the procedure. We prefer a 'crying face' incision located at the superior border of the umbilicus for the first port with an open technique when area of interest is away from umbilicus (urachal cyst, urachal diverticulum etc.). If area of interest is close to umbilicus (urachal sinus, patent urachus etc.), first port is introduced from the Palmer's point (on the left upper quadrant) by an open technique in order to obtain a wide angle vision. One can also use this site for the second port after insertion of the umbilical port if umbilical port is deemed inappropriate for the vision of the area of interest. The other working ports can be inserted parallel to the midline at the left of abdomen pointing the course of the urachus (Figure 2). When the margins of the anomaly is satisfactorily clear, limited resection is performed , but wide resection with inclusion of the medial ligaments and umbilicus is preferred if the margins are considered as 'not clear'. In 1 infant presented with umbilical polyp and patent urachus, 1 port was inserted through the Palmer's point and, the umbilical polyp and the patent urachus could be removed through a mini-periumbilical incision with the help of distending the bladder. In another patient who was presented as an incarcerated umbilical hernia, purulent discharge was encountered after umbilical incision was performed and the definitive diagnosis became evident as 'infected urachal cyst' (Figure 1). A single port for the camera was inserted from the left of abdomen and peritoneal violation and contamination were excluded by laparoscopic vision. The abscess was drained through the umbilical incision and managed with antibiotics. During the 13 months of follow up, no other intervention was deemed necessary as radiological and clinical findings suggest remission. In a third infant presented with a vague umbilical discharge, laparoscopic exploration was performed as ultrasonographic evaluation suggested a patent urachus containing air within. After insertion of the camera through the Palmer's point, no patent urachus was identified but a patent omphalomesenteric band was

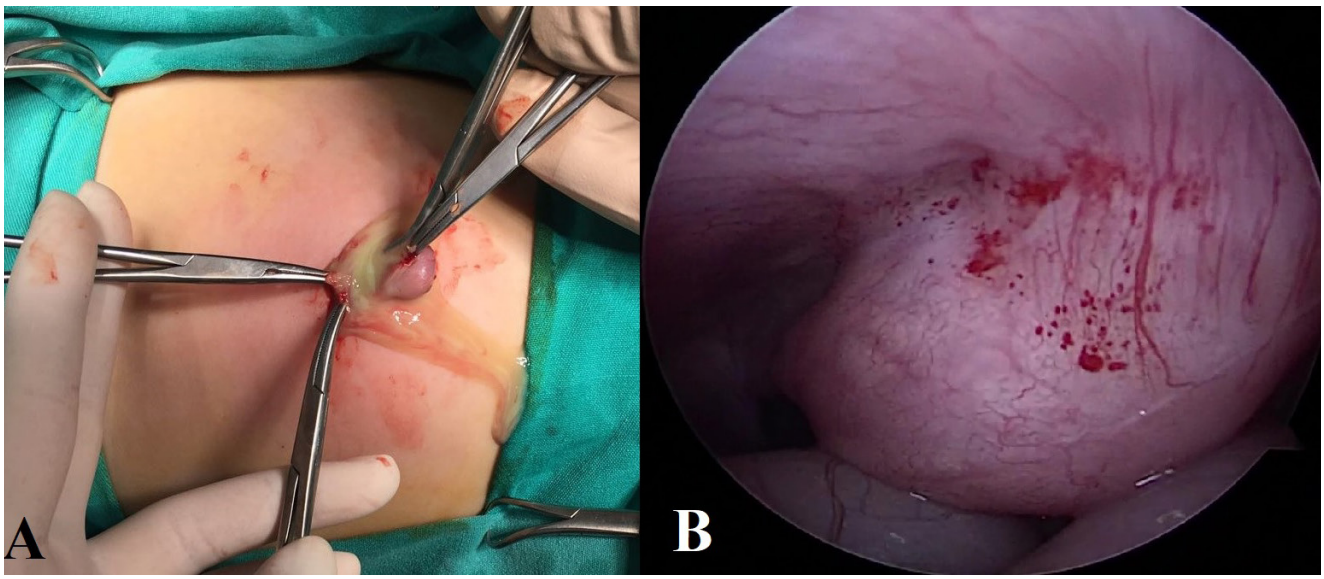

Figure 1: Discharge through the umbilicus in a patient who was referred as incarcerated umbilical herni depending on the ultrasonographic images (A). A 5 mm camera port was introduced through the Palmer's point and lack of peritoneal violation or contamination was confirmed by direct vision (B).

found between the umbilicus and intestinal mesentery (Figure 3). With the help of a grasper, the band is excised through the second periumbilical port and the patient was free of symptoms 6 months after the operation in the last follow up examination.

Figure 2: Port sites are demonstrated in a patient who was managed by 4 ports (3 left and 1 umbilical).

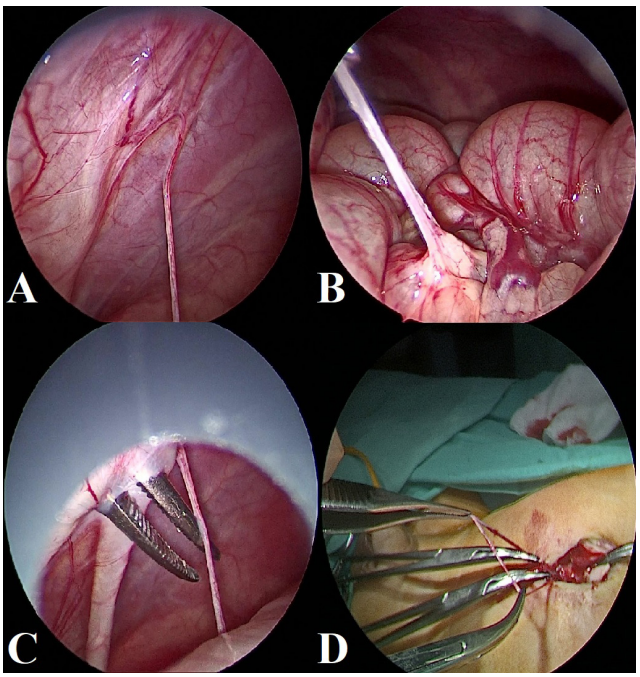

Figure 3: An interesting case of an infant admitted with vague symptoms of umbilical discharge and found to have an omphalomesenteric band between umbilicus and intestinal mesentery. Umbilical end of the band (A). Mesenteric end of the band (B). A mosquito forceps is introduced through a smiling incision (C) and the band is taken out through the incision and excised (D).

DISCUSSION

Although still low, the incidence of the urachal conditions is increasing secondary to increased availability of advanced imaging modalities (1). This resulted in increased rate of asymptomatic cases and further questioned the surgical indications of urachal anomalies which are already controversial in children (2, 3). Although presence of symptoms is quite a universal indication, relating a symptom with the radiological finding is not always satisfactory. Infection is the most commonly accepted indication for surgery but some still argue in favor of medical management (4). Malignancy is a common concern but it is rarely reported in children and data about the transformation to urachal carcinoma later in life is insufficient.

When a hard decision process that ends with surgical exploration is concluded, the next concern emerges as how to do the exploration. Suprapubic transvers , midline or a periumbilical incisions can be preferred depending on the surgeons experience (5, 6). Although suprapubic or periumbilical incisions are cosmetically more acceptable, they may not allow satisfactory evaluation and exploration of the area of interest (area among the umbilicus, bladder dome and median umbilical ligament). On the other hand, a midline incision that provides generous exposure might be "too much" and "not cosmetic" for a benign condition. Although robotic surgery is also described for the correction of urachal anomalies, cost and availability of the robot is a major problem and may be challenging in young children (7).

Identification of the surgical margins may be challenging in a significant number of patients before and during surgery (5). Additionaly, previous infection episodes may result in omental or intestinal adhesions that cause trouble in identifying the tissue margins during surgery. All these concerns may confuse the clinician during the management of urachal anomalies and may sometimes effect the management modality; is the juice worth the squeeze?

The surgery is quite straightforward in urachal cyst and urachal diverticulum but is challenging and may be confusing in patent urachus, umbilical sinus or complicated cases. In acute conditions like infection or abscess, the diagnosis and management is more challenging (8). Complete excision of the urachal tract is recommended whenever possible (9). Umbilectomy may also be recommended in adults or if umbilical involvement can not be ruled out (10). However, the condition is poorly documented in a significant rate of patients due to complications or heterogenous/obscure nature of the anomaly. In this context, laparoscopic approach offers a superior exposure and vision with excellent cosmetic results (11). Especially in complicated cases with abscess or in challenging cases without a definitive diagnosis before surgery, laparoscopy offers detailed documentation of the condition, extent of the disease and involved adjacent structures. After definitive diagnosis is established with the help of the scope, appropriate interventions can be performed in single or multiple sessions.

In one of our patients who presented with fever and vomiting mimicking incarcerated umbilical hernia, definitive diagnosis was established during the operation and the patient was safely managed with good cosmetic results, thanks to the help of the laparoscope. In such cases without a definitive diagnosis, laparoscopy should be encouraged to confirm and treat the condition as mortality has been reported due to a possible delay in diagnosis (12). In the other infant presented with umbilical discharge and had a preoperative diagnosis of patent urachus,no urachal remnant was found but an omphalomesenteric band located between intestinal mesentery and umbilicus which was managed with excellent cosmetic results that has the potential to cause serious complications (intestinal obstruction or volvulus..) later in life if it would gone unnoticed during surgery(Figure 3) (13).

Low risk minor surgeries with cosmetically good results are usually accepted more easily both by patients and physicians. When the potential risks and extent of the surgery increase, both patients and physicians refrain from surgery and indication of the surgery is scrutinised more extensively. Unfortunately, indication of surgery is widely variable in children for urachal anomalies and evidence for malignant transformation is lacking as it's significantly hard to demonstrate the relation between an urachal remnant identified in childhood and an urachal malignancy (which is most commonly seen after the 5th decade) (14, 15). Due to this unclarity, parents and physicians hesitate to proceed with surgery but remain anxious and dissatified. In this context, minimal invasive surgery (laparoscopic or robotic) may provide a more accurate diagnosis, a smoother perioperative course, better cosmetic results, and relief and satisfaction for all the involved parties (16).

CONCLUSION

Despite the growing bulk of literature about the urachal remnants, significant controversary persist about the definition, classification and management due to low

incidence of the condition. Laparoscopic or laparoscopy-asisted management may provide relief and satisfaction both for the patient and the physician.

DECLARATIONS

Conflict of interest statement

The authors declare no conflict of interest related.

Ethical Approval

Ethical board approval was obtained from Ondokuz Mayıs University Ethical Committe For Human Subjects (Approval number: 2020/502).

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Dentistry / Diş Hekimliği

Morphometric Assessment of the Sella Turcica in Different Morphological Types of Class II Malocclusion: A Retrospective Study

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ABSTRACT

Objectives: The sella turcica is a substantial anatomic reference structure used to assess craniofacial growth and treatment changes in orthodontics. The aim of this retrospective study was to analyze the size and morphology of the sella turcica in different subdivisions of Class II malocclusion and to compare these factors to those exhibited in Class I craniofacial development.

Materials and Methods: The study was conducted with 150 patients' pre-treatment lateral cephalometric radiographs. Good quality lateral cephalometric radiographs with a prominent appearance of the sella turcica were grouped into Class II division 1, Class II division 2, and Class I (control group). On lateral cephalograms, the length, diameter, and depth of the sella turcica were gauged and morphological types of the sella turcica were detected. For statistical analysis, one-way ANOVA, Kruskal–Wallis analysis with a Dunn-Bonferroni test, and a chi-square test were used ($p < 0.05$).

Results: A significant difference was found in the length of the sella turcica in the Class II division 2 group ($p < 0.05$) compared to the other groups. The differences in depth and diameter of the sella turcica among all 3 groups were non-significant ($p > 0.05$). The shape of the sella turcica was normal in most of the subjects (60.6%). Conclusion: No significant differences were found among the skeletal Class II division 1, Class II division 2, and Class I groups in terms of diameter and depth of the sella turcica. A smaller length of sella turcica was found in patients with Class II division 2 anomalies.

Keywords: sella turcica, morphology, size, skeletal type

Sınıf II Maloklüzyonun Farklı Morfolojik Tiplerinde Sella Turcica'nın Morfometrik Değerlendirilmesi: Retrospektif Bir Çalışma

ÖZET

Amaç: Sella turcica, ortodontide kraniyofasiyal büyüme ve tedavi değişikliklerini değerlendirmek için kullanılan önemli bir anatomik referans yapıdır. Bu retrospektif çalışmanın amacı, Sınıf II maloklüzyonun farklı alt bölümlerindeki sella turcica'nın boyutunu ve morfolojisini analiz etmek ve bu faktörleri Sınıf I kraniyofasiyal gelişim özellikleri ile karşılaştırmaktır.

Gereç ve Yöntem: Çalışma 150 hastanın tedavi öncesi lateral sefalometrik radyografileri ile gerçekleştirilmiştir. Sella turcica'nın belirgin görünümüne sahip iyi kalitede lateral sefalometrik radyografiler Sınıf II bölüm 1, Sınıf II bölüm 2 ve Sınıf I (kontrol grubu) olarak gruplandırılmıştır. Lateral sefalogramlarda sella turcica'nın uzunluğu, çapı ve derinliği ölçülmüş ve sella turcica'nın morfolojik tipleri belirlenmiştir. İstatistiksel analiz için, tek yönlü ANOVA, Dunn-Bonferroni testi ile Kruskal-Wallis analizi ve ki-kare testi kullanılmıştır ($p < 0.05$).

Bulgular: Diğer gruplara göre Class II divizyon 2 grubunda sella turcica uzunluğunda anlamlı bir fark bulunmuştur ($p < 0.05$). Her 3 grup arasında sella turcica'nın derinlik ve çap farklılıkları önemsizdi ($p > 0.05$). Sella turcica'nın şekli olguların çoğunda normaldi (%60.6).

Sonuç: İskeletsel Sınıf II bölüm 1, Sınıf II bölüm 2 ve Sınıf I gruplar arasında sella turcica çapı ve derinliği açısından anlamlı fark bulunmadı. Sınıf II divizyon 2 anomalisi olan hastalarda daha küçük bir sella turcica uzunluğu bulundu.

Anahtar kelimeler: sella turcica, morfoloji, boyut, iskelet tipi

Lateral cephalograms are generally used in orthodontics to diagnose, plan treatment, predict treatment outcomes, and assess skeletal maturation (1). In the analysis of lateral cephalometric radiographs, several landmarks are used as reference points for the diagnosis of facial skeletal type and evaluation of orthodontic treatments (1, 2). The sella turcica, which means "Turkish saddle" in Latin, is located on the sphenoid bone in the region of the pituitary gland. The sella point in the center of the sella turcica is a crucial reference point in evaluating cranial morphology and intermaxillary relationships (3).

The sella turcica is a saddle-shaped, concave structure that is positioned over the corpus ossis sphenoidale, surrounded by the anterior and posterior vertical walls of the bone (4, 5). It consists of 3 parts: the tuberculum sellae in the front, the dorsum sellae in the posterior, and the fossa hypophysialis in the middle; the pituitary gland, also called the glandula pituitaria, is located in the middle part (5). Abnormal sella size or shape may be detected using cephalometric radiographs of patients with dental anomalies and syndromes (6–9).

The size and shape of the sella turcica have been evaluated by many investigators, and many morphological variations in the sella turcica have been reported (10–14). One of the first studies in this field was carried out by Gordon and Bell (15), who divided sella turcica shapes into 3 groups in general: circular, oval and flattened, or saucer shaped. Later, Davidoff and Epstein (16) used the term "J-shaped sella," whereas Fournier and Denizet (17) used the term "omega sella." However, Axelsson et al. (18) classified the sella turcica morphology into 6 different categories: normal, oblique anterior wall, double contour of the floor, sella turcica bridging, irregularity in the posterior part of the dorsum sellae, and pyramid-shaped dorsum sellae.

The relationships between skeletal facial types and the sella turcica have also been stated by many researchers (10, 19–21). Alkofide (10) compared sella sizes in patients with different skeletal malocclusions and found smaller diameter sizes in skeletal Class II patients; however, larger sizes were found in Class III patients. Karatas et al. (20) identified a significant difference in the sella diameters of skeletal Class I and Class II patients. In the literature, studies analyzing the relationship between skeletal malocclusions and sella turcica morphology have examined Class II malocclusion under a single roof (10, 11). However, there are 2 morphologically quite different subtypes of Class II malocclusion (21). Basdra et al. (21) indicated that Class II division 2 anomalies are closely related to congenital dental anomalies. It has also been observed that the size and shape of the sella turcica differ in congenital anomalies, such as tooth deficiency, impacted teeth, transposition in teeth, or cleft lip and palate (6–8).

Therefore, the aim of this retrospective study was to analyze the size and morphology of the sella turcica in different subdivisions of Class II malocclusion and to compare it to normal Class I craniofacial development using lateral cephalometric radiographs. The null hypothesis was as follows: There are no differences between different skeletal patterns in terms of the size and morphology of the sella turcica.

MATERIALS AND METHODS

This retrospective study was confirmed by the Ethics Committee of İzmir Katip Çelebi University (No: 842). A power analysis was performed using the G*Power statistical software (Cunningham & McCrum-Gardner, 2007). The optimal sample size of the study was calculated as 51 based on an alpha score of 0.05 and a power of 80%. The effect size was calculated as 0.89 based on the study by Sheresta et al. (22), who reported that the length of sella turcica was 7.32±1.62 in the Class II group and 9.16±2.42 in the Class III group. To increase the power of the study, a total of 150 cephalograms were included.

Subjects

The study was performed with 150 pre-treatment lateral cephalograms of patients acquired from the archives of the Department of Orthodontics' Faculty of Dentistry at İzmir Katip Çelebi and Adıyaman University. Good quality cephalometric radiographs featuring a prominent appearance of the sella turcica were grouped into Class II division 1, Class II division 2, and Class I (control group), with 50 persons in each group. The Class II division 1 group included 20 females and 30 males with a mean age of 14.85±1.61 years. The Class II division 2 group included 21 females and 29 males with a mean age of 15.30±1.77 years. The Class I group included 22 females and 28 males with a mean age of 15.32±1.76 years. The demographics of the groups are shown in Tables 1 and 2.

The inclusion criteria for Class I cases were as follows: angle between A point, nasion, and B point (ANB) between 0 and 4 degrees and Angle class I dental relationship. For class II division 1 cases; ANB angle more than 4 degrees, U1/SN (angle between axis of the upper central incisor and plane joining S and N points) more than 98 degrees,

overjet more than 3.5 mm and Angle class II dental relationship. Criteria for class II division 2 cases were; ANB angle more than 4 degrees, U1/SN angle less than 98 degrees, overjet less than 3,5 mm and overbite more than 4 mm. Subjects with congenital tooth anomalies (impaction, missing teeth, supernumerer teeth, transposition cases), or congenital syndromes as a cleft lip/palate, a high angle growth pattern (SN/GoGn>38) and systemic diseases were excluded (21).

Cephalometric evaluation

Dimensions and morphology of sella turcica were evaluated from cephalometric radiographs by the same author (MAY) using Adobe Photoshop CC 2020. To measure of the linear dimension of sella turcica, Silverman (23) and Kisling (24) methods were used. Accordingly; length of sella turcica (distance between the tuberculum sella and the tip of the dorsum sella), anteroposterior diameter of sella turcica (distance from the tuberculum sella to the furthest point on the posterior wall of the fossa) and the depth of the sella turcica (perpendicular to the deepest point of the ground from the line above) were measured (Figure 1).

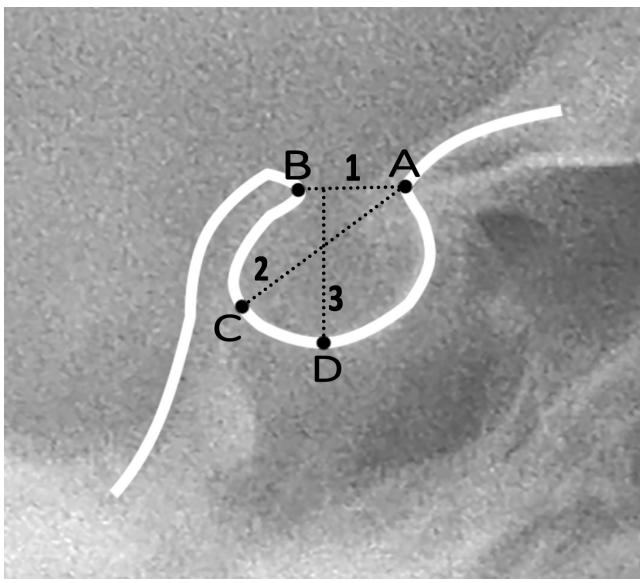

Figure 1. Reference lines used in the measurement of sella turcica size: A, tuberculum sella; B, dorsum sella; C, the furthest point to dorsum sella; D, base of the pituitary fossa. 1, length of sella; 2, sella turcica diameter 3, sella turcica depth

The morphological variations of Sella turcica was detected with respect to classification of Axelsson et al. : (18) normal sella turcica, irregularity in the posterior part of the sella turcica, oblique anterior wall, sella turcica bridge, double contour of the floor and pyramid shaped dorsum sella (Figure 2).

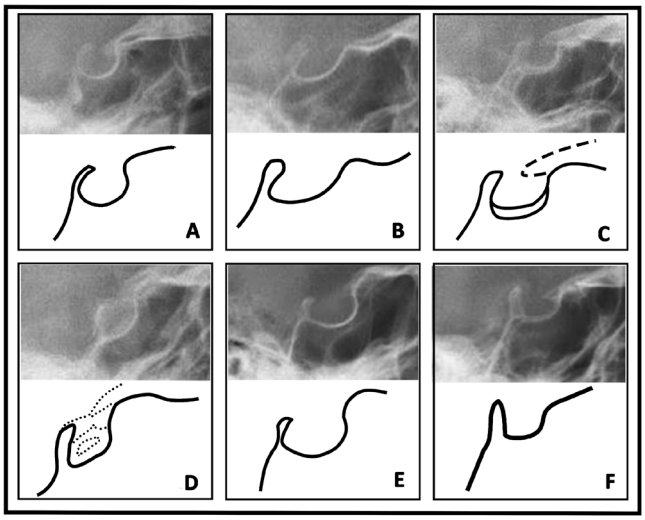

Figure 2. The different shapes of sella turcica: (a) normal sella turcica, (b) oblique anterior wall, (c) double contour of the floor, (d) sella turcica bridge, (e) irregularity in the posterior part of the sella turcica, (f) pyramidal shape of the dorsum sella.

2 weeks after the initial measurements were performed, 10 randomly selected cephalograms in each group were re-evaluated by the same researcher (GG). The Dahlberg (25) formula was employed for the assess of method error. The intra-class correlation coefficient (ICC) was used to quantify intra-examiner reliability.

Statistical analysis and error of the method

The data obtained from the study were analyzed with the IBM SPSS V23 (Armonk, N.Y., USA) software program. Shapiro Wilk normality test and Q-Q graphs were used for the normally distributed variables. Homogenity of variances was evaluated by Levene test. Comparisons of numerical variables by gender were made using Student's t test for variables with normal distribution, and Mann-Whitney U test for variables that did not demonstrate normal distribution. Comparisons of numerical variables by groups were evaluated using one-way analysis of variance for variables with normal distribution, and Kruskal-Wallis analysis for variables that did not show normal distribution. Multiple comparisons were made by Dunn-Bonferroni test in case of difference in Kruskal-Wallis analysis. The relationship among numerical variables was appraised with Spearman correlation analysis. In order to compare the groups with categorical variables, chi-square test was used and $p < 0.05$ was accepted statistically significant.

RESULTS

Intra-observer reliability values were 0.983, 0.989, and 0.999 for length, diameter, depth of the sella turcica, in order of and high level of intra-examiner reliability was detected for each parameter.

In the study, all groups were similar with about gender and age ($p > 0.05$) (Table 1,2). The descriptive statistics for different sella turcica parameters (length, diameter and depth) are presented for skeletal Class II div 1, Class II div 2 and Class I groups separately, in Table 2. No significant differences were found in the depth and diameter values among three groups ($p > 0.05$). However, a significant difference was found in the length of the sella turcica in Class II div 2 group ($p < 0.05$) as per to the other groups. The length of sella turcica was significantly smaller in Class II div 2 subjects (Table 3).

Table 1. Distribution of subjects according to gender

			Gender		Test Stat.	p
			Female	Male		
Groups	Class II div 1	n	20	30	0.164	0.921$^{\Psi}$
		%	40.0	60.0		
	Class II div 2	n	21	29		
		%	42.0	58.0		
	Class 1	n	22	28		
			44.0	56.0		

$^{\Psi}$Pearson Chi Square test. *$p < 0.05$

Table 2. Distribution of subjects according to age

Groups	n	Age (x̄±sd)	Test Statistic	p
Class II div 1	50	14.85±1.61	1.704	0.427$^{\Psi}$
Class II div 2	50	15.30±1.77		
Class I	50	15.32±1.76		

$^{\Psi}$Kruskal Wallis Test. *$p < 0.05$

Table 3. The mean and standard deviation (SD) values of linear measurements of sella turcica by skeletal classifications

	Groups	n	(x̄±sd)	Test Stat.	p
Lenght of sella	Class 1	50	7,74±1,66a	12,120	0.002 ψ
	Class 2 div 1	50	8,19±1,18a		
	Class 2 div 2	50	6,94±1,15b		
Diameter of sella	Class 1	50	7,58±2,46	10,530	0.495 Δ
	Class 2 div 1	50	8,18±1,49		
	Class 2 div 2	50	6,91±1,54		
Depth of sella	Class 1	50	6,56±1,89	10,530	0.731 Δ
	Class 2 div 1	50	7,91±1,34		
	Class 2 div 2	50	7,09±1,06		

$^{\Delta}$ One-way ANOVA; $^{\Psi}$ Kruskal Wallis Test;
a, b,: represent a statistically significant difference; *$p < 0.05$

The appearance of the sella turcica was normal shaped in most of the subjects (60.6%) whereas followed by double contour of floor (18%), oblique anterior wall (8.6%), irregular dorsum (5.3%), pyramidal shape (4.6%). The least seen sella turcica shape was sella turcica bridge (Table 4). There was no significant difference in the morphological appearance of the sella turcica among all different skeletal classes ($p > 0.05$, Table 4).

The relationship of the size of sella turcica among genders and age was also analyzed. Accordingly, there were no statistically significant differences between gender and the mean values of length, diameter and depth of the sella turcica ($p > 0.05$). On the other hand, when the effect of age on the sella turcicas dimensions was investigated, no significant effect was found ($p > 0.05$).

DISCUSSION

In the current study, lateral cephalometric radiographs were used to analyze the size and morphology of sella turcica with different subgroups of Class II malocclusion and to compare it with normal Class I craniofacial development. In addition, the effects of gender and age on sella turcica dimensions were evaluated. Based on the results of the study, the null hypothesis was rejected since differences were found in the sella turcica length in Class II div 2 group.

Table 4. The distribution of shape of sella turcica according to skeletal classification

			Type of sella						Test Stat.	p
			Normal	Oblique Anterior Wall	Doubling of floor	Bridging	Irregularity	Pyramidal		
Groups	Class II div 1	n	34	6	7	1	1	1	11.57	0.315 ψ
		%	68.0	12.0	14.0	2.0	2.0	2.0		
	Class II div 2	n	26	3	10	1	6	4		
		%	52.0	6.0	20.0	2.0	12.0	8.0		
	Class I	n	31	4	10	2	1	2		
			62.0	8.0	20.0	4.0	2.0	4.0		

ψPearson Chi Square test; *p< 0.05

Although the morphology and dimensions of the sella turcica in different skeletal patterns have been examined in the literature, to the author's knowledge, there is no study comparing Class II malocclusion into 2 subgroups as Class II div 1 and Class II div 2. Studies examining the craniofacial characteristics of patients with Class II division 2 malocclusion reported the great variability in forms of Class II malocclusion (21,26). Therefore, it was concluded that examining the patients with skeletal Class II pattern in 2 subgroups while evaluating the sella turcica shape and dimensions would provide more detailed and accurate information.

The estimation of the sella turcica dimensions and its morphological types are significant since changes in the size and shape of sella turcica may be a sign of both pathology in the pituitary gland and various cranio- facial syndromes. Meyer-Marcotty et al. (27) reported an unusual sella turcica morphology like sella turcica bridge in Axenfeld–Rieger, Gorlin-Goltz and Rieger syndromes. Assessments of the size and shape of the sella turcica are important, not only in evaluation of syndromes or pathology in the pituitary gland, but also in terms of craniofacial morphology, growth changes and orthodontic treatment outcomes (18). The association of changes in the dimensions and morphology of the sella turcica with skeletal anomalies has been the focus of our study and it is aimed to use this relationship as a predictor of facial growth models (28).

In many studies, the changes in sella turcica morphology during the growth period were examined and it was reported that sella turcica morphology did not show a significant change after the age of 12 (29,30). Thus, patients aged over 12 years were included in our study.

The morphologic alterations in the sella turcica have been investigated by many authors (10-12). Axelsson et al. (18) concluded that the normal shaped of sella turcica was observed in 14.90% of Class I patients and 13.30% of Class II patients. Alkofide (10) reported that about 67% of Saudi subjects had a normal-shaped sella turcica regardless of skeletal type. Additionally, Shah et al. (31) found normal sella turcica in 65% of Class I subjects and 61.7% of Class II subjects. Sathyanarayana et al. (9) observed normal shaped sella turcica in 75% of Class I patients and 60% of Class II patients. Motwani et al. (2) observed normal shaped sella turcica in 40.59% of Class II subjects. Whereas, Valizadeh et al. (11) reported normal shaped sella turcica only in 16.1% of Class II Pakistani subjects. In our study, normal sella turcica was found in 68% of Class II div 1 patients, 52% of Class II div 2 patients and 62% of Class I patients, which is higher than previously reported. It is thought that the differences in the results obtained in the studies on sella turcica morphology are due to ethnic variability.

The first of the abnormal sella shapes described by Axelsson et al. (18) was the oblique anterior wall. Motwani et al. (2) observed oblique anterior wall in %6.06 of Class I and %4.95 of Class II subjects. Similar results were obtained by Shah et al. (31) They found oblique anterior wall in 3.3% of Class I and 1.7% of Class II patients. In addition, Satyanarayan et al. (9) reported oblique anterior wall in 3% of Class I and 5% of Class II patients. In our study, an oblique anterior wall was seen in 8.6% of the subjects, which was higher than previously obtained.

The double contour incidence was found 14%, %20 and 20%, respectively Class II div 1, Class II div 2 and Class I patients in the current study. In contrast to our study, Shah et al. (31) reported a double contour in 5% of both Class I and Class II patients. Kucia et al. (12) reported double contour incidence rate of 66.6% in class I patients and 11.1% in class II patients.

The rate of sella turcica bridge in normal individuals was reported as 5.5-22% and this rate could be increased in patients with craniofacial disorders (24,32,33). Leonardi et al. (6) reported that the possibility of development dental anomalies was higher in individuals with sella turcica bridge. Shrestha et al. (22) reported that the incidence of the sella turcica bridge was higher in Class II (12.5%) than Class I (5%). Similarly, Obayis et al. (34) observed increased the incidence of the sella turcica bridge in skeletal Class II patients. In contrast, Karatas et al. (20) observed the incidence of sella turcica bridge similar in all 3 skeletal patterns and reported that this value was on average 1.3%. In the current study, we found sella turcica bridge in 4% of Class I cases and 2% of Class II div 1 and div 2 cases. In addition, there were no significant differences between sella morphology and skeletal type. The reason for the low incidence of the sella bridge in our study may be the exclusion of congenital dental anomalies claimed to be related to sella morphology.

We found no significant differences among males and females in terms of the sella turcica dimensions and the shape which was also corroborated by Alkofide (10), Shrestha et al. (22) and Kucia et al (12). However, Axelsson et al. (18) and Sathyanarayana et al. (9) reported that sella turcica depth and anteroposterior diameter were similar between males and females, but sella length was larger in males.

In the current study, no relationship was found among age and the variables of length of sella, diameter of sella, and depth of sella. The current study is in agreement with the study of Silveira et al (35). In contrast, Alkofide (10) and Sathyanarayana et al. (9) concluded that dimension of the sella turcica increase with age. Similarly, Tejavathi Nagara et al. (36), Valizadeh et al. (11) and Turamanlar et al. (37) reported statistically significant differences in terms of chronological age for all three linear dimensions of the sella turcica.

In another cephalometric studies performed by Preston (38) and Shrestha et al. (22), no difference was found among Skeletal Class I and Class II patients in terms of the sella size. Similarly, Tepedino et al. (39) reported no differences in sella length or depth among patients with Class I, Class II, and Class III skeletal patterns. The present study showed that, antero-posterior diameter and depth of the sella turcica did not differ by subgroups of Class II and Class I relationships. While, length of the sella turcica was found significantly lower in Class II div 2 group as per to other groups. This result is predictable, considering that Class II div 2 malocclusion shows more frequent dental anomalies with many other morphological differences (21). Class II div 2 anomaly is similar to Class II div 1 anomaly in terms of mandibular retrognathy, but it exhibits quite different morphological features such as retroclination of the upper incisors, jaw tip prominence, prominent labiomental sulcus, strong masseter muscle (24). The dimensionally significant difference in the morphology of Sella Turcica can be explained by the fact that Class II div 2 anomalies may exhibit different properties not only in viscerocranium but also in cerebrocranium.

Linear difference obtained in sella turcica length in class II div 2 group can be informative for assessment of skeletal pattern on lateral cephalometric radiographs. Thus, it is important for orthodontists to be familiar with the different shapes and sizes of sella turcica.

The results of this study may be highly informative in evaluating the skeletal pattern of adolescent by measuring the diameter of the Sella.

Limitations

Performing the study on 3-dimensional images with a larger sample may increase the accuracy of the results. These are the limitations of our study.

CONCLUSION

1. There was no significant difference between skeletal Class II division 1, Class II division 2 and Class I groups in terms of diameter and depth of the sella turcica.

2. A smaller length value of sella turcica was detected in the Class II division 2 group.

3. There was no significant difference in the dimensions of the sella turcica among genders and age.

DECLARATIONS

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Compliance with ethical standards

Conflict of interest

The authors declare that they have no competing interests.

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Ethical approval

The research ethics committee of Faculty of Dentistry, İzmir Katip Çelebi University, had approved the study (Reference number: 842).

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Geriatrics and Gerontology / Geriatri ve Gerontoloji

Association of Frailty with Serum Vitamin D and Parathyroid Hormone Levels

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ABSTRACT

Objective: Studies investigating the effect of vitamin D and parathyroid hormone (PTH) in frailty syndrome are limited. Therefore, we aimed to evaluate the relationship between frailty and serum vitamin D and PTH levels.

Material and Methods: This is a cross-sectional study conducted on individuals aged >65 years. In this cross-sectional study, data were collected using sociodemographic data sheet, Fatigue, Resistance, Ambulation, Illnesses, & Loss of Weight (FRAIL) scale and Study of Osteoporotic Fracture (SOF) index via face-to-face interview. The study included data from 513 subjects. Chi-square test was used in analyses. A p value<0.05 was considered as statistically significant.

Results: The mean age was 71.9±6.4 years in the study population. The prevalence of frailty elder was found as 46.8% by FRAIL scale and 51.3% by SOF index while pre-fail elder prevalence was found as 45.2% by FRAIL scale and 33.3% by SOF index.

Conclusion: In our study it was found that frail elder prevalence was increased by advancing age, female gender and presence of comorbidity and that low serum vitamin D and elevated PTH levels were closely associated with prevalence of frail elder.

Keywords: Frailty, vitamin D, parathyroid hormone, elderly

Kırılganlığın Serum D Vitamini Ve Paratiroid Hormon Düzeyleriyle İlişkisi

ÖZET

Amaç: Kırılgan yaşlı sendromunun patobiyolojisi ile ilgili bilgiler kısıtlıdır. Kırılgan yaşlı sendromunun biyolojik yaşlanmaya bağlı oluşan hematolojik, immünolojik, endokrin ve metabolik sistemdeki değişiklikler ile birlikte çevresel faktörlerin sorumlu olabileceği düşünülmektedir. Bu araştırmanın amacı 65 yaş ve üzeri bireylerde kan bazlı biyobelirteçler ve kırılganlık arasındaki ilişkinin iki farklı kırılganlık indeksine göre değerlendirilmesidir.

Gereç ve Yöntemler: Bu çalışma 65 yaş ve üzeri bireylerde kan bazlı biyobelirteçler ve kırılganlık arasındaki ilişkinin belirlenmesi amacıyla yapılmış kesitsel bir çalışmadır. Veriler; sosyodemografik anket formu, FRAİL Kırılganlık Ölçeği ve Osteoporotik Kırık Çalışma İndeksi kullanılarak toplanmıştır. Veriler yüz yüze görüşme yöntemiyle toplanmış ve 513 kişiye ait veriler değerlendirilmiştir. Analizlerde Pearson's Ki kare testi kullanılmış olup, p<0.05 değeri anlamlı kabul edilmiştir.

Bulgular: Araştırma grubumuzun yaş ortalaması 71.9 ± 6.4 yıl idi. Kırılgan yaşlı prevalansı FRAİL İndekse göre %46.8 iken SOF İndeksine göre %51.3; pre-frail olanların prevalansı ise FRAİL İndeksine göre %45.2 iken SOF İndeksine göre %33.3 bulundu.

Sonuç: Çalışmamızda, kırılgan yaşlı prevalansının, yaşın ilerlemesi, kadın cinsiyet ve komorbidite ile artış gösterdiği, ayrıca serumda düşük D vit düzeyi ile yüksek PTH düzeylerinin de KYS ile yakından ilişkili olduğu bulunmuştur.

Anahtar Sözcükler: Kırılganlık, D vitamini, paratiroid hormon, yaşlılık

There are various definitions of frailty syndrome, emphasizing altered mobility, weakness and nutritional impairment in the syndrome. However, the most widely definition used for fragile elderly syndrome; It is an increased sensitivity to external stresses due to age-related physiological reserves, loss of function in neuromuscular, metabolic and immune systems (1-3). In frail elder, the limited reserves can readily lead disabling damage even with minimal stress (1,4,5). It is extremely important to distinguish between the normal aging process and the symptoms of CFS by following the physiological changes due to aging (1,4,5). Thus, it is highly important to diagnose frailty syndrome in early phase and determine the stage in order to manage process in an appropriate manner (6,7).

In the study found an association between low vitamin D levels and risk of frailty syndrome in Italian male elderly (8). Additionally, in a study of older adults a similar result was determined (9). Again, in a recent study, a cross-sectional relationship was found between low vitamin D levels and frailty in female American elders (10). In a study on integrated geriatric care from Taiwan, an association was determined between low vitamin D level and frailty in elder individuals (11). In most studies, serum 25-hydroxy-vitamin D [25(OH)D] level was used as an indicator of vitamin D status (12).

Studies showing the effect of vitamin d and parathyroid hormone on frailty are limited (13,14). Therefore, the potential etiological link between vitamin D, PTH and frailty has not been identified.

The aim of this study is to define the effect of frailty and vitamin D and PTH on frailty in persons aged 65 and over.

MATERİAL AND METHODS

Study design

The study is a cross-sectional study on individuals aged >65 years.

Study setting

This study was conducted at Physical Therapy and Rehabilitation outpatient clinic of Bozok University, Medicine School between October, 2019 and February, 2020.

Study population

This study included individuals aged>65 years. In many studies using different definitions of frailty, frailty prevalence has been reported as 7.0-32.0% with higher rates among female individuals (4,15,16). In studies from Turkey, frailty prevalence has been reported as 27.8-44.5% (17,18). Based on these studies, minimum sample size was estimated to be 318 subjects using frailty prevalence of 30% in 95% confidence interval and alpha level of 5.0%. The study included 513 subjects. Individuals under the age of 65 and using calcium and vitamin D were not included in the study.

Tools and data collection

Data were collected using sociodemographic data sheet, FRAIL scale (19) and Study of Osteoporotic Fracture (SOF) index (20).

Sociodemographic data sheet

Sociodemographic data sheet designed by researchers included 10 items questioning age, marital status, educational level, income level, occupation, systemic disorders and medications.

Fatigue, Resistance, Ambulation, Illnesses, & Loss of Weight (FRAIL) scale

The FRAIL scale was developed by Morley et al. in 2012 (19). The scale included 5 items. The validation studies were conducted in many languages, proving its effectiveness in detection of frailty (21-25). The 5-item FRAIL scale assess fatigue, resistance, ambulation, diseases and loss of weight by 2-points rating scale (0 or 1). In the scale, 0 point is accepted as non-frail while 1-2 points as pre-frail and >2 points as frail (19).

Study of Osteoporotic Fracture (SOF) Index

In the elderly individual, more than 5% weight loss (willingly or unwillingly in the last year), the inability to get up from the chair without using the arms five times and the "Do you feel energetic?" It is based on the assessment of their status of answering "no" to the question. Frailty is defined as no (0 component), pre-fragility (1 component) called medium and fragile (≥2 component) (20,26).

Laboratory evaluation

The laboratory data regarding calcium, phosphor, magnesium, PTH and vitamin D within prior 3 months were retrospectively extracted from hospital database.

Serum phosphor, magnesium and calcium levels were classified as low, normal or high according respective reference ranges. Serum PTH level was classified as high if it was above upper limit of reference range while as normal if it was within reference range.

Serum 25 (OH) D levels were measured by Architect i2000 (Abbott, Diagnostics, Wiesbaden, Germany) using chemiluminescent microparticle immunoassay technology. The linearity of the test was 3.4–155.9 ng / ml. The manufacturer reports an within-assay precision of 2.3%, 2.1%, 2.8% and a total precision of 3%, 3.1%, and 4.1% for values of 20, 40, 78.3 ng7dl (respectively). Serum 25 (OH) D levels <10 ng / ml severe deficiency, 10-20 ng / ml deficiency, 21-29 ng / ml insufficiency and 30 ng / ml were considered sufficient. Measurements of serum 25 (OH) D levels are considered the best indicator for assessing vitamin D status (27).

Ethics

The study was approved by Ethics Committee on Clinical Research of Bozok University (2017_KAEK-189_2019.10.16_06). The work followed the rules of Helsinki Declaration.

Data analysis

The statistics are presented as mean ± standard deviation or frequency (%). The correlation between selected variables and frailty was assessed using Pearson's chi-square analysis. In all analyzes, p <0.05 values were considered significant.

Limitations

This study has some limitations including cross-sectional and single-center design. These may prevent to generalize our findings in different settings.

RESULTS

Mean age was 71.9±6.4 years in the study population. Of the subjects, 75.2% were women and 77.2% were married while 61.8% were illiterate and 99.2% had own income.

It was found that there was at least one chronic disease in 83.6% of subjects while 83.6% was using at least one medication. Based on laboratory results, it was found that vitamin D level was low in 94.5% while PTH level was normal in 84.6% of subjects. In addition, it was found that calcium level was low in 3.7% of subjects. Regarding phosphor and magnesium levels, 97.3% and 97.0% of subjects had normal levels, respectively. Table 2 presents health-related parameters and laboratory results in the study population.

Table 1: Descriptive characteristics of the study population (n: 513)

Variables	Groups	Count	%
Age groups	65-74 years	365	71.2
	75-84 years	113	22.0
		35	6.8
Mean age (yrs)	71.9 ± 6.4		
Gender	Male	127	24.8
	Female	386	75.2
Educational level	Illiterate	317	61.8
	Literate	31	6.0
	Primary school	153	29.8
	≥High school	12	2.3
Marital status	Married	396	77.2
	Single	117	22.8
Income	Yes	473	92.2
	No	40	7.8

Table 2: Health-related parameters and laboratory results in the study population (n: 513)

		Count	%
Chronic disease	Yes	429	83.6
	No	84	16.4
Medication	Yes	429	83.6
	No	84	16.4
Vitamin D	Low	485	94.5
	Normal	28	5.5
Calcium	Normal	494	96.3
	Low	19	3.7
Phosphor	Normal	499	97.3
	Low	14	2.7
Magnesium	Normal	498	97.0
	Low	15	2.9
Parathyroid hormone	Normal	434	84.6
	Low	64	12.5
	High	15	2.9

In the study population, frailty prevalence was 46.8% by FRAIL scale whereas 51.3% by SOF index. According to the FRAIL scale, the prevalence of frailty was found to be 48.8% in subjects aged 65-74, 49.6% in subjects aged 75-84, and 82.9% in subjects aged 85 and over. The frequency of frailty in individuals aged 85 and over was higher and significantly higher than other age groups.

The prevalence of fragility according to the SOF index is 42.2% in people aged 65-74, 68.1% between the ages of 75-84 and 91.4% in persons aged ≥85 years. The frequency of frailty was significantly higher in subjects aged 85 years and older than in other age groups.

In addition, 43.8% and 40.8% of subjects aged 65-74 years were rated as pre-frail according to FRAIL scale and SOF index.

Frailty prevalence was determined to be significantly higher in females than males on both scales. (FRAIL scale; 53.4%, 26.8% and SOF index: 58.3%, 29.9%). The frailty prevalence was significantly higher in subjects with 5 or more chronic diseases by both scales (FRAIL scale: 83.3% and SOF index: 58.9%) The frailty prevalence was 50.6% by FRAIL scale and 56.9% by SOF index in subjects using at least one medication, indicating significantly higher prevalence.

In the evaluation made according to serum vitamin D levels, it was determined that the prevalence of frailty was significantly higher in patients with low serum vitamin D levels in both scales (FRAIL scale: 46.1% and SOF index: 50.3%).

The frailty prevalence was 57.9% in subjects with low calcium levels but there was no significant difference according to FRAIL scale, while it was 52.2% in subjects with calcium level at lower limit of normal, indicating a significant difference according to SOF index.

According to FRAIL scale, of the subjects with high PTH level, 20% were pre-fail and 80% were frail. The frailty prevalence was significantly higher in these subjects. According to SOF index, 60.0% of subjects with high PTH level were pre-fail while 40% were frail, indicating significant difference in frailty prevalence.

Table 3 presents relationship of frailty with selected variables stratified according to frailty status.

DISCUSSION

In our study population, the frailty prevalence was found as 48.3% by FRAIL scale and 50.3% by SOF index while pre-frail prevalence as 45.2% by FRAIL scale and 33.3% by SOF index.

In the literature, it has been suggested that frailty prevalence varies from 7.0% to 32.0% in community-dwelling elder individuals (27,28). In a study conducted in Turkey, which is 27.8% prevalence of frailty in the elderly has been reported (29). The term pre-frail defines elder individuals not meeting all of frailty criteria but at risk for frailty. The prevalence of pre-frail has been reported as 28-0-44.0% in the literature (30). In our study, both frail and pre-frail prevalence were found to be slightly higher than those reported in the literature.

In addition, in our study, it was determined that the prevalence of frailty was significantly higher by both scales in 85-year-old patients whose prevalence increased with age. Many studies have shown that the frequence of frailty increases with age (3). By advancing age, With advancing age, decreased slowness, physiological reserves, fatigue, decreased physical activity, fatigue and decreased body mass index become more common and are known to cause an increase in the prevalence of frailty decreased slowness, physiological reserves, fatigue, reduced physical activity, exhausting and decreased body mass index become more common, causing an increase in the frailty prevalence (1,4).

Gender is another factor that affects the frailty syndrome. Being a woman is a risk factor for vulnerability. In the studies found that frailty was more in women. Similarly, in our study, it was sighted that the prevalence of fragility in females was higher than in male subjects in terms of both the FRAIL scale (53.4%, 26.8%) and the SOF index (58.3%,29.9%). In addition, frail prevalence was also found to be higher in subjects with 5 or more diseases by both FRAIL score and SOF index. It has been thought that the difference in frailty prevalence between women and men could be related with higher strength and muscle mass in men. In our study, it was found that 83.6% of subjects had at least one chronic disease and was using at least one medication. The frail prevalence was significantly higher in subjects with 5 or more chronic disease (FRAIL scale: 83.3% and SOF index: 58.9%). Moreover, it was also found to be significantly higher in subjects using at least one medication by both scales. It is well-known that presence of chronic disease is among factors related to frailty syndrome. In Brazilian study, it was found that 5 or more medication was associated to frailty syndrome and Zalavsky et al. also reported that chronic diseases was associated to risk for frailty syndrome (7).

Table 3: The relationship of frailty with selected variables stratified according to frailty status (n: 513)

Parameters		FRAIL scale (n:513)				SOF index (n:513)			
		Robust	Pre-frail	Frail		Robust	Pre-frail	Frail	
		n:41 (8.0%)	n:232 (45.2%)	n:240 (46.8%)		n:79 (15.4%)	n:171 (33.3%)	n:263 (51.3%)	
Age (yrs)	65-74	27 (7.4%)	160 (43.8%)	178 (48.8%)	Fisher's exact test p<0.001	62 (17.0%)	149 (40.8%)	154 (42.2%)	Fisher's exact test p<0.001
	75-84	14 (12.4%)	43 (38.1%)	56 (49.6%)		16 (14.2%)	20 (17.7%)	77 (68.1%)	
	≥85*	0 (0.0%)	29 (82.9%)	6 (17.1%)		1 (2.9%)	2 (5.7%)	32 (91.4%)	
Gender	Male	33 (26.0%)	60 (47.2%)	34 (26.8%)	Fisher's exact test p<0.001	70 (55.1%)	19 (15.0%)	38 (29.9%)	Fisher's exact test p<0.001
	Female*	8 (2.1%)	172 (44.6%)	206 (53.4%)		9 (2.3%)	152 (39.4%)	225 (58.3%)	
Number of Chronic Diseases	None	25 (29.8%)	53 (63.1%)	6 (7.1%)	Fisher's exact test p<0.001	27 (32.1%)	35 (41.7%)	22 (26.2)	X^2:34.625 p=0.001
	<5	16 (8.7%)	138 (75.4%)	29 (15.8%)		23 (12.6%)	64 (35.0%)	96 (52.5%)	
	≥5 *	0 (0.0%)	41 (16.7%)	205 (83.3%)		29 (11.8%)	72 (29.3%)	145 (58.9%)	
Medication	Yes*	20 (4.7)	192 (44.8)	217 (50.6)	X^2:44.566 p=0.001	50 (11.7%)	135 (31.5%)	244 (56.9%)	X^2:42.669 p=0.001
	No	21 (25.0)	40 (%47.6)	23 (%27.4)		29 (34.5%)	36 (42.9%)	19 (22.6%)	
Vitamin D	Low*	25 (5.1%)	226 (46.6%)	234 (48.3%)	Fisher's exact test p=0.004	73 (15.1%)	168 (34.6%)	244 (50.3 %)	Fisher's exact test p=0.002
	Normal	16 (57.2%)	6 (21.4%)	6 (21.4%)		6 (21.5%)	3 (10.8%)	19 (67.7%)	
Calcium	Normal	41 (8.3%)	224 (45.3%)	229 (46.4%)	Fisher's exact test p=0.565	73 (14.8%)	163 (33.0%)	258 (52.2%)	Fisher's exact test p=0.034
	Low*	0 (0.0%)	8 (42.1%)	11 (57.9%)		6 (31.6%)	8 (42.1%)	5 (26.3%)	
Parathyroid hormone	Normal	40 (9.2%)	174 (40.1%)	220 (50.7%)	Fisher's exact test p<0.001	74 (17.1%)	128 (29.5%)	232 (53.5%)	Fisher's exact test p<0.001
	Low	1 (1.6)	55 (85.9)	8 (12.5)		5 (7.8%)	34 (53.1%)	25 (39.1%)	
	High*	0 (0.0%)	3 (20.0%)	12 (80.0%)		0 (0.0%)	9 (60.0%)	6 (40.0%)	

FRAIL scale: Fatigue, Resistance, Ambulation, Illnesses, & Loss of Weight scale SOF index: Study of Osteoporotic Fracture, p values < 0.05 were considered as statistically significant are highlighted in bold,* Group of differences

The relationship between serum 25 (OH) vitamin D level and frailty is complex; Frailty is thought to be both the cause and the consequence of vitamin D deficiency. However, vitamin D, which binds to vitamin D receptors (VDR), can increase de novo synthesis and cellular calcium uptake of the protein in the muscle cell, thus affecting muscle mass and physical performance, in addition, vitamin 25 (OH) D, IL-2 and IL It can reduce inflammatory mediators such as -12, thus it has been reported to affect physical performance and muscle strength (31).

It is stated that vitamin D deficiency is associated with poor physical performance in elderly individuals. Again, in a meta-analysis of 7 studies evaluating the relationship between vitamin D and frailty, low vitamin D levels were found to increase the risk of frailty. In the National Health and Nutrition Examination Survey III, it was determined that 25 (OH) D <15 ng / mL increased the risk of frailty by 3.7 times (9). In our study, it was found that frailty prevalence by both FRAIL scale and SOF index was significantly higher in subjects with low serum vitamin D level in agreement with literature.

It is thought that there is vitamin D deficiency in 90% of elder individuals. It is most commonly due to dietary habits and insufficient exposure to sunlight. In elder individuals, gastrointestinal calcium absorption is decreased due to malnutrition and vitamin D deficiency while renal calcium excretion is increased. The decreased dietary calcium intake can also contribute to reduced absorption and low blood calcium levels. Given these associations, it is also suggested that low calcium level caused by low 25(OH) D level can be associated to fall, fracture, sarcopenia, poor physical function, disability and frailty (32).

In our study, although frailty prevalence (57.9%) was higher in subjects with low calcium level according to FRAIL scale, there was no significant difference. However, frailty prevalence was 52.2% in subjects with calcium level at lower limit of normal, indicating statistical significance.

A correlation was shown between elevated PTH levels and frailty in elder individuals. It is suggested that PTH can cause frailty through vitamin D deficiency and increased intracellular calcium uptake (33). In our study, of the subjects with elevated PTH levels, 20.0% were pre-frail and 80% were frail; in addition, frailty prevalence was significantly higher according to FRAIL scale. Moreover, 60% of subjects with high PTH levels were pre-frail and 40% were frail according to SOF index. Our results are in agreement with literature.

The relationship between frailty and low 25 (OH) D level may be related to active vitamin D metabolites that downregulate inflammatory markers such as interleukin-2 and interleukin-12 (8).

Thus, the effects of low 25 (OH) D on muscles may be mediated by proinflammatory cytokines known to affect physical performance and muscle strength (34) and in addition, low vitamin D levels may indirectly influence the thought of secondary hyperparathyroidism.

In patients with hyperparathyroidism, muscle functions decrease and can be corrected by parathyroidectomy (35). Additionally, high PTH levels have also been associated with decreased physical activity (8,13). It is also unclear whether the effects on muscle function are due to hypovitaminosis D secondary to hyperparathyroidism or direct effects of PTH, such as increased intracellular calcium concentrations (36-40). Therefore, vitamin D deficiency may contribute to some of the negative consequences regarding frailty; however, further work is required to confirm or rule out this result.

Our understanding about pathobiology o frailty syndrome is limited. It is thought that changes in hematologic, immunological, endocrine and metabolic system caused by biological aging together with environmental factors can be involved in frailty syndrome. The frailty syndrome is not only reduction of strength in performing daily living activities but also severe condition that may result in hospitalization and death.

CONCLUSION

In conclusion, it was found that frailty prevalence is increased by advancing age, female gender and comorbid diseases and that low vitamin D level and elevated PTH levels are closely related to frailty syndrome. It is apparent that early diagnosis of frailty and exercises enhancing muscle strength, nutritional support and prevention of polypharmacy can prevent undesired outcomes such as morbidity and mortality.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Geriatrics and Gerontology / Geriatri ve Gerontoloji

Is There a Correlation between the Quality of Life of Old People and Their Attitude to Aging?

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ABSTRACT

Objective: The aim of the research was to the correlation between the quality of life of old people and their attitude to aging.

Methods: The descriptive relational study was conducted between July and November 2016 at a nursing home in the province of Izmir. The population of the study consisted of the old people (n=308), and the sample was formed from the 147 individuals. The instruments were socio-demographic questionnaire, the World Health Organization Quality of Life Module for Old People (WHOQOL-OLD), and the Turkish version of the World Health Organization Europe Aging Attitudes Questionnaire (AAQ). Descriptive statistical methods, Spearman correlation analysis and multiple regression analysis were used to analyze the data.

Results: The mean age of the old people was 74.32±6.65 years and 64.6% were male. The total mean scores of the old people were 60.49±16.99 on WHOQOL-OLD and 52.84±14.17 on AAQ. A strong positive correlation was found between these two scores (r=0.827, p<0.001). It was seen in the multiple regression analysis that the old people's attitudes to aging were a predictive factor of their quality of life (F=53.114, p<0.001, R^2=0.70).

Conclusion: These results indicate that there is a significant correlation between the quality of life and attitudes toward aging in nursing home residents, and that their attitudes to aging are a significant variable explaining their quality of life.

Keywords: Aging; attitude; nursing home; quality of life

Yaşlıların Yaşam Kalitesi ile Yaşlanmaya Karşı Tutumları Arasında Bir İlişki Var Mı?

ÖZET

Amaç: Araştırmanın amacı, yaşlı bireylerin yaşam kalitesi ile yaşlanmaya karşı tutumları arasındaki ilişkiyi belirlemektir.

Yöntem: Tanımlayıcı ilişkisel araştırma, Temmuz-Kasım 2016 tarihleri arasında İzmir ilindeki bir huzurevinde gerçekleştirilmiştir. Araştırmanın evreni 308 yaşlı olup, örneklemi 147 yaşlı birey oluşturmuştur. Veri toplama araçları sosyo-demografik anket, Dünya Sağlık Örgütü Yaşlılar için Yaşam Kalitesi Modülü (WHOQOL-OLD) ve Dünya Sağlık Örgütü Avrupa Yaşlanma Tutumları Anketi (AAQ)'nin Türkçe versiyonudur. Verilerin analizinde tanımlayıcı istatistiksel yöntemler, Spearman korelasyon analizi ve çoklu regresyon analizi kullanılmıştır.

Bulgular: Yaşlı bireylerin % 64.6'sı erkek olup, yaş ortalaması 74.32±6.65 yıldı. Yaşlı bireylerin toplam puan ortalamaları WHOQOL-OLD 60.49±16.99 ve AAQ 52.84±14.17 olup; bu iki puan arasında güçlü bir pozitif korelasyon bulunmuştur (r=0.827, p<0.001). Çoklu regresyon analizinde yaşlı bireylerin yaşlanmaya karşı tutumlarının yaşam kalitelerini yordayıcı bir faktör olduğu görülmüştür (F=53.114, p<0.001, R^2=0.70).

Sonuç: Bu sonuçlar huzurevinde yaşayan yaşlı bireylerin yaşam kaliteleri ile yaşlanmaya yönelik tutumları arasında anlamlı bir ilişkinin olduğunu ve yaşlanmaya karşı tutumlarının yaşam kalitelerini açıklayan önemli bir değişken olduğunu göstermektedir.

Anahtar Kelimeler: Yaşlanma, tutum, huzurevi, yaşam kalitesi

The proportion of old people in the world is rapidly increasing. It has been reported that in the world in general there are 600 million people aged 60 and over, and that by the year 2025 this number will double. It is estimated that 80% of this population live in developing countries (1). In Turkey, a developing country, the proportion of old people in the population was 6.8% in 2008, and in 2020 this proportion had risen to 9.5% (2). According to this information, the proportion of old people in the country is estimated to reach 10.2% by 2023 (3). The city of Izmir, where the research was performed, is in the west of Turkey, and is Turkey's third largest city. At the same time it is the second city in terms of people aged over 100, with 236 centenarians, and the proportion of old people in the population is higher than the average for Turkey, which is 10.1% (2).

In the present day, as conditions of life improve, lifestyles and family values change and the number broken families increases, there is also an increase in the number of old people living alone (4-6) or in nursing homes (7). Researches have shown that being alone has a negative effect on physical and psychological health, and decreases the quality of life (6,8).

The WHO reports that people in industrialized countries become rich before they age, whereas in developing countries they age before they become rich. In the whole world, preparation is recommended against the consequences of this process of demographic change of increasing aging (9). Providing independence for old people, developing their active life and contributing to their social and economic life, that is, an approach of adding quality to life, has been developed (10). For this reason, assessing the quality of life of old people is an important public health issue in order to encourage active aging (9).

Along with aging, disability (11), economic problems and social status changes, and other related factors which increase dependency raise the importance of the quality of life (12,13). Along with progressively increasing life expectations, it has become more important to determine the factors affecting the quality of life for healthy aging. Looking generally at studies performed on the quality of life of old people, it is seen that certain traits such as age, gender, educational level (14-16), chronic illnesses or physical disabilities (14), state of physical activity (6), physical changes and psychological losses (12), social support and loneliness and economic condition (6,16) are factors which affect the quality of life of old people.

Another significant factor affecting the quality of life is the attitude of old people about old age (15,17). Along with social changes, the perception of old age has also changed. For this reason, not only old people's experience of old age but also their attitude to it has become an important indicator of healthy aging (17). Studies have found that a positive attitude to aging is more effective than many other variables on the length of life, that a negative attitude to aging is a variable which has a direct effect on the quality of life (15,18), that there is a correlation between the sub-dimensions of attitude to aging and quality of life (12,15,19), that there is a significant correlation between the attitude to aging and quality of life (15,19), and that the state of perception of aging affects the level of quality of life (20).

Quality of life and attitudes to old age have been studied in Turkey by descriptive research (13,20,21), but there have been few studies explaining the effects of attitudes to old age on the quality of life (15,22,23). Determination of the attitudes of old people to old age and examining its relationship to the quality of life by nurses who take on the important roles of preserving the quality of life of old people and enabling them to maintain an active life is thought to be a significant need in setting up and providing health care for old people. Also, this is the first study conducted in the west of Turkey.

Objective

The research aim was to the correlation between the quality of life of old people and their attitude to aging.

MATERIALS and METHODS

Study Design and Samples

The research was a descriptive relational type of study. It was performed between July and October 2016 at a nursing home of Izmir City Municipality, which was determined by the purposive sampling method. The nursing home had a 304 bed capacity and 270 resident old people.

The population of the study was the 270 old people resident in the nursing home, 44 of whom had serious illnesses. It was intended to reach the whole of this population, and so no sampling method was used. Old people with cognitive problems (dementia, mental retardation, etc.) to the extent that they could not understand or answer the questions (n=42), those with hearing loss at an advanced level (n=31), those who were not present in the nursing home or who were on leave at the time of the research (n=19), and those who did not agree to participate (n=25)

were excluded from the study, so that 147 individuals were included.

Data Collection

Data collection forms were an old people's question form, the World Health Organization Quality of Life Module for Old People (WHOQOL-OLD), and the Turkish version of the World Health Organization - Europe Aging Attitude Questionnaire (AAQ). Collection of data was performed with face to face interviews by the researchers with the old people in the nursing home.

Old People's Question Form

This form was developed by the researchers in the light of the literature (13,22,23), and consisted of 11 questions to determine the old people's socio-demographic characteristics and their medical history.

World Health Organization Quality of Life Old People's Module (WHOQOL-OLD)

This consisted of six dimensions and 24 questions. The dimension of Sensory Functions consisted of questions number 1, 2, 10 and 20, and evaluated sensory functions and the effects on their loss on the quality of life. The dimension of Autonomy included questions 3, 4, 5 and 11. This covered independence at an old age, and expressed the ability to live independently. The dimension of Past, Present and Future Activities consisted of questions number 12, 13, 15 and 19, and showed the satisfaction obtained from successes in life and the view of the future. The dimension of Social Participation included questions 14, 16, 17 and 18, and described in particular the ability to participate in the activities of daily life. The dimension of Death and Dying comprised questions number 6, 7, 8 and 9, and related to concerns, worries and fears to do with death and dying. The dimension of Closeness included questions 21, 22, 23 and 24, and evaluated the skill of forming personal and private relationships. The answers given to each question scored from 1 to 5 on a 5-way Likert-type scale, and the possible dimension score was between 4 and 20. Also, the total score was calculated from the total of the values of each separate score. A higher score indicated a better quality of life. The validity and reliability of the Turkish version of the form was tested by Eser et al. (2010), and alpha values were found of 0.85 for the general structure of the scale (24). In this research, the Cronbach alpha value of the scale was found to be 0.73.

Europe Aging Attitude Questionnaire (AAQ)

This questionnaire consisted of 24 questions and three sub-dimensions (psycho-social loss, bodily change and psycho-social development), each with eight questions. The dimensions were evaluated with a score of between 8 and 40. Alongside the scores obtained, the total scale score could be calculated. When the score for the psychosocial loss dimension was inverted, a higher score indicated a positive change in attitude for that dimension. Validity and reliability for the Turkish-language form were tested in this country by Eser et al. (2011) (17). In this study the Cronbach alpha value was found to be 0.56.

Data Analysis

The data were analyzed with SPSS version 21.0. for Windows (SPSS, Inc., Chicago IL, USA). Data analysis made use of numerical and percentage distribution, means and standard deviation in descriptive statistical evaluation. Spearman correlation analysis was used to examine the relation between scales, and multiple regression analysis to determine the best explanatory factors.

Study Ethics

Written permission was obtained from the Scientific Ethics Committee of University Nursing Faculty (Approval dated Jun 28, 2016; Number: 2016-214) and from the management of the nursing home. The purpose and benefits of the research were explained to the old people who took part in the research. Informed consent was given by participants and the questionnaire forms were completed anonymously. The research was carried out in accordance with the Helsinki Declaration Principles.

RESULTS

Socio-demographic characteristics and health histories of the old people

The mean age of the old people was 74.32±6.65 (min=65, max=91), and 64.6% were male. It was found that 58.5% were educated to primary school level, 74.1% were retired and 43.5% had an income which was less than their expenditures. Most (76.9%) of the 68% who were married had children; the mean number of children was 1.73±0.73 (min=1, max=6), and 52.2% saw their children occasionally (Table 1). The old people had spent a mean of 64.56±53.80 (min=1, max=276) months in the old people's home. Most of them (82.3%) had at least one chronic illness, the most frequent of which were diabetes (30.6%), hypertension (29.8%), and heart disease (29.8%) (Table 1).

Table 1. Old people by socio-demographic characteristics		
Characteristics	**N**	**%**
Age group		
65-74 years (younger)	75	51.0
75-84 years (medium)	62	42.2
85 years and above (older)	10	6.8
Gender		
Female	52	35.4
Male	95	64.6
Education		
Primary	86	58.5
Middle school	40	27.2
High school	17	11.6
University	4	2.7
Marital status		
Married	100	68.0
Single	47	32.0
Working status		
Retired	109	74.1
Other (not working, not retired)	38	25.9
Income status		
Income < Expenditure	64	43.5
Income = Expenditure	59	40.1
Income > Expenditure	24	16.3
Number of children		
0	34	23.1
1-2	58	39.5
3 or more	55	37.4
Frequency of seeing children (n=113)		
Not at all	22	19.5
Occasionally	59	52.2
Frequently	32	28.3
Length of residence in nursing home		
1-10 years	128	87.1
11-20 years	17	11.6
21 years or more	2	1.4
Total	**147**	**100.0**

Quality of Life and Attitudes to Aging of the Old People

Table 2 shows the mean, minimum and maximum values of the scores obtained by the old people on the WHOQOL-OLD and AAQ scales. The mean total scores of the old people were found to be 60.49±16.99 on WHOQOL-OLD and 52.84±14.17 on AAQ.

Table 2. Mean, standard deviation, min. and max. values of WHOQOL-OLD and AAQ			
Scale and sub-dimensions	**Mean**	**SD**	**Min –Max**
WHOQOL-OLD	**60.49**	**16.99**	**18.75 – 92.71**
Sensory functions	67.77	23.21	25 – 100
Autonomy	55.70	20.07	6.25 – 100
Past, present and future activities	56.08	19.88	0 – 100
Social participation	52.85	21.10	0 – 100
Death and dying	67.26	28.90	6.25 - 100
Closeness	63.31	18.61	12.5 – 100
AAQ	**53.84**	**14.17**	**28 – 83**
Psychosocial loss	18.79	7.93	8 – 37
Bodily change	24.34	6.36	11 – 37
Psychosocial development	24.29	4.23	12 – 38

Correlation between Quality of Life and Attitudes to Aging in the Old People

The correlation between the total WHOQOL-OLD and AAQ scores was positive, very strong and significant at a high level ($r=0.827$, $p<0.001$). At the same time, correlations between the total WHOQOL-OLD score and the sub-dimensions of AAQ were as follows: psycho-social loss, strongly negative ($r=-0.715$, $p<0.001$); body change, strongly positive ($r=0.780$, $p<0.001$); psycho-social development, weakly positive ($r=0.272$, $p<0.01$). A statistically high level of correlation was found (Table 3).

A Variable Explaining the Old People's Quality of Life: Their Attitudes to Aging

The old people's quality of life was significantly related to their attitudes to aging ($F=103.228$, $p<0.001$, $R^2=0.68$). Significant predictors of the old people's quality of life included the AAQ sub-dimensions of psychosocial development, psychosocial loss and bodily change (Table 4).

Table 3. Correlations between WHOQOL-OLD and AAQ

Scale and sub-dimensions	Psychosocial loss	Bodily change	Psychosocial development	AAQ
Sensory functions	- 0.576***	0.556***	0.064 p=0.444	**0.583*** **
Autonomy	- 0.633***	0.687***	0.303***	**0.750*** **
Past, present and future activities	- 0.665***	0.704***	0.289***	**0.762*** **
Social participation	- 0.570***	0.699***	0.394***	**0.754*** **
Death and dying	- 0.505***	0.514***	0.103 p=0.216	**0.543*** **
Closeness	- 0.426***	0.511***	0.136 p= 0.100	**0.503*** **
WHOQOL-OLD	**- 0.715*** **	**0.780*** **	**0.272****	**0.827*** **

Spearman correlation analysis (r) was used.
***p<0.001; **p<0.01

Table 4. Regression model predicting old peoples' quality of life

Factors	Beta 31.636	t-statistics 4.389	p-value .000***
Psychosocial loss	-1.046	-6.211	0.000***
Bodily change	0.904	4.229	0.000***
Psychosocial development	1.092	5.095	0.000***
R^2 = 0.684	F (3.147) = 103.228***		Durbin-Watson = 1.632

***p < 0.001

DISCUSSION

This research explained the quality of life of older people living in a nursing home in the west of Turkey and its relation to their attitudes to aging. The old people's attitude to aging (AAQ mean total score 52.84±14.17, max. score 120) was at slightly medium level. In a study by Top and Dikmetaş (2015), this proportion was at a medium level in a similar age group of residents of an old people's home, while Bryant et al. (2012) in a study of 421 people in Australia aged 60 and above, found a positive attitude. In these studies, a positive attitude was found to be correlated to satisfaction with life, good physical and mental health, and low levels of anxiety and depression (14,25) and to affect cognitive performance and preventive health behaviors (26).

It was seen in the study that the attitudes of the old people to bodily change and psychosocial development were more positive than that to psychosocial loss. Also, it was seen that the attitudes of old people to bodily change in a study in Turkey by Eser et al. (2011) and to psychosocial developments in studies by Özyurt et al. (2012) and Top and Dikmetaş (2015), also performed in this country, were more positive. Similar result was obtained in study carried out in in rural and regional Australia (25). In all studies, old people had fewer positive attitudes to psychosocial losses.

The mean total score of the old people on the WHOQOL-OLD was 60.49±16.99, and the maximum score for the overall scale was 120. This mean score shown that the old people's QOL was at a medium level. In Turkey, studies by Altay, Çavuşoğlu, Çal (2016) and Top and Dikmetaş (2015) found a lower score, while a study by Eser, Saatli, Eser, Baydur, Fidaner (2010) found a higher one. Comparing with researches carried out in other countries, it was seen that the quality of life found in a study conducted with 220 old people in a rural area of Tehran was lower than that in this study (27).

Maintaining functional independence is an important factor for old people in terms of quality of life. Viewed from this perspective, it was seen that sensory function, a sub-dimension of the quality of life of old people, obtained higher scores in the study than the other sub-dimensions. It may be thought that because the mean age of the old people was 74.32±6.65 and more than half of them were in the younger old-age group, their sensory function losses were less. At the same time, similar finding was encountered in the literature showing that sensory function was lower at a more advanced age (13). Also, the old people were living in an nursing home and benefitted from organized health services, their access to health services was easy, and problems relating to sensory function were diagnosed and treated early. Similarly, sensory function was found to be the highest among the quality of life sub-dimensions in studies with residents of nursing homes by Şahin and Emiroğlu (2013), with old people living in an urban area by Tavares, Bolina, Dias, Ferreira, Haas (2014) (28), and by Altay, Çavuşoğlu, Çal (2016). Differently, Top ve Dikmetaş (2015) and Top, Eriş, Kabalcıoğlu (2012) were found to be the lowest. This result can be explained by the greater age of the group of old people, and along with this the increase in chronic illness and dependence.

It was seen in the study that the old people had high scores on death and dying, one of the sub-dimensions of quality of life. Death is seen in Western societies as a chance event which it is not talked about, while in Eastern societies on the contrary death is accepted as a natural phenomenon (24). It was seen in this study too that death was accepted by the old people in a way that could be seen as fatalistic as a natural, unavoidable process, and that this perception had a positive effect on the quality of life. In studies by Kritika, Aggarwal, Semwal (2017) (27), Bilgili and Arpacı (2014) (29), the sub-dimension of death and dying had the highest score. Differently, Eser (2010) found it to be the lowest.

Similar to a previous study (6), our research showed that social support was an important factor in quality of life, with the old people reporting that a higher level of social support correlated to a higher quality of life (24). In this way it is thought that the result that old people's social participation was low arose from their restricted field of social activity in society because they were in an nursing home. On this topic, Şahin and Emiroğlu (2014) found a correlation between the ways old people in an nursing home spent their time and their quality of life, and reported that the quality of life increased with an increase in the number of activities in the nursing home. Similar to the results of our study, social participation was found to be low in old people living in rural areas by Tavares, Bolina, Dias, Ferreira, Haas (2014). For this reason it is thought that increasing the social interaction of people living in nursing homes is an important approach in improving their quality of life.

In parallel with the level of development in societies, the perception of old age in traditional societies as maturity and wisdom has given way to a perception of it as deficiency, weakness and dependence (17). It was found that positive perceptions of old age by old people extended their lives. For this reason, the attitude of old people towards old age is an important indicator for healthy aging (17,21).

The results showed significant relationship between quality of life and attitudes toward aging for old people in a city of Turkey. Physical change, psychosocial loss and psychological growth related to attitudes were significant predictors (68%) of their quality of life. Eser, Saatli, Eser, Baydur, and Fidaner (2010) in Turkey, Low, Molzahn, and Schopflocher (2013), Kalfoss, Low, Molzahn (2010) in Canada and Norway, found significant relationship between quality of life and attitudes toward aging in old people. Additionally, Bryant et al. (2012) reported that a positive attitude to aging had a positive effect on physical and mental health. Studies performed by Top and Dikmetaş (2015) in the north of Turkey and by Kalfoss, Low, Molzahn AE (2010) in Norway support this result. Kalfoss, Low, and Molzahn (2010) found that all the subscales of WHOQOL–Older Adults Module (OLD) and WHO-AAQ correlations were significant in the Canadian and Norwegian samples, the lowest being between psychosocial loss and psychosocial growth for both Canada (r=.363) and Norway (r = .132).

The old people's attitude to the sub-dimension of psychosocial development was the most important variable explaining their quality of life. Psychosocial development can be said to be a process which shows that physical, psychological and social changes are accepted by old people.

CONCLUSION

In conclusion, As a result, as the elderly population increases, improving the quality of life of the elderly becomes an important requirement in health services. By determining the factors affecting the quality of life of the elderly, preventive health services can be provided to the elderly at risk in the early period. The research results show that there is a significant relationship between quality of life and attitudes towards aging and that their attitudes towards aging are an important variable explaining the quality of life. It is thought that preparation of old people for the aging process by health professionals and in this process the creation of a positive attitude to aging could have an important positive effect on the quality of life of old people. Knowledge of the relationships between the quality of life of old people and their attitudes towards aging will contribute to consideration of strategies to improve the quality of life of old people on the part of professionals and policy makers concerned with the aged. It is thought that developing attitudes to aging at a societal and individual level will help to reach the target of successful aging.

Limitation of the Study

The limitations of the research are that it was limited to old people living in a nursing home, that participation was low, and that data was dependent on the self-reporting of the old people.

DECLARATIONS

Financial Disclosure/Statement

None declared

Conflict of Interest

All authors declare no conflict of interest.

Authorship Contribution

All authors contributed equally while this study preparing.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nutrition and Dietetics / Beslenme ve Diyetetik

The Comparison of the Effects of Different Nutrition Education Methods on Nutrition Knowledge Level in High School Students

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ABSTRACT

Purpose: Adolescence is an important life period and has crucial importance for the development of appropriate eating habits and a healthy diet. Nutritional interventions may help improving diet and thus may provide prevention from the development of lifestyle related diseases during both adolescence and in the future. This educational intervention study with a pretest-posttest design aimed to evaluate the effectiveness of different nutrition education methods on nutrition knowledge levels among adolescents.

Methods: A total of 216 students from 3 high schools in Usküdar, Istanbul were randomly assigned to three different educational intervention method groups (video-mediated, peer-directed, and visual aids), each consisting of 36 students to compare the effectiveness with the traditional education method. The nutrition knowledge level of adolescents was evaluated with the Adolescent Nutrition Knowledge Questionnaire (ANKQ) before and after interventions

Results: All of the intervention methods provided significantly increased post-test total scores when compared to pre-test scores ($p<0.05$). Peer-led and visual tools mediated nutrition education were significantly related to increased post-test scores compared to traditional nutrition education ($p<0.05$).

Conclusion: Repetitive interventions, follow-ups regarding sustainability and evaluation of behavioral changes are recommended for future studies.

Keywords: adolescent, healthy diet, dietary habits

Lise Öğrencilerinde Farklı Beslenme Eğitim Yöntemlerinin Beslenme Bilgi Düzeyine Etkisinin Karşılaştırılması

ÖZET

Amaç: Adölesan dönem yaşamın önemli bir dönemidir ve uygun beslenme alışkanlıklarının geliştirilmesi ve sağlıklı bir diyet oluşturulması için büyük önem taşımaktadır. Beslenme müdahalelerinin, diyetin iyileştirilmesine yardımcı olabileceği, böylece hem adölesan dönemde hem de gelecekte yaşam tarzı ilişkili hastalıklarının gelişmesini engelleyebilmektedir. Öntest-sontest tasarımlı bu eğitsel müdahale çalışması, farklı beslenme eğitimi yöntemlerinin lise öğrencilerinin beslenme bilgi düzeylerine olan etkisini değerlendirmeyi amaçlamıştır.

Yöntem: İstanbul ili Üsküdar ilçesinde gönüllü olan 3 liseden toplam 216 öğrenci, her biri 36 kişiden oluşan müdahale gruplarına (video aracılı, akran yönlendirmeli ve görsel araç kullanılan) rastgele atanmış ve her bir yöntemin beslenme bilgi düzeyine etkisi geleneksel eğitim yönteminin etkinliği ile karşılaştırılmıştır. Her bir eğitim öncesi ve sonrası Adolesan Beslenme Bilgi Düzeyi Anketi (ABBID) ile ergenlerin beslenme bilgi düzeyleri değerlendirilmiştir.

Bulgular: Son test puanlarının tüm müdahale yöntemlerinde ön test puanlarına göre anlamlı olarak arttığı saptanmıştır ($p<0.05$). Akran yönlendirmeli ve görsel araç kullanılan beslenme eğitimi, geleneksel beslenme eğitimine kıyasla belirgin olarak artmış test skorları ile sonuçlanmıştır ($p<0.05$).

Sonuç: Gelecekteki çalışmalar için tekrarlayan, uzun vadede kalıcılığı izleyen ve davranış değişikliklerinin de değerlendirildiği müdahaleler önerilmektedir.

Anahtar Kelimeler: adölesan, sağlıklı diyet, diyet alışkanlıkları

Adolescence is a period of transition from childhood to adulthood in which the fastest growth and development in life is seen (1). Along with physical changes and increased nutritional requirements, eating habits and nutritional preferences alter during this period. The level of nutritional knowledge is the major contributor for appropriate nutritional habits and attitudes (2,3). Therefore, appropriate nutrition education programs (NEPs) should be organized. NEPs commonly embrace information about nutrition, nutrients, and healthy eating behaviours (4). Traditional nutrition education (TNE) as well as video-mediated nutrition education (VMNE); nutrition education given with visual tools (NEGVT); and peer-led nutrition education (PLNE) models are among the commonly used interventions to improve the nutritional knowledge level of adolescents (2,5,6).

VMNE programs are suggested to improve students' learning and considered as an innovative way to organize and present information for students (2,7). In addition, studies showed that videos contributed as a valuable tool for supporting learning, thus might be adapted for all learners as well as adolescents (1,5–8).

It has also been suggested that nutrition education with visual tools including photographs/card etc., is one of the best methods for effective education and education given with visual tools may provide increased awareness about healthy nutrition and improvement in eating habits among adolescents (9,10).

Adolescents are mostly under the influence of peer pressure so the peer-led nutrition education method has also been used in recent studies (11–13). It has been demonstrated that peer-led nutrition education among adolescents provides information, education, and resources for healthy nutrition and health promotion (14). In addition, peer-led education for improving health among adolescents directly affects adolescents in such matters as being a positive role model and changing social norms (12,14).

The efficiency of nutrition education also depends on population-associated factors including socioeconomic status, age, gender, and cultural diffreneces. Therefore, it is not precise which educational intervention method is the most effective on nutritional knowledge level in a specific adolescent population compared to traditional nutrition education. This study aims to evaluate the effects of different nutrition education methods on nutritional knowledge levels among Turkish adolescents.

MATERIAL AND METHODS

Study Design and Sampling Process

The sample was collected regarding the results of a study titled "Evaluation of Body Mass Index and Related Lifestyle Factors among 14-17 Year Old Turkish Adolescents" in Üsküdar district with the participation of 1561 vocational high school students (15). The study results showed that vocational high school 9th-grade students (n=417) have a higher risk in terms of body weight status and unhealthy eating habits including meal skipping, snacking, and fast food consumption in previous year. Thus, the sample size was determined as 216 with a 95% confidence interval and a 5% margin of error (16). Three schools volunteered to participate in the study from vocational high schools studied in the previous study (15). From each school 72 of the 10th grager students were enrolled in the study and the first 36 of them identified as the TNE group and the rest of them were included in other education method groups (VMNE, NEGVT, and PLNE) (Table 1).

Voluntary students with a written "Informed Consent" form signed by their parents were included in the study.

Table 1. Study Design and Sampling Process

1. Vocational High School	Traditional Nutrition Education (n=36)	Video Mediated Nutrition Education (n=36)
2. Vocational High School	Traditional Nutrition Education (n=36)	Nutrition Education Given With Visual Tools (n=36)
3. Vocational High School	Traditional Nutrition Education (n=36)	Peer-Led Nutrition Education (n=36)

Measurements and Data Collection

Nutrition knowledge levels of the adolescents were measured by Adolescent Nutrition Knowledge Questionnaire (ANKQ) which was developed by Oz et al. The items in the questionnaire are complete true or false sentences and the questionnaire includes 9 items from adequate and balanced nutrition; 21 items from essential nutrients, and 8 items from malnutrition-related diseases and the maximum score that can be obtained from the ANKQ questionnaire is 38 and the minimum score is 0 (17).

Nutrition Education Methods

In all education methods, the content of education was same. PowerPoint slides were prepared for Traditional Nutrition Education (TNE) including the answers to the questions in the ANKQ without any visual content. Video Mediated Nutrition Education (VMNE) included a video prepared in the departments of a supermarket and explained the general topics following the nutrition education program. For VMNE; in accordance with the education model, the food at the supermarket aisles was shown in the video without showing a label, and the importance of adequate and balanced nutrition was emphasized throughout the video. In addition, the researcher wore the outfit she wore in the video on the TNE education day, thus the participants saw the researcher in the same way. For Nutrition Education Given with Visual Tools (NEGVT), 36 photographs were taken based on the recommendations of the TNE method. Photos were printed on A3 size copy paper as coloured and all photos were elucidated in the same order with traditional education. In Peer-Led Nutrition Education (PLNE) method, 18 out of 36 students were taken to the conference hall and the rest 18 students were kept in any area of the school. Students who were trained by the researcher were asked to teach the other 18 students. Students from both groups filled the ANKQ at the same time. For identifying the groups, narrators were marked on the questionnaire as "A" and the audiences were marked on the questionnaire as "D".

Statistical Analyses

Data were analyzed using the SPSS software, version 21 (SPSS Inc., Chicago, Illinois, USA). Descriptive quantitative data were expressed as the mean±standard deviation, the qualitative data frequencies, and percentages were used. The suitability of the variables to normality assumption was examined with the Kolmogorov-Smirnov test. As all of the parameters did not satisfy the normality assumption the non-parametric tests were used. P values were tested for comparison of the differences of parameters with two groups the Mann Whitney U test and for parameters with more than two groups the Kruskal Wallis test was used. The differences between the two repeated measures were evaluated via Wilcoxon Signed test. Spearman's rho correlation analysis was used to analyze the correlation between subgroups of questionnaire and questionnaires total score. Statistical significance was defined as $p < 0.05$.

RESULTS

Significant increases were observed among all intervention groups including TNE after educations regarding the total and subgroups scores of ANKQ ($p<0.05$). But the VMNE and the NEGVT methods did not significantly increase the malnutrition-related disease scores of the participants ($p>0.05$) (Figure 1)

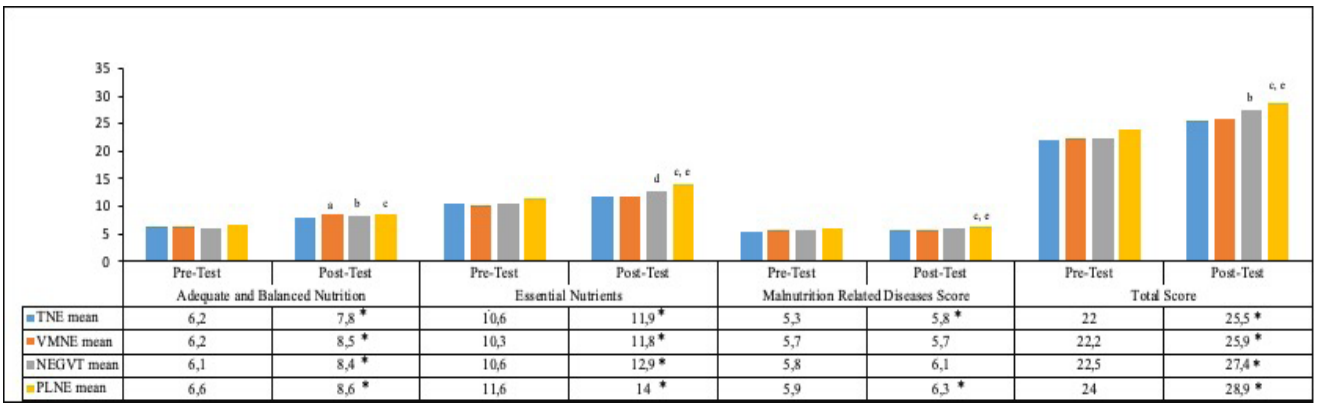
Differences between pre-test and post-test scores of adolescents in all intervention groups are given in Figure 1. There was no statistical significance in pre-test scores between the four groups (Figure 1.) which is analysed for the assessment of the homogeneity between the groups regarding nutritional knowledge levels. On the other hand, after the intervention, there was a significant difference in the subgroup of adequate and balanced nutrition scores of participants from VMNE, NEGVT, and PLNE groups, and the TNE group ($p<0.05$ for all, Figure 1.). The post scores of the subgroup of essential nutrients and malnutrition-related diseases, and total scores in PLNE groups were statistically higher compared to participants of the TNE and VMNE ($p<0.05$). Besides, the essential nutrients score of the NEGVT group significantly increased compared to participants in VMNE ($p<0.05$).

Pretest and posttest results within each education method are numerically shown in Table 2. (Delta = difference of pretest and posttest). Considering differences between 4 groups, only the difference between subgroup 1 was significant (Table 2.) The difference between the TNE method and the VMNE, NEGVT, and PLNE methods were found significant. However, the differences between VMNE and NEGVT and between VMNE and PLNE were also significant (Figure 1.).

Tablo 2. Comparison of Pre-test and Post-test Differences for Each Group According to the Subgroups

	Changes in mean score				Significance within group
	TNEI	VMNEI	NEGVT	PLNE	p*
Total Score	3.47	3.75	4.90	4.90	0.473
ΔSubgroup 1	1.64	2.30	2.36	2.00	0.041
ΔSubgroup 2	1.27	1.47	2.27	2.44	0.258
ΔSubgroup 3	0.44	0.28	0.25	0.47	0.478

p* values were tested via Kruskal Wallis.
Δ denoted for represent the differences between pretest and posttest scores.
Subgroup 1: Subgroup of Adequate and Balanced Nutrition
Subgroup 2: Subgroup of Essential Nutrients
Subgroup 3: Subgroup of Malnutrition Related Diseases



	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test	Pre-Test	Post-Test
	Adequate and Balanced Nutrition		Essential Nutrients		Malnutrition Related Diseases Score		Total Score	
TNE mean	6,2	7,8 *	10,6	11,9 *	5,3	5,8 *	22	25,5 *
VMNE mean	6,2	8,5 *	10,3	11,8 *	5,7	5,7	22,2	25,9 *
NEGVT mean	6,1	8,4 *	10,6	12,9 *	5,8	6,1	22,5	27,4 *
PLNE mean	6,6	8,6 *	11,6	14 *	5,9	6,3 *	24	28,9 *

Figure 1. Comparison of total score and subgroups scores of between the different educational methods.
*p<0,05
[a] Indicates statistically significant differences between the post-test scores of VMNEI and TNE.
[b] Indicates statistically significant differences between the post-test scores of NEGVT and TNE.
[c] Indicates statistically significant differences between the post-test scores of PLNEI and TNE.
[d] Indicates statistically significant differences between the post-test scores of NEGVT and VMNE.
[e] Indicates statistically significant differences between the post-test scores of PLNEI and VMNE.

DISCUSSION

The adolescent period has a vital role in the development of healthy eating habits as the acquired nutritional habits have a potential for persistence along adulthood (18).

Our results showed that all of the nutrition education methods provide significantly increased nutritional knowledge scores when compared to pre-test scores in adolescents. Rao et al. (2007) reported similar results in the improvement of nutrition knowledge level (19). This might be explained by the fact that adolescents are open to learning (1,20). Therefore, any education may be effective on the nutrition knowledge level. Oz et. al. carried out an educational intervention study to improve eating habits, increase physical activity, and reduce sedentary behaviours in adolescents and they found a significant increase in the level of knowledge in the internet-based education group compared to the control group (classical education) regarding prevention from excessive body

weight (17). However, our study demonstrated that the TNE group has significantly different post-test scores than the pre-test scores. The contributory factors to the score of the TNE group may be the research year; socioeconomic status; nutrition knowledge levels; awareness; and motivation of the participants.

We found significant difference only between the pre- and post-test scores of malnutrition-related diseases subgroup in VMNE. The reason for that may be explained as the video was taken in a supermarket and there was no visual material about malnutrition-related diseases in the content of the video.

Our results confirmed that the most effective nutrition education method for increasing the knowledge level was NEGVT and PLNE when compared with TNE ($p<0.05$). This might be explained by the fact that when the time is kept constant, people recall 10.0% of what they read, 20.0% of what they hear, 50.0% of what they see and hear, 70.0% of what they say, and make 90.0% of what they say and do. In addition, it is reported that learning will be faster and more permanent when using visual and auditory tools in teaching (21).

In a study participants had two consecutive teaching experiences as video-based and traditional text-based and then were asked about their perceptions of learning in terms of comprehension, retention, and motivation (i.e. attention, relevance, satisfaction, and confidence). Video-based instruction was found more motivating and memorable than traditional text-based instruction. (22). In contrast, we found no significant difference in ANKQ scores of participants of TNE and VMNE groups which may be associated with the content of the video, awareness, motivation, and knowledge levels of the participants.

Awareness in NEGVT was created by using various photographic materials and it might be assumed that the use of photographic material attracted the attention of the students and thus NEGVT was more effective than TNE. In another study, 461 adolescents were divided as the intervention group and the control group. Only the intervention group was educated using pictorial representation and its effect on healthy nutrition was investigated. Pictorial representations included food drawings, food models, and food package models. It was found that the responses of the intervention group to the questions were more accurate than the control group.

PLNE model was another successful education model in our study. In this model, information from a friend at the same age is more effective than an adult, and "peer pressure" may have a positive impact among the peers (12). Similar to our findings, it is reported that PLNE has superiority over other models in terms of providing knowledge and self-confidence to adolescents (23). For instance, Ghasemi et al. found peer education more effective than traditional methods such as booklets, lecture notes, and teacher explanations also they found that only the expression of health personnel was more effective than peer education (24). Parents Action on Drugs (PAD) site has reviewed and complied articles about peer methods on substance use, and as a result, the peer method has been more successful than traditional methods (25).

In many peer-led nutrition education studies, a separate education was given to the group that is the narrator in the peer studies, and the narrators were determined in advance whereas long education was given to the narrators (26–28) In our study, all students were educated on the same day, and the education was carried out on the randomly selected students. Akkuş et al. found peer education to strengthen the friendship relations of adolescents, improve self-confidence, and increase the level of knowledge (28). They stated that the narrator group was more advantageous as they learn the principle of helping first, increase the desire to participate in the study, and they can use this acquired skill for the rest of their lives. In addition, they mentioned that the quality of education is important, but even if the quality of education is low, it can make a difference (28).

Some limitations should be considered when evaluating the results of our study. Firstly, this study was carried out with a limited specified population who have been educated in one district of Istanbul. Secondly, this research has only investigated the short-term effects of various education methods on nutrition knowledge. However, the main aim of nutrition education programs should be developing healthy eating habits. Therefore, further interventional studies are recommended to evaluate the development of permanent nutrition knowledge and improved eating behaviors among adolescents. Lastly, the food environment (availability, prices, variety, quality, etc.) is a very strong determinant of dietary habits. Thus, it can be a constraint for nutrition education programs' success.

CONCLUSION

Our results supported that nutritional education with interactive and innovative intervention components can be useful for future programs for adolescents. In this context, studies with a combination of VMNE and PLNE methods can be recommended for larger samples for improvement in the knowledge level of adolescents. This design of the study provides improved efficacy in the evaluation of the success of nutrition education methods. However, further educational and interventional studies are required for the determination of the long-term effects of education on nutrition knowledge levels, habits, and behaviors of adolescents.

DECLARATIONS

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Conflicts of Interest/Competing Interests

All authors have no conflicts of interest to disclose.

Ethics Approval

This project was approved by the Marmara University Ethics Committee for Human Research with 03.01.2019 date and 07 number. According to this protocol, which is adjusted to the Declaration of Helsinki, adolescents and their parents were informed about the research objectives and procedures.

Availability of Data and Material

We can provide all the original data.

Authors' Contributions

S.A., H.Ö., and E.Ö. conceived and coordinated the study, performed nutrition educations, and wrote the paper. İ.K.C. performed statistical analyses, wrote and revised the manuscript. E.G. and B.O.B contributed to designing and coordinating the study and wrote the manuscript.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Physiotherapy and Rehabilitation / Fizyoterapi ve Rehabilitasyon

Assessment of Pulmonary Functions and Peripheral Muscle Strength of COPD Patients in Different GOLD Stages

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Begüm ÜNLÜ

Saadet Ufuk YURDALAN

İpek ÖZMEN

This study was presented as an e-poster at the 23rd Annual Congress of the Turkish Thoracic Society on 15-18 October 2020

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ABSTRACT

Purpose: The purpose of this research was to examine the respiratory functions, respiratory muscle strength and peripheral muscle strength of COPD patients with different GOLD stages and to evaluate their correlation with the duration and prognosis of the disease in COPD.

Methods: Patient's demographic information, clinical status, COPD Assessment Test score, mMRC Dyspnea Scale score, emergency and hospital admissions numbers in the last three months, number of exacerbation and hospitalizations in the last one year were recorded. Maximal mouth pressures were used for respiratory muscle strength. Peripheral muscle strength was evaluated with hand grip in the upper extremity. In the lower extremity knee extension and flexion strength were evaluated with a hand-held dynamometer. The findings of PFT performed during the regular hospital controls were obtained. GOLD stages of patients were determined according to GOLD combined assessment.

Results: Total of thirty-one COPD cases (five females, twenty-six males, age 64.80 ± 7.71 years), including nine in Group B, five in Group C and seventeen in Group D, were included in our study. There were statistically significant, negative, moderate correlations between all patients' respiratory functions and disease duration ($p < 0.05$; for FVC% r: -0.410; for FEV_1% r: -0.569; for MEF_{25-75}% r: -0.451). There was statistically significant, moderate, negative correlation between knee extension strength and numbers of exacerbations and hospitalizations over the last one year ($p < 0.05$).

Conclusion: The results of the study suggest that non-respiratory symptoms and GOLD stages should also be considered in the planning of COPD follow-up and pulmonary rehabilitation programs.

Keywords: COPD, pulmonary functions, peripheral muscle strength

Farklı GOLD evrelerindeki KOAH hastalarında pulmoner fonksiyonlar ve periferal kas kuvvetinin değerlendirilmesi

ÖZET

Amaç: Bu araştırmanın amacı, farklı GOLD evrelerdeki KOAH hastalarının solunum fonksiyonlarını, solunum kas kuvvetlerini ve periferal kas kuvvetlerini incelemek ve KOAH'da hastalığın süresi ve prognozu ile ilişkisini değerlendirmekti.

Yöntemler: Hastaların demografik bilgileri, klinik durumları, KOAH Değerlendirme Testi skoru, mMRC dispne skalası skoru, son üç ay içindeki acil servis başvuru ile hastaneye yatış sayıları, son bir yıl içindeki alevlenme öyküsü ile buna bağlı hastaneye yatış bilgileri kaydedildi. Solunum kas kuvveti değerlendirmesi için maksimal ağız içi basınç ölçümü yöntemi kullanıldı. Üst ekstremite periferal kas kuvveti dinamometre ile birlikte el kavrama kuvveti olarak değerlendirildi. Alt ekstremite periferal kas kuvveti değerlendirmesinde el dinamometresi ile diz ekstansiyon ve fleksiyon kuvveti değerlendirmesi yapıldı. Ayrıca tüm hastaların düzenli hastane kontrolleri sırasında yapılan solunum fonksiyon testi sonuçları alındı. KOAH hastalarının GOLD evrelerinin belirlenmesi GOLD birleşik değerlendirmesine göre yapıldı.

Bulgular: Araştırmaya dokuz B Grubu, beş C Grubu ve on yedi D Grubu olmak üzere toplam otuz bir KOAH hastası (beş kadın, yirmi altı erkek; yaş ortalaması 64.80 ± 7.71 yıl) dahil edildi. Tüm hastaların hastalık süresi ile FVC%, FEV_1%, MEF_{25-75}% değerleri arasında istatistiksel olarak anlamlı, negatif, orta dereceli korelasyon vardı ($p < 0.05$; FVC% için r: -0.410; FEV_1% için r: - 0.569; MEF_{25-75}% için r: -0.451). Ayrıca tüm hastaların diz ekstansiyon kuvveti ile son bir yıl içindeki alevlenme öyküsü ve hastaneye yatış sayısı arasında istatistiksel olarak anlamlı, negatif, orta dereceli korelasyon bulundu ($p < 0.05$).

Sonuç: Çalışmanın sonuçlarına göre, KOAH takibi ve pulmoner rehabilitasyon programlarının planlanmasında solunum dışı semptomlar ve KOAH evreleri de dikkate alınabilir.

Anahtar Kelimeler: KOAH, pulmoner fonksiyonlar, periferal kas kuvveti

Chronic obstructive pulmonary disease (COPD) is a common and progressive disease that characterized by airway obstruction against harmful particles and gases in the airway and lungs, and is treatable and preventable. It develops due to increased chronic inflammatory response in the lungs and airways due to toxic gases and particles. Exacerbations and comorbidities affect the severity of the disease (1, 2).

In 2012, more than three million people (6% of deaths worldwide) died from COPD. COPD is an important preventable and treatable public health problem. It is the leading source of global lifelong morbidity and mortality; many people die due to this disease or its complications. COPD is expected to become more common in the coming years around the world, as the population is older and continues to age. The severity of the disease in COPD is determined according to the GOLD (Global Initiative for Chronic Obstructive Lung Disease) guidelines (2). While determining the severity of airway obstruction with the patient's spirometric values in COPD; combined COPD assessment is made with symptomatic evaluation, number of exacerbations and hospitalizations. Airway restriction is numerically (GOLD 1-4), symptom evaluation and exacerbation risk combined with letter grouping (Group A-D) (2).

COPD causes lung parenchyma injury, resulting in structural changes in the small airways and dynamic collapse. Limitation of expiratory airflow; a reduction of the apposition zone and mechanical side effects in the chest wall, along with changes in diaphragm muscle fibers, cause air trapping and lung hyperinflation. Length of respiratory muscle fibers; shortened due to hyperinflation and increased chest wall expansion resistance, the increase in respiratory work also increases the need for respiratory muscles (3).

A mixture of various local and systemic causes was responsible for respiratory muscle dysfunction in COPD. Respiratory muscle dysfunction is thought to be caused mostly by pulmonary hyperinflation. However, additional structural factors such as tobacco use, systemic inflammation, exacerbations, vigorous exercise, dietary and gas exchange conditions, anabolic insufficiency, comorbidities and medications can also affect muscle function (4). In COPD patients, disturbance of respiratory muscle function can lead to exercise intolerance and hypercapnic respiratory failure. A higher risk of frequent hospital visits has been attributed to respiratory muscle dysfunction (5).

As it is one of COPD physiopathology's most significant extrapulmonary findings, it is the changes in peripheral muscle strength. The loss of muscle mass causes a decrease in muscle strength. Skeletal muscle atrophy is an important cause of weight loss in COPD. The cellular and molecular processes that in these patients contribute to skeletal muscle atrophy remain unclear. Immobility, systemic inflammation, hypoxia of the tissue, oxidative stress and increased apoptosis of the skeletal muscle have been identified as possible pathogenic factors, among others (6, 7). It is also possible to evaluate changes in peripheral muscle strength with hand grip strength. It has been proven that there is a decrease in hand grip strength in COPD compared to healthy individuals (8, 9).

In the light of this information, it was aimed to evaluate the respiratory functions, respiratory muscle strength and peripheral muscle strength of COPD patients in different GOLD stages clinically and to evaluate their correlation with the duration and prognosis of the disease.

MATERIALS AND METHODS

Study Place and Time

The study was held between February 2019 - May 2019 at the Health Sciences University Sureyyapaşa Chest Diseases and Thoracic Surgery Training and Research Hospital.

Subjects

Inclusion criteria in the study; being in COPD stable period and over the age of 40, the absence of abnormal laboratory findings, not having a mental problem that prevents filling the questionnaires to be used in the study, and the absence of any other respiratory disease such as asthma. The exclusion criteria from the study are; COPD exacerbation (hospitalization with acute exacerbation in the last 15 days), presence of cognitive impairment, pregnancy status, ischemic heart disease, kyphoscoliosis and advanced postural disorder, orthopedic problems and amputation surgery, emphysema, bullous lung disease, presence of bronchiectasis, previous thoracic surgery history, presence of lung cancer, advanced heart failure.

Data Collection

Demographic information of all subjects (age, gender, educational status, occupation, body weight, height, body mass index), clinical (diagnosis period) and medical status, personal history and family history, GOLD stage, COPD Assessment Test (CAT) score, mMRC Dyspnea Scale score, emergency and hospital admissions numbers in the last

three months, exacerbation and hospitalization numbers in the last one year were recorded. Maximal mouth pressures were used for respiratory muscle strength. Peripheral muscle strength in upper extremity was assessed with hand-grip; hand-held dynamometer was used in the lower extremity. In addition, the results of the Pulmonary Function Test performed during the routine controls of all patients were recorded. Informed consent was obtained from the patients who agreed to participate in the study. GOLD stages of patients were determined according to GOLD combined assessment (ABCD Assessment) (2).

Group A: Exacerbation history (0 or 1- not leading to hospital admission), Symptoms (mMRC 0-1 or CAT < 10)

Group B: Exacerbation history (0 or 1- not leading to hospital admission), Symptoms (mMRC ≥ 2 or CAT ≥ 10)

Group C: Exacerbation history (≥ 2 or ≥ 1 leading to hospital admission), Symptoms (mMRC: 0-1 or CAT<10)

Group D: Exacerbation history (≥ 2 or ≥ 1 leading to hospital admission), Symptoms (mMRC ≥ 2 or CAT ≥ 10)

a. Modified Medical Research Council (mMRC) Dyspnea Scale: The patient expresses the degree of shortness of breath according to the score between 0-4. The mMRC dyspnea scale is compatible with the health status score and other dyspnea scales and its application is simple (10, 11). Presence and degree of dyspnea in patients were evaluated with the mMRC Dyspnea Scale.

b. COPD Assessment Test (CAT): The CAT which evaluates the effects of COPD and deterioration in health status, consists of eight items that question "cough, sputum, chest symptoms, fatigue and confidence in leaving home". The reliability and validity of the scale was carried out in Turkey in 2012 by Yorgancıoğlu et al. The minimum score of 0 and the maximum score of 40 can be obtained on the scale. A high score indicates that the severity of COPD is high and the health condition is poor (11).

c. Pulmonary Function Test (PFT): PFT is performed according to American Thoracic Society (ATS) / European Respiratory Society (ERS) statement (12). The PFT results of patients' performed during their routine controls taken into consideration. The percentages of the predicted values for forced expiratory volume in one second (FEV_1), forced vital capacity (FVC), FEV_1/FVC, mid-expiratory flow rate (MEF_{25-75}) and peak expiratory flow (PEF) were used for statistical analysis (12).

d. Respiratory Muscle Strength Assessment: It is a non-invasive test that indirectly demonstrates respiratory muscle strength with maximal inspiratory pressure (PI_{max}) and maximal expiratory pressure ($PE_{max)}$. Tests were done in a sitting position. Patients were asked to perform a maximal inspiration for at least three seconds after expiration while their nose were occluded with a nose clip for evaluation. This cycle was repeated three times and the best score was recorded. In PE_{max} measurement, at least three seconds of maximal expiration was requested after maximal inspiration. The test was repeated three times, and the best score was recorded (13). Measurements were made with a portable mouth pressure measuring device (Micro Medical Micro-RPM, UK). PI_{max} maneuver was done from residual volum (RV) while PE_{max} was from total lung capacity (TLC). The percentage of the predicted values (percent) was used for statistical analysis (14).

e. Peripheral Muscle Strength Assessment:

Upper extremity: For grip strength test a manual hydraulic dynamometer was used according to the recommendations of the American Association of Hand Therapists (AETD). The patients were measured in sitting position, shoulder adduction at 90°, elbow flexion, forearm in prono- supination, neutral and wrist joints in neutral position. Three consecutive measurements were obtained by giving 60-second rest breaks between measurements. The result obtained from the average of three measurements was recorded (15).

Lower extremity: The evaluation was made with a handheld digital dynamometer. M. Quadriceps femoris strength was evaluated for knee extension. The test was applied with the "make test" technique that requires isometric contraction. (Make test is the protocol of the person applying the maximum force against the device while the meter keeps the dynamometer constant). The participant was asked to sustain maximal isometric contraction for 5 seconds after knee extension was done, and the average of three consecutive maximum contraction measurements taken at 30-second intervals was obtained (16). M. Hamstring strength was evaluated for knee flexion. The test also was applied with the "make test" technique. The participant was asked to sustain maximal isometric contraction for five seconds after knee flexion was done, and the average of three consecutive maximum contraction measurements taken at 30-second intervals were obtained (16).

Ethical Considerations

Ethical approval was obtained from the Marmara University Faculty of Medicine Clinical Research Ethics Committee (approval dated 07.09.2018, protocol number 09.2018.613); Approval letter from the İstanbul Provincial Health Directorate, which declared a work permit, was received (the letter dated 12.12.2018 approved was submitted on 25.12.2018).

Statistical Analysis

The data obtained in the study were evaluated with the SPSS (SPSS Inc., Chicago, IL, USA) 11.5 statistical package program at a 95% confidence interval, and the significance level was $p < 0.05$. The compliance of the data to normal distribution was evaluated by One sample Kolmogorov Smirnov and Spiro Wilk tests. Data that did not show normal distribution were evaluated with non-parametric hypothesis tests. Kruskall Wallis test was used for comparison of the groups. According to the results of the test, the group or groups that cause a difference are determined by the Mann-Whitney U test with Bonferroni correction, $\alpha = 0.05/ 3 = 0.0167$ was taken to show statistical significance. In addition, the relationship between respiratory functions, respiratory muscle strength, peripheral muscle strength and duration and prognosis of the disease was evaluated with Spearman's rank correlation coefficient.

RESULTS

A total of thirty-one COPD patients, nine in Group B, five in Group C, and seventeen in Group D, participated in our study. The patients' ages who included in the study were between 45-80 years and their mean age was $\dot{x} = 64.80 \pm 7.71$ years. The results of the gender of the participants 83.9% of the patients were male; 87.1% were right-dominant and 71% were primary school graduates. While three of the cases evaluated in the study were active smokers, twenty-four people quit smoking (Table 1). Twenty-one people were self-employed, eight were civil servants, one patient was retired while another one was a housewife.

Although there was no statistically significant difference between the groups for age, height, body weight, BMI and quantity of smoking (pack*year), it was observed that there was a statistically significant difference between the groups according to the year of diagnosis ($p < 0.05$) (Table 2), Group D significantly differentiated from other groups ($p < 0.0167$).

When respiratory functions and respiratory muscle strengths were compared according to the groups, no statistically significant difference was found ($p > 0.05$) (Table 3).

When the peripheral muscle strength was compared according to the groups, a statistically significant difference was found only in the hand grip strength of the dominant hand ($p < 0.05$) (Table 4). Paired comparisons were made using the Mann Whitney-U test in order to determine which groups caused the significant difference. By applying Bonferroni correction, the new significance level was accepted as 0.0167 and no statistically significant difference was found between the paired groups. When the median value was compared, group B was found to be higher than the other groups, although it was not statistically significant.

The statistically significant relationships between respiratory functions, peripheral muscle strength and disease duration and prognosis for all patients are shown in Table 5. There were negative statistically significant, negative, moderate correlations between disease duration and FVC% (r: -0.410; $p < 0.05$); FEV_1% (r: -0.569; $p < 0.05$); MEF_{25-75}% (r: -0.451; $p < 0.05$) (Table 4). It was found statistically significant, negative, moderate correlations between the number of exacerbations in the last one year and both dominant and non-dominant knee extension strength (r: -0.416; $p < 0.05$; r: -0.411; $p < 0.05$ respectively). Also there were statistically significant, negative, moderate correlations between the number of hospitalization in the last one year and both dominant and non-dominant knee extension strength (r: -0.557; $p < 0.05$; r: -0.523; $p < 0.05$ respectively).

Table 1. Demographic Features of COPD Patients

		Group B		Group C		Group D	
		n	%	n	%	n	%
Gender	Male	8	88.9	2	40	16	94.1
	Female	1	11.1	3	60	1	5.9
Dominant Side	Right	9	100	4	80	14	82.4
	Left			1	20	3	17.6
Cigarettes Use	Active smoker	1	11.1	-	-	2	11.8
	Ex-smoker	7	77.8	4	80	13	76.5
	Non-smoker	1	11.1	1	20	2	11.8
		9	100	5	100	17	100

Table 2. Comparison of Demographic Informations of COPD Groups

	GOLD ABCD	n	Median	Quarters	Chi Square	p
Age (year)	Group B	9	66	56.50-73	0.424	0.809
	Group C	5	68	62.50-70.50		
	Group D	17	65	60-70		
Height (cm)	Group B	9	167	162.50-170.50	2.166	0.339
	Group C	5	161	152.50-160		
	Group D	17	167	165-169.50		
Weight (kg)	Group B	9	72	63.40-81.15	2.48	0.289
	Group C	5	63.4	53.30-71.05		
	Group D	17	68	60.25-73.15		
BMI (kg/m^2)	Group B	9	26.8	23.50-29.95	2.126	0.345
	Group C	5	23.6	22.35-26.10		
	Group D	17	24.3	21.90-26.35		
Quantity of smoking (Pack*Year)	Group B	8	47.5	42.50-60	1.563	0.458
	Group C	4	43	40.25-50		
	Group D	15	45	35-50		
Year of diagnosis	Group B	9	5	3-10	13.837	**0.001***
	Group C	5	5	2-7		
	Group D	17	13	10-15		
	Total	31				

*p<0,05. Kruskall Wallis Test; BMI: body mass index

Table 3. Comparison of Respiratory Functions and Respiratory Muscle Strength According to COPD Groups						
	GOLD ABCD	**n**	**Median**	**Quarters**	**Chi Square**	**p**
PI_{max} %	Group B	9	79.06	59.36-104.64	0.002	0.999
	Group C	5	84.61	53.25-116.25		
	Group D	17	81.35	60.98-102.78		
PE_{max} %	Group B	9	61	46.49-71.82	0.55	0.76
	Group C	5	49.83	46.47-64.54		
	Group D	17	54.53	46.70-63.67		
FVC %	Group B	9	51	38.50-84.50	2.484	0.289
	Group C	5	64	52-68.50		
	Group D	17	47	40-57.50		
FEV_1 %	Group B	9	38	25-58	3.359	0.186
	Group C	5	42	38-47.50		
	Group D	17	33	27-40		
FEV_1 / FVC	Group B	9	55	50-62	0.825	0.662
	Group C	5	53	44.50-72		
	Group D	17	54	47-62		
MEF_{25-75} %	Group B	9	21	9-28.50	3.345	0.188
	Group C	5	21	19-24		
	Group D	17	16	12-18.50		
PEF %	Group B	9	47	35.50-54.50	2.171	0.338
	Group C	5	37	23.50-46.50		
	Group D	17	40	32.50-50.50		
	Total	31				

*p<0,05. Kruskall Wallis Test; PI_{max}: maximal inspiratory pressure, PE_{max}: maximal expiratory pressure, FEV_1: forced expiratory volume in one second, FVC: forced vital capacity, MEF_{25-75}: mid-expiratory flow rate, PEF: peak expiratory flow

Table 4. Comparison of Peripheral Muscle Strength According to COPD Groups						
	GOLD ABCD	**n**	**Median**	**Quarters**	**Chi Square**	**p**
Knee Extension Strength Dominant (kg)	Group B	9	28.62	25.90-32.65	3.145	0.208
	Group C	5	24.2	18.95-27.30		
	Group D	17	29.5	22.05-31.25		
Knee Extension Strength Nondominant (kg)	Group B	9	29.5	24.19-36.25	2.625	0.269
	Group C	5	24.2	18.95-29.20		
	Group D	17	28.5	22.15-30.95		
Knee Flexion Strength Dominant (kg)	Group B	9	19.4	15-23.80	0.137	0.934
	Group C	5	22.1	8.80-23.10		
	Group D	17	18.2	16.05-21.45		
Knee Flexion Strength Nondominant (kg)	Group B	9	18	10.95-24.60	0.361	0.835
	Group C	5	19.7	8.80-20.90		
	Group D	17	18.3	14.75-21.40		
Hand Grip Strength Dominant (kg)	Group B	9	36.1	29.55-41.85	6.335	**0.042***
	Group C	5	25.5	21.60-32.20		
	Group D	17	31.9	26.95-35		
Hand Grip Strength Nondominant (kg)	Group B	9	32.6	27.85-40.55	3.968	0.137
	Group C	5	24.6	20.65-31.75		
	Group D	17	31.5	22.90-33.75		
	Total	31				

*p<0,05. Kruskall Wallis Test

Table 5. Relationship between Respiratory Parameters and Peripheral Muscle Strength of the Patients and Prognosis and Duration of Disease

		Number of Exacerbations in the Last One Year	Hospitalization in the Last One Year	Year of Diagnosis
FVC %	r	-0.224	-0.1	**-.410**
	p	0.226	0.593	**0.022***
FEV_1 %	r	-0.184	-0.079	**-.569**
	p	0.322	0.673	**0.001***
MEF_{25-75} %	r	-0.095	0.061	**-.451**
	p	0.61	0.744	**0.011***
Knee Extension Strength Dominant (kg)	r	**-.416**	**-.557**	0.235
	p	**0.02***	**0.001***	0.203
Knee Extension Strength Nondominant (kg)	r	**-.411**	**-.523**	0.241
		0.022*	**0.003***	0.191

*p<0,05. r: Spearman correlation coefficient, FEV_1: forced expiratory volume in one second, FVC: forced vital capacity, MEF_{25-75}: mid-expiratory flow rate, PEF: peak expiratory flow.

DISCUSSION

In our research; it was foreseen that studies comparing COPD patients at different stages in the relevant literature are limited and their contribution to clarification of the subject in the clinic is anticipated.

When the demographic characteristics of the groups were compared, they showed similarities in terms of age, height, body weight, BMI and smoking. Considering the years of diagnosis, it was seen that the disease duration (median: 13 years) of group D was longer than other groups. The median of duration of disease in groups B and C was 5. According to the combined evaluation, the degree and frequency of exacerbation and symptoms were higher in group D than in the other groups (2). This situation; attributed to increasing frequency and severity of symptoms with increasing duration.

One of the respiratory function test values FEV_1 / FVC value, is the spirometric value used in the diagnosis of the disease. In addition, the expected percentage of FEV_1 is used to evaluate airway restriction (17-19). When respiratory function test results were compared in our groups, no significant difference was found. According to GOLD, it is known that there is a weak relationship between the FEV_1 value and the patient's symptoms and general health status (2). It was thought that the determination of symptoms and exacerbation based on combined assessment in our groups may be the reason for the lack of difference between values of respiratory functions.

In COPD, the function of respiratory muscles is impaired due to pulmonary hyperinflation and loss of strength is observed (20). In addition, the clinical characteristics and risk factors of COPD also affect the respiratory muscle strength. All these considerations contribute to a discrepancy between the respiratory system's mechanical requirements and the respiratory muscle's functional capability, as well as the muscle's metabolic demands and the availability of resources (21). Inspiratory muscle dysfunction is caused by the changes in the thoracic structure due to systemic inflammation that interferes with the structural properties of these muscles. This situation does not limit the ventilation capacity, but it may cause dyspnea, decreased effort capacity and respiratory failure during exacerbation (22). When the respiratory muscle strengths of the COPD patients included in the study were compared, no significant difference was found. Although there was no difference in the group comparison, respiratory muscle strength decreased in all groups compared to the expected values. Since the impairment of respiratory muscle function, especially the diaphragm, is an important predictor of survival in COPD (22), it was accepted as an outcome of our study that respiratory muscle strength evaluations are important in clinical practice.

In COPD, a decrease in peripheral muscle strength is observed along with respiratory muscle strength. In about one third of COPD patients, functional dysfunction of peripheral muscles is seen (4). Decreased peripheral muscle strength has important clinical consequences as it is associated with lower exercise tolerance and higher mortality (23, 24). In many studies conducted with M. Quadriceps, loss of muscle strength in the extremities has been shown in patients with COPD (23, 25). There was no significant difference in the comparison of lower extremity muscle strength of the cases evaluated in our study, according to the groups. It was predicted that this might be due to the difference in the number of cases between the groups.

There is also a decrease in upper extremity muscle strength (4, 23). Although there are studies showing that hand grip strength in COPD is evaluated, it decreases when compared with healthy participants, the relationship between respiratory symptoms has not been clarified (26). Also decrease in hand grip strength is associated with reduced functional capacity and worsening survival (9). In our study, upper extremity muscle strength was evaluated by hand grip strength. When the dominant side hand grip strength values of the groups were compared, a significant difference was found. No significant difference was found when further tests were performed for paired groups. B group hand grip strength median value 36.10; The median value for group C was 25.50 and the median for group D was 31.90. Although it was not statistically significant, it was observed that the hand grip strength values of group B were higher than the other groups. It is also reported in the literature that exacerbations negatively affect muscle strength (27). Parallel to the literature, high hand grip strength in group B; it was thought to be due to the fact that the history of exacerbation in group B was less than in groups C and D according to the combined assessment.

When the relationship between disease duration and respiratory function test results was evaluated, a moderate negative correlation was found with FVC%, FEV_1% and MEF_{25-75}%. As the duration of the illness increased, deterioration in respiratory functions was detected. In the literature, it has been shown that respiratory functions in COPD decrease due to disease prognosis, exacerbations and inflammation (2). Our research results were also in line with the literature.

In the study, it was observed that as the number of exacerbations and hospitalizations in the last one year, there was a decrease in both dominant and non-dominant extremity knee extension strength. It has been shown in the literature that there is a loss of strength in COPD patients, especially in the quadriceps muscle and it has been reported that quadriceps muscle strength is reduced two to four times faster in COPD (4, 25, 28, 29). It was found that the quadriceps muscle strength evaluated on the third day of hospitalization in COPD patients with acute exacerbation was less than those with stable COPD (30, 31). In addition, quadriceps strength decreased by 5% after five days of hospitalization in these patients. The association between reduced strength of quadriceps during hospitalization and less increase in walking time one month after discharge shows that there is a major and long-lasting influence on functional status of loss of strength due to hospitalization (32). Three months after discharge, the loss of quadriceps muscle strength partially improved. In other words, an exacerbation that occurs at any time negatively affects muscle strength and may jeopardize recovery (27, 31). In our study, as the number of exacerbations and hospitalizations increased in the last one year, the decrease in knee extension strength was consistent with the literature.

Study's results are important because it compared respiratory functions, respiratory muscle strength and peripheral muscle strength in different groups of COPD and investigate the relationship between duration and prognosis of the disease. For future researches planning studies including patients in group A who were not included in our study; it will create added value in the COPD clinic in terms of evaluating COPD patients and planning and applying pulmonary rehabilitation programs according to the groups and patients also it will increase the clinical benefit of patients. Muscle strength in COPD; it decreases due to chronic inflammation, exacerbations, comorbidities and drugs used. Especially the late effects of muscle strength loss after exacerbation should be taken into consideration and exercise programs specific to musculoskeletal losses should be structured in these patients. The results of the study show that non-respiratory symptoms and COPD stages should also be considered in the planning of COPD follow-up and pulmonary rehabilitation programs.

DECLARATIONS

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

Availability of Data and Material: Data are not available due to privacy and other restrictions.

Authors' Contributions: All authors contributed to the study conception and design. Material preparation, data collection and analysis were performed by BU, SUY and IO. The first draft of the manuscript was written by BU and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Healthcare Sciences and Services / Sağlık Bilimleri ve Hizmetleri

Knowledge, Attitudes and Behaviors about Hand Hygiene among Students Training in Health Departments of Two Universities

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ABSTRACT

Objective: The aim of this study was to evaluate the knowledge, attitudes and behaviors about hand hygiene among students training in health departments of two universities.

Methods: This descriptive study was conducted between January-February 2018. A total of 480 students training in nursing and elderly care/anesthesia departments were included in the sampling. Data were analyzed by SPSS 17.0 package program with using percentage, mean, chi-square test. In analysis $p<0.05$ value was considered statistically significant.

Results: Of the study group, 71,2% were female, 65,6% were in nursing department and the mean age was 20,80±1,90 years. In our study, 73,5% of the students knew that dirty hands of health workers was the main road for crossing the harmful microorganisms and it was significantly higher in nursing department ($p<0.05$). The knowledge of both practices was higher in nursing department than in elderly care/ anesthesia ($p<0.05$). Only a quarter of all students knew that the minimum time required for alcohol-based handrubbing effects on microorganisms and it was significantly higher in nursing department ($p<0.05$).

Conclusions: There was a big gap on hand hygiene knowledge, attitude and behaviors in both two departments. Gender and residence region were effective on hand hygiene behaviors.

Keywords: Hand hygiene, knowledge, attitudes, behaviors, university students

İki Üniversitenin Sağlık Bölümünde Öğrenim Gören Öğrencilerin El Hijyeni Hakkındaki Bilgi, Tutum ve Davranışları

Amaç: Bu çalışmanın amacı iki üniversitenin sağlık bölümlerinde eğitim gören, öğrencilerin el hijyeni konusundaki bilgi, tutum ve davranışlarını değerlendirmektir.

Yöntemler: Tanımlayıcı tipteki bu çalışma Ocak-Şubat 2018 tarihleri arasında yürütülmüştür. Hemşirelik, yaşlı bakımı ve anestezi bölümlerinde eğitim alan toplam 480 öğrenci çalışmaya dahil edilmiştir. Veriler SPSS 17.0 paket programı ile yüzde, ortalama, ki-kare testi kullanılarak analiz edildi. Analizlerde p <0.05 değeri istatistiksel olarak anlamlı kabul edildi.

Bulgular: Çalışma grubunun %71,2'si kadın, %65,6'sı hemşirelik bölümünde ve yaş ortalaması 20,80 ± 1,90 yıldı. Çalışmamızda öğrencilerin %73,5'i zararlı mikroorganizmaların bulaşında ana yolun sağlık çalışanlarının kirli ellerinin olduğunu bildi ve ve bu oran hemşirelik bölümünde anlamlı ölçüde yüksekti ($p <0.05$). El hijyeni ile ilgili her iki uygulamaya ilişkin bilgi hemşirelik bölümünde yaşlı bakımı / anestezisine göre daha yüksekti ($p <0.05$). Tüm öğrencilerin sadece dörtte biri alkol bazlı el dezenfektanı ile el ovma için gerekli minimum sürenin mikroorganizmalar üzerindeki etkilerini bildi ve bu oran hemşirelik bölümünde anlamlı ölçüde yüksekti ($p <0.05$).

Sonuç: Her iki üniversitenin sağlıkla ilgili bölümlerindeki öğrencilerde el hijyeni bilgisi, tutumu ve davranışları açısından yetersizliklerin olduğu belirlendi. Cinsiyet ve yerleşim bölgesi el hijyeni davranışlarında etkili bulundu.

Anahtar Kelimeler: El hijyeni, bilgi, tutum, davranış, üniversite öğrencisi

Patient safety is in the cornerstone of medical care in modern era. Health care-associated infection (HCAI) is a major problem for patient safety in worldwide. According to World Health Organization (WHO) estimates, more than 1,4 million patients are affected at any time, which has considerable impact on morbidity and mortality rates and financial burden for health systems (1).

In high-income countries, HCAI affects at least 7% of patients admitted to hospital and about 15% of those in low-income and middle-income countries (2,3).

According to a report covering European Centre for Disease Prevention and Control (ECDC), approximately 6% of patients suffer from health-related infections admitted to acute service hospitals in Europe. This rate varies between 2-10% in the member countries (4). In USA, on any given day, about one in 25 hospital patients has at least one healthcare-associated infection (5). Annual costs were estimated to be as €7 billion in Europe and US$ 6,8 billion in the USA (2). Evidence of endemic HCAI in developing countries report hospitalwide rates higher than in developed countries (6-13).

One-day prevalence surveys have found HCAI prevalence as 19,1% in Albania (13), 17,8% in Morocco (12), 17,9% in Tunisia (11) and 14,8% in Tanzania (10) hospitals.

HCAI, in the world are considered as an important public health problem, and serious efforts are also being made to prevent and control in Turkey. A protocol is signed between The Ministry of Health and the World Health Organization (WHO) which aims at "zero infection" in health service in 2018 (14).

Hand hygiene is the most effective and a simple way by building block for pathogen transmission in the maintenance of health-care delivery (15-17). Compliance of health-care workers (HCW) to hand hygiene guidelines varies from country to country, but is remains under expectations to ensure patient safety (1, 18). On average, healthcare providers compliance to less than half of the times they should (5).

The aim of this study was to evaluate the knowledge, attitudes and behaviors about hand hygiene among students training in health departments of two universities.

MATERIAL AND METHODS

This descriptive study was conducted in 2018. The population of the study was consisted of Bozok University Vocational School of Health Service and Hitit University Faculty of Health Sciences students. Students attending elderly care/anestezi departments from Bozok University Vocational School of Health Service and nursing department from Hitit Universty Faculty of Health Sciences were included in the sampling (n=480).

There were 365 nursing and 190 elderly care/ anesthesia students in these universities. The students who could not be met after three visits were excluded from the study. The questionnaires which were not completely filled were not taken for analysis. So study was completed with a total of 315 nursing and 165 elderly care/anesthesia students who filled the all questionnaire.

Data was collected through a questionnaire which was prepared in accordance with the literature review by the researchers. Knowledge, attitudes and practices related to hand washing were questioned as well as socio-demographic characteristics of students. The knowledge on hand hygiene was assessed using WHO hand hygiene questionnaire for HCW. It consists of 25 questions which had answers as "yes", "no", "true" and "false" (1).

The study was planned in accordance with the principles of Helsinki and was approved by Bozok University Clinical Research Ethics Committee (2017-KAEK-189_2018.04.11_09).

SPSS 17.0 package program was used to analyze the data. In analysis, percentage, mean, chi-square test were used. In evaluation $p<0.05$ value was considered statistically significant.

RESULTS

Study was colmpleted with 480 students. Of the study group, 50,8% were ≥20 years, 71,2% were female, 65,6% were in nursing department and the mean age was 20,80±1,90 years. Among the students 45,2% were stated that their family were residing in the western/northern region of the country and among those 50,8% were living in the city center continuously. The rate of students with nuclear family structure was 82,9%, who stayed in dormitories was 61,9% and students with social security was 97,3%. Majority of students (90,4%) stated that hand hygiene course was given to the them in the first year.

Comparison of knowledge on hand hygiene among students according to departments was given in Table 1.

About three out of every four students knew that dirty hands of health workers was the main road for crossing the harmful microorganisms among the patients in the health facility. The rate of those who knew the main transmission path of microorganisms was higher in nursing students than in elderly care and anesthesia students ($p<0.05$).

Although the rate of knowledge about source of germs causing health care-related infections was low in both departments and there was no significant difference ($p>0.05$).

Although 77,1% of the students were aware of the rapid effect of hand rubbing, this rate was higher in elderly care and anesthesia students ($p<0.05$). The knowledge of both practices was higher in nursing students than in elderly care and anesthesia ($p<0.05$).

Only a quarter of all students knew that the minimum time required for alcohol-based handrubbing effects on microorganisms. Knowledge about minimum time was significantly higher in nursing students ($p<0.05$).

More than half of all students knew which hand hygiene method should be applied in which situations. This rate was significantly higher in nursing students ($p<0.05$).

Almost all of the students in both departments were aware of situations which were should be avoided as associated with increased likelihood of colonisation of hands with harmful germs, there were no significant differences between the departments ($p>0.05$).

Table 2 showed the comparison of hand hygiene attitudes and behaviors of students according to their departments.

In the study group, 88,0% were thought they applied hand hygiene during internships. This rate was 90,5% and 83,0% among nursing and elderly care/anesthesia departments respectively. The difference between the hand hygiene attitudes of the students according to departments was significant ($p<0.05$).

The rate of those who who washed their hands 8-10 times in a day was 50% in the whole group. This rate was 56,5% in nursing department while it was 37,6% in elderly care/ anesthesia department. The frequency of handwashing was significantly different between the departments ($p<0.05$). Almost all of the students used water and soap in handwashing, but there was no difference in the type of material for hand hygiene between departments ($p> 0.05$).

Hand hygiene behaviors according to the gender of the students were given in Table 3.

Daily handwashing frequency was significantly higher among females than males ($p<0.05$). Almost all of the male and females were washing their hands with soap and water, there was a significant difference between the gender ($p<0.05$). More than half of the female students stated that their dried hands with paper towels and it was significantly higher in females than males ($p<0.05$).

Hand hygiene behaviors of students according to residence regions of their families were given in Table 4.

The frequency of handwashing and the rate of drying hands with paper towels were significantly higher among the students whose family residing in the western/northern region of the country ($p<0.05$). There was no significant difference between the regions in terms of the type of material used in handwashing ($p>0.05$).

DISCUSSION

Hand hygiene is very important in preventing hospital infections. Germs can be transmitted through the healthcare provider's dirty hands (19). There is a serious need for accurate information, positive attitude and proper practice in hand hygiene throughout basic trainings of all HCWs, although it maintains its place in the agenda (20).

In this study, three-quarters of the students generally knew the main path in cross-transmission of harmful microorganisms in hospitals (Table 1). While this result was consistent with a Sri Lankan study (21) it was higher than an Indian study (22).

Regardless of department, in our study less than one-fifth of the students knew the source of microorganism responsible for HCAI ($p> 0.05$). (Table 1). On the other hand, in two studies conducted in India, this rate has been reported to varied between 40-94% (22,23).

Table 1. Comparison of knowledge on hand hygiene among students according to departments

Knowledge	Nursing (n=315)	Elderly care / anesthesia (n=165)	Total (n=480)	p
	No.(%)	No.(%)	No.(%)	
Q1.The main route of cross-transmission of potentially harmful germs between patients in a health-care facility	248 (78,7)	105 (63,6)	353 (73,5)	**0,000**
Q2. Most common source of infection associated with infections (Germs already present on or within the patient)	48 (15,2)	25 (15,2)	73 (15,2)	0,155
Q3.Which of the following statements on alcohol-based handrub and handwashing with soap and water are true ?				
Handrubbing is more rapid for hand cleansing than handwashing (TRUE)	210 (66,7)	160 (97,0)	370 (77,1)	**0,000**
Washing the hand causes more dryness (FALSE)	117 (37,1)	51 (30,9)	168 (35,0)	**0,000**
Handrubbing is more effective against germs than handwashing (FALSE)	151 (47,9)	15 (9,1)	166 (34,6)	**0,000**
Hand washing and hand rub should be done alternately (FALSE)	190 (60,3)	75 (45,5)	265 (69,7)	**0,035**
How long is enough time for alcohol-based hand sanitizer to kill germs? (20 seconds)	92 (29,2)	31 (18,8)	123 (25,6)	**0,001**
Q4. Which type of hand hygiene method is required in the following situations?				
Before palpation of the abdomen (rubbing)	165 (52,4)	103 (62,4)	268 (55,8)	**0,035**
Before giving an injection (rubbing)	128 (40,6)	113 (68,5)	241 (50,2)	**0,000**
After emptying a bedpan (washing)	235 (74,6)	81 (49,1)	316 (65,8)	**0,000**
After removing examination gloves (rubbing)	172 (54,6)	76 (46,1)	248 (51,6)	0,786
After making a patient's bed (rubbing)	189 (60,0)	53 (32.1)	242 (50,4)	**0,000**
After visible exposure to blood (washing)	222 (70,5)	66 (40.0)	288 (60.0)	**0,000**
Q5. Which of the following should be avoided, as associated with increased likelihood of colonisation of hands with harmful germs				
Wearing jewellery (YES)	289 (97,1)	147 (89,1)	436 (90,8)	0,338
Damaged skin (YES)	288 (91,4)	149 (90,3)	437 (91,0)	0,682
Artificial fingernails (YES)	297 (94,3)	153 (92,7)	450 (93,8)	0,503
Regular use of a hand cream (NO)	227 (72,1)	106 (64,2)	333 (69,4)	0,077

Table 2. Comparison of attitudes and behaviors on hand hygiene according to students departments

Attitudes and behaviors	Nursing (n=315)	Elderly care / anesthesia (n=165)	Total (n=480)	p
Compliance hand hygiene during internships	**No.(%)**	**No.(%)**	**No.(%)**	
Yes	285 (90,5)	137 (83,0)	422 (88,0)	**0,017**
No	30 (9,5)	28 (17,0)	58 (12,0)	
Frequency of daily hand washing				
≤3 times	13 (4,2)	16 (9,7)	29 (6,0)	**0,000**
4-7 times	93(29,5)	77 (46,7)	170 (35,5)	
8-10 times	178 (56,5)	62 (37,6)	240 (50,0)	
Hands when dirty	31(9,8)	10 (6,0)	41 (8,5)	
Material use for hand hygiene				
Water and soap	305 (96,8)	164 (99,4)	469 (97,7)	0,188
Alcohol-based handrub	10 (3,2)	1 (0,6)	11 (2,3)	
Drying material for hands				
Paper towels	167 (53,0)	63 (38,2)	230 (47,9)	**0,007**
Fabric towel	132 (41,9)	88 (53,3)	220 (45,8)	
Wipe hands to the clothes	16 (5,1)	14 (8,5)	30 (6,3)	

In general, nursing students had more knowledge about effects of alcohol-based handrub and handwashing as well as methods for necessary situations. However it was not desired level in generally (Table 1). Our study was consistent with Indian and Nepal studies (20,22,24).

Only a quarter of all students knew the minimum effect of alcohol-based hand disinfectants on microorganisms (Table 1). This finding was similar to a study conducted in India (%35) and Nepal (%24) where minörity of the participants didn't know the minimum time required for hundrubbing (20). Contrary to our study, this rate was found to be 90% among nurses in Saudi Arabia (25).

In low and middle-income countries it was noteworthy that all health workers had insufficient knowledge and behavior. Studies conducted with Polish physicians and medical students (26), Iranian nurses and nurse assistants (27), Serbian doctor and auxiliary health personnel (28) were important evidence in this accordance. According to the World Bank income classification 2018 (29), Turkey was in the group of middle-high income countries and studies performed in our country knowledge and behavior of health workers were low (30).

In the present study hand hygiene behaviors were found to be very low especially among students training in elderly care/anesthesia departments (Table 2). This result overlapped with Table 1. Nursing students had more knowledge compared to elderly care/anesthesia students, This may be due to hand hygiene course in their curriculum. Nurses students also spend more time in the wards and have more chance of practicing hand hygiene.

One of the main obstacles for HCWs is hand hygiene compliance among health workers. Evidence suggested that poor hand hygiene compliance in health-care facilities an important aspects of low knowledge and poor behaviors. In worldwide average compliance was reported as 38,7% (1). On the other hand, a majority of students (%88) were self-reported compliance but this result was not compatiple with low knowledge and poor behaviors (Table 2).

In our study, it was a pleasing result that participants aware of the situations to be avoided in patient care which was compatible with other studies (20,22).

In present study, hand hygiene behaviors of female students were higher than male students (Table 3).

Table 3. Hand hygiene behaviors according to the gender of students

	Gender			p
Behaviors	**Women (n=342)**	**Men (n=138)**	**Total (n=480)**	
Frequency of daily hand washing	**No. (%)**	**No. (%)**	**No. (%)**	
≤3 times	13 (3,8)	16 (11,6)	29 (6,0)	**0,001**
4-7 times	128 (37,4)	42 (30,4)	170 (35,4)	
8-10 times	178 (52,0)	62 (44,9)	240 (50,0)	
Hands when dirty	23 (6,7)	18 (13,0)	41 (8,6)	
Material use for hand hygiene				
Water and soap	336 (98,2)	133 (96,4)	469 (97,7)	**0,023**
Alcohol-based handrub	6 (1,8)	5 (3,6)	11 (2,3)	
Drying material for hands				
Paper towels	172 (50,3)	58 (42,0)	230 (48,0)	**0,000**
Fabric towel	159 (46,5)	61 (44,2)	220 (45,8)	
Wipe hands to the clothes	11 (3,2)	19 (13,8)	30 (6,2)	

Table 4. Hand hygiene behaviors of students according to residence regions of their families

Behaviors	Region			Total (n=480)	p
	West/North (n=217)	İnner/Middle (n=142)	South/east/ South-east (n=121)		
Frequency of daily hand washing	**No. (%)**	**No. (%)**	**No. (%)**	**No. (%)**	
≤3 times	10 (4,6)	14 (9,9)	5 (4,1)	29 (6,0)	**0,010**
4-7 times	62 (28,6)	61 (43,0)	47 (38,8)	170 (35,4)	
8-10 times	126 (58,1)	56 (39,4)	58 (47,9)	240 (50,0)	
Hands when dirty	19 (8,8)	11 (7,7)	11 (9,1)	41 (8,6)	
Material use for hand hygiene					
Water and soap	212 (97,7)	140 (98,6)	117 (96,7)	469 (97,7)	0,413
Alcohol-based handrub	5 (2,3)	2 (1,4)	4 (3,3)	11 (2,3)	
Drying material for hands					
Paper towels	125 (57,6)	58 (40,8)	47 (38,8)	230 (48,0)	**0,001**
Fabric towel	80 (36,9)	78 (54,9)	62 (51,2)	220 (45,8)	
Wipe hands to the clothes	12 (5,5)	6 (4,2)	12 (9,9)	30 (6,2)	

Hand hygiene behaviors were better among students whose family residing in the western/ northern region of the country (Table 4). This may be due to the different cultural characteristics and habits of the regions.

CONCLUSION

In our study showed that there was a big gap on hand hygiene knowledge, attitude and behaviors among two health related departments. Gender and residence region were effective on hand hygiene behaviors. Through continuous pre and post-graduate programs students' knowledge and practice on hygiene should be updated which were training in health departments. Programs supported by practical laboratory sessions can be a foundation stone in this respect.

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Conflict of Interest
None

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Healthcare Sciences and Services / Sağlık Bilimleri ve Hizmetleri

Korzul Clinical Practice Attitude Scale Validity and Reliability Study

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ABSTRACT

Purpose: In this study, it was aimed to develop the "Korzul clinical practice attitude scale" in order to determine the attitudes of students in health branch, who perform clinical practices such as nursing, midwifery and elderly care program, etc., towards clinical practice.

Methods and Materials: An experiment form consisting of 44 expressions validated in terms of language and psychometry was applied to a sample of 1203 participants, of which 68% were female and whose age range was 18-34 years. In order to test the reliability of the scale, the Cronbach's alpha reliability coefficient and test-retest consistency were calculated.

Results: The developed "Korzul clinical practice attitude scale" consists of 4 sub-dimensions and 25 items, and it can explain 52.9 of the total variance for clinical practice attitudes. The total score of the scale ranges from 25 to 125, and the increase in score means a positive attitude towards clinical practice. The general Cronbach's alpha reliability coefficient of the scale was calculated as .90, which indicates high reliability.

Conclusions: According to the results, it is observed that the "Korzul clinical practice attitude scale,"of which validity and reliability study was performed for the purpose of measuring attitudes towards clinical practice, can perform measurements in a valid and reliable way.

Keywords: Clinical practice, validity, reliability

Korzul Klinik Uygulama Tutum Ölçeği Geçerlik ve Güvenilirlik Çalışması

ÖZET

Amaç: Bu çalışmada, hemşirelik, ebelik ve yaşlı bakımı gibi klinik uygulamaları gerçekleştiren sağlık alanındaki öğrencilerin klinik uygulamaya yönelik tutumlarının belirlenmesi amacıyla "Korzul klinik uygulama tutum ölçeği" nin geliştirilmesi amaçlanmıştır.

Yöntem: Dil ve psikometri açısından doğrulanmış 44 ifadelik deneme formu; % 68'i kadın, yaş aralığı 18-34 olan 1203 katılımcıdan oluşan bir örnekleme uygulanmıştır. Ölçeğin güvenirliğini test etmek için Cronbach alfa güvenirlik katsayısı ve test- tekrar test tutarlılığı hesaplanmıştır.

Bulgular: Geliştirilen "Korzul klinik uygulama tutum ölçeği" 4 alt boyut ve 25 maddeden oluşmakta olup, klinik uygulama tutumları için toplam varyansın 52.9'unu açıklayabilmektedir. Ölçeğin toplam puanı 25 ile 125 arasında değişmekte olup, puanın artması klinik uygulamaya yönelik olumlu bir tutum anlamına gelmektedir. Ölçeğin genel Cronbach alfa güvenirlik katsayısı .90 olarak hesaplanmıştır ve bu yüksek güvenilirliği gösterir.

Sonuç: Elde edilen sonuçlara göre, klinik uygulamaya yönelik tutumları ölçmek amacıyla geçerlik ve güvenirlik çalışması yapılan "Korzul klinik uygulama tutum ölçeğinin" ölçümleri geçerli ve güvenilir bir şekilde yapabildiği görülmektedir.

Anahtar kelimeler: Klinik uygulama, Geçerlilik, Güvenilirlik

Clinical practices are practices that allow students to learn by practicing/experiencing in a real setting and contribute positively to communicating with healthy/sick individuals using professional knowledge and skills and contribute positively to problem-solving and decision-making skills (1,2).

Clinical practice areas allow students to observe role models, practice alone by taking responsibility, act according to the patient's clinical situation both and individuality, make decisions, and work as a team member, giving students the opportunity to integrate the theoretical knowledge and practice taught in the school setting by experiencing and practicing in the real setting (3). The clinical settings selected in line with educational objectives contribute positively to the development of students, and it is stated that in cases when clinical education is not conducted in accordance with educational objectives and the rules of education are not taken into consideration, students learn by trial and error or imitation of examples they encounter (4,5).

The importance of clinical practice in transforming theoretical knowledge into skills and improving the professional identity of students cannot be denied (6). However, the studies conducted show that clinical practices create stress for students. Furthermore, they show that they cannot be implemented exactly as desired due to the short period of time, the lack of skill-oriented practices, the clinical setting not meeting the educational objective, problems with observing role models and work-centered studies (7–9).

One of the reasons why clinical practice cannot be implemented as desired is that students have negative attitudes towards clinical practice. Attitude is a "tendency that is attributed to an individual and forms his/her thoughts, feelings, and behaviors with regard to a psychological object on a regular basis." An attitude affects an individual's thoughts, feelings, and behaviors by harmonizing them.

One of the bases for quality health service is education which encompasses the three domains of learning; knowledge, practice, and attitude (10). Students' attitudes towards clinical practice could be affected by student-staff interaction, clinical environment, clinical preceptors, and the availability of necessary equipment in a hospital setting (11,12). If the attitude of health professionals is not favorable, the quality of health care could be compromised in a significant manner (11).

There is a significant incoherence between clinical practice and theory (13) and one of the causes of this discrepancy could be the attitude. A positive attitude towards clinical practice enhances effective clinical learning. Whereas, a negative attitude hampers the acquisition of essential clinical skills. Thus, identifying the gap in clinical practice is noteworthy for improving the quality of health professional's educations(12)

Attitudes toward clinical practice depend on close collaboration between clinical staff and school educators who are especially responsible for the students' clinical education as a preceptor (14,15). Therefore, developing high-quality clinical environments between the school and hospital are cornerstones in optimizing clinical practice (16,17). Evaluating students' diverse attitudes, in particular, provide a helpful insight to facilitate the development of effective clinical teaching strategies in education (18). Consequently, the attitudes of each student toward clinical practice must be investigated before and after clinical practice, and the results must be also respected and reflected to maximize clinical learning outcomes(19).

When attitudes are fully developed, they become a complex tendency that prepares the individual for a behavior. Thus, the individual's feelings to various objects around him/her, his/her thoughts about the object and behaviors towards them show continuity and consistency (20). Accordingly, it is thought that the positive attitude towards clinical practice will affect the behaviors of students when they start the profession and all the aspects related to the profession positively.

Proper understanding of the attitudes of students toward clinical practice and reflection of these results in planning and evaluating clinical practice are the linchpin to achieve clinical learning objectives (19). In this context, it is thought that determining the attitudes of students towards clinical practice will contribute to the development of effective teaching strategies in vocational education. However, it is observed in the literature that students studying in clinical practice areas are not a measurement tool that measures clinical practice attitudes. Therefore, the aim of this study was to develop a measurement tool that can be used to measure the clinical practice attitudes of students towards the professions involved in clinical practice. The scale, which is planned to be developed, has a unique value since it is the first measurement tool that allows measuring the clinical practice attitudes of

students who receive healthcare education and are involved in clinical practice areas.

MATERIAL AND METHODS

Design

The development of the clinical practice attitude scale consisted of several stages. These stages include the examination of the theoretical structure, ethical practices, item writing, the creation of the draft form, pilot study, expert opinion, the creation of the trial form, the application of the trial form to the sample, findings (validity and reliability), and the finalization of the scale.

Examination of the theoretical structure: At this stage, the conceptual framework of the subject was determined by reviewing the literature on clinical practice, and the previous studies on the subject were reviewed.

Ethical practices: Ethical permissions required for the study were obtained from University Scientific Research and Publication Ethics Committee (session dated 18.05.2017 and numbered 2017/3 and decision no: 9). The permission of the institutions where the data collection stage was carried out was obtained. These institutions are Bingöl University (letter dated 04.10.2017 and numbered 8836), Kafkas University (letter dated 23.10.2017 and numbered 9535), Maltepe University (letter dated 06.10.2017 and numbered 8929), Recep Tayyip Erdoğan University (letter dated 06.10.2017 and numbered 8910).

Creation of the question pool: This stage consisted of a literature review, composition writing, and focus group interview. At the stage of the literature review, studies related to clinical practice in online and printed sources were examined, and statements that might be an attitude were included in the question pool. At the composition-writing stage, students were asked to write down their feelings, thoughts, and behaviors related to clinical practice by distributing notepads to them. Afterward, the notepads in which the students had written were collected and content analyses, and the statements containing the attitudes towards clinical practice were added to the question pool. At the focus group interview stage, a group of 8 students was interviewed as recommended in the literature (21). The statements obtained during the interview process were added to the question pool. After these procedures, the question pool consisted of a total of 55 statements.

Creation of the draft form: At this stage, it was decided with the help of the expert's opinion that a 5-point Likert type of the questionnaire would be useful and convenient for this study. Likert-type scales are commonly used in instruments that measure thoughts, beliefs, and attitudes by combining multiple Likert-type questions (22,23). Likert-type scales are one of the methods for placing individuals on the psychological dimension according to the predetermined stimuli, criteria, or set of criteria (24). After deciding on the type of the questionnaire, the expert's opinion was again taken into consideration, and the questionnaire was transformed into a 5-point Likert-type draft form with the responses of "Totally Disagree," "Disagree," "Moderately Agree," "Agree," and "Totally Agree."

Pilot study: After the draft form is created, a pilot study is required to determine whether these statements are understood correctly by the sample. It is stated in the literature that 30-50 people may be sufficient for a pilot study (25). For this reason, the 55-item draft form was applied to a sample of 52 people with similar characteristics to the study sample. As a result of the application, it was determined that there were statements that were not understood or were misunderstood by students, and after the corrections were made, a draft form consisting of 49 statements was obtained.

Expert's opinion: For the content validity of the draft form, on which the necessary corrections were made after the pilot study, 6 experts (statistician, measurement and evaluation specialist, psychologist, nurse), who were academicians experienced in scale development studies and health sciences, were asked to submit their opinions. After the necessary corrections were made after the expert suggestions, the draft form was reduced to 46 statements. Afterward, this draft form consisting of 46 statements was evaluated by the experts in terms of Turkish language validity, and their opinions were received, and the questionnaire was corrected in terms of language and grammar. After the corrections, the draft form consisted of a total of 44 statements.

Creation of the trial form: The statements in the draft form were arranged as 1 = "Totally Disagree," 2 = "Disagree," 3 = "Moderately Agree," 4 = "Agree," 5 = "Totally Agree," and a trial form consisting of 44 statements was obtained.

Application of the trial form to the sample: The obtained 44-item trial form was applied to a sample of 1244 people, 68% of whom were female, and the age range was 18-34, and the mean age was 20.8 ± 0.1. The sample of the study consisted of 1203 people because of the exclusion of the participants who responded to the statements in the trial form incompletely or who were thought to have filled in the form randomly. The nonprobability sampling method was used in sample selection in accordance with the aim of the study. In nonprobability sampling, sampling units are selected consciously within the framework of certain criteria (26). Since the aim of this study was to determine the attitudes of students involved in clinical practice in the health branch towards clinical practice, only healthcare branches involved in clinical practice were included in the sample of the study. These branches include nursing (n=589), midwifery (n=133), elderly care (n=47), emergency medical technician (n=268), medical imaging (n=46), and home health care (n=120) branches. These healthcare branches were chosen because the clinical practice of the students was similar.

Two criteria were taken into consideration in determining the number of samples required for this study. One of them is the adequacy of the number of individuals to be included in the sample, and the other one is the Kaiser-Meyer-Olkin (KMO) test to determine the adequacy of the data obtained from the sample. Although there are various suggestions in the literature for the sample size to be taken into consideration in scale development studies, there is little consensus among authors regarding how large the sample should be (27). One of them is the rule of 10. According to this rule, there should be at least 10 participants per variable (26). Ho (2006) suggested that the number of samples should not fall below 100 to perform factor analysis (p.207), while Comrey and Lee stated that 100 is poor, 200 is moderate, 300 is good, 500 is very good, and 1000 is excellent (28). In the evaluation of KMO, the KMO value is considered to be excellent as it approaches 1 and unacceptable if it is below 0.50. According to this evaluation, 0.50s are considered to be poor, 0.60-0.70s as moderate, 0.80s as very good, and 0.90s as excellent (29). The fact that the number of samples is over 1000 and the KMO value is 0.952 in this study shows that the number of samples is excellent and the data obtained from the sample are adequate.

Validity and Reliability: Validity is that the measurement tool used corresponds to the feature to be measured, the data fully reflect the quality of the feature to be measured, and the data are useful for the purpose (26).

Reliability is that test or scale results accurately reveal the fact related to the conceptual structure, and the measurement tool gives similar results when applied in different locations, at different times, and in different masses selected from the same main mass (26).

In order to determine the construct validity of the scale developed to determine attitudes towards clinical practice, "Principal Component Analysis," which is one of the "Exploratory Factor Analysis" techniques, was used. The exploratory factor analysis is used to collect the items in the measurement tool under certain sub-factors (30). In factor analysis, when factors are determined for the first time, since most variables are collected in the most important factor with the highest load, they are not apparent and, therefore, difficult to interpret (31). For this reason, the "convergence" procedure is performed. At the end of convergence, factors find items that are highly correlated with them, and as a result, factors become easier to interpret (31). If there is no theoretical structure that requires factors to be correlated with each other in the convergence procedure, "vertical convergence techniques" are used, and if there is a structure that requires factors to be correlated with each other, "oblique convergence techniques" are used (30,31).

In this study, since it is thought that there may be a correlation between the factors and a structure consisting of theoretically related factors is desired to be created, the "direct oblimin technique," which is one of the oblique techniques, was used as the factor convergence technique, and the maximum iterations for convergence were used as 12. Furthermore, confirmatory factor analysis (CFA) was performed to test the resulting structure. For the internal validity of the scale, 27% subgroup-supergroup comparisons were made. Cronbach's α reliability coefficient and test-retest consistency were used for the reliability of the scale.

RESULTS

In this section, preliminary statistics and findings related to the validity and reliability of the scale are given.

Preliminary statistics

At this stage, first, the suitability of the data for factor analysis was investigated. In order to determine the suitability of the data for factor analysis, it is recommended to ensure item reliability, calculate the Kaiser-Meyer-Olkin (KMO) coefficient, and perform Bartlett's sphericity test before factor analysis (24,32).

Item reliability, i.e. mean item-total score correlation coefficients

It shows the correlation between the total scores of the five-or seven-degree scale in attitude scales (indices) and the scale/test, which may also consist of double-digit values, in knowledge and achievement tests, and the scores of each item (26). If the item-total score correlation coefficient is below .30, it should be considered that there is a problem in the item, and it should be changed or removed from the scale.

The item-total item correlation of the clinical practice attitude scale is presented in Table 1. In the analysis, it was determined that the correlation coefficients of 6 items (items M8, M20, M28, M42, M43, and M44) were below .30 and were therefore excluded from the scale. The correlation coefficients of the remaining 38 items ranged from .36 to .64.

Kaiser-Meyer-Olkin (KMO) coefficient and Bartlett's sphericity test

The KMO coefficient provides information about whether the data matrix is suitable for factor analysis and whether the data structure is suitable for factor extraction. The KMO coefficient is expected to be above .60. Bartlett's test examines the relationship between variables on the basis of partial correlations. The fact that the calculated chi-square statistic is significant can be regarded as a proof of the normality of the scores (32). The KMO value was found to be .95, and Bartlett's test result was found to be 21444.388 ($p<.0001$) for 38 items evaluated in order to develop a clinical practice attitude scale. These values indicate that the trial form is suitable for factor analysis.

Validity

While the validity of the scale was examined, construct validity and internal validity were examined. Factor analysis was used to determine construct validity, and a subgroup-supergroup comparison was performed to determine internal validity.

Construct Validity: Construct validity was analyzed by factor analysis. Factor analysis is a multivariate statistic, which aims to find and explore a few unrelated new variables and conceptually significant new variables (factors, dimensions) by bringing together the related p variables (32). Various criteria are proposed in the literature for item selection in factor analysis. The first one is related to the item factor load value. Although the factor load value of the items of 0.45 and above is a suitable criterion for selection, this value can decrease to 0.30. In this study, items with a factor load value of 0.45 and above were selected in item selection. The second criterion is that items have high load values in one factor and low load values in other factors. The difference between the two high load values is recommended to be at least .10 (30,32). In this study, this criterion was taken into consideration, and items with at least .10 value between two load values were evaluated as overlapping items and were excluded from the process. As a result of the factor analysis, 9 items with a factor load value below .45 and 4 overlapping items were excluded from the study, and the study was continued with the 25-item trial form.

Table 1. Item-Total Item Test Correlation Values

Item No	Item Corelation	Item No	Item Corelation	Item No	Item Corelation	Item No	Item Corelation
M1	.607	M12	.488	M23	.538	M34	.359
M2	.381	M13	.478	M24	.505	M35	.589
M3	.513	M14	.482	M25	.505	M36	.544
M4	.491	M15	.576	M26	.210	M37	.550
M5	.551	M16	.469	M27	.586	M38	.473
M6	.644	M17	.385	*M28	.238	M39	.535
M7	.540	M18	.583	M29	.513	M40	.576
*M8	.264	M19	.508	M30	.571	M41	.532
M9	.403	*M20	.276	M31	.530	*M42	.296
M10	.431	M21	.419	M32	.577	*M43	.284
M11	.545	M22	.487	M33	.442	*M44	.224

* Items of which the item-item total correlation value is below .30 and those removed from the scale

Exploratory factor analysis was performed to determine the factorization of the scale. The exploratory factor analysis is a process used to determine the number of headings for items (variables) in a measurement tool prepared as a draft and applied to find factors based on the relationships between the variables, and is a method frequently used to examine the construct validity of the scale (30,32). When determining the number of factors to be included in a scale, each sub-dimension must have an eigenvalue of at least 1 and above and explain at least 5% of the variance in the factor analysis. Moreover, it is accepted as a principle that the variance explained by the scale is larger than the variance that the scale cannot explain (30). In addition, examining the line graph of factor analysis is one of the methods that help researchers to decide how many factors the scale will consist of. In this study, maximum attention was paid to these criteria. While determining factors, it was ensured that each factor had an eigenvalue greater than 1 and explained at least 5% of the variance, and the total variance was over 50%, and item selection was made in this direction. As a result of the factor analysis and line graph analysis performed according to these criteria, it was decided that the scale could consist of 4 factors, each explaining at least 5% of the variance and having an eigenvalue greater than 1. Table 2 shows the eigenvalue and variance percentages of the obtained clinical practice attitude scale according to the factor groups.

Table 2. Factor Values and Variance Ratios of The Clinical Practice Attitude Scale

Factors	Eigenvalue	Variance Percentage (%)	Total Variance Percentage (%)
Factor 1	7.61	31.7	31.7
Factor 2	2.41	10.0	41.8
Factor 3	1.46	6.1	47.8
Factor 4	1.23	5.1	52.9

In this 4-factor scale obtained, the first factor explained 31.7% of the total variance, the second factor explained 10.0% of the total variance, the third factor explained 6.1% of the total variance, and the fourth factor explained 5.1% of the total variance. Together, four factors explained 52.9% of the total variance.

The first factor consists of 6 items, and the factor load values of the items vary between .509 and .828. The second factor consists of 9 items, and the factor load values of the items vary between .544 and .710. The third factor consists of 4 items, and the factor load values of the items vary between .494 and .774. The fourth factor consists of 6 items, and the factor load values of the items vary between .479 and .724 (Table 3).

Confirmatory factor analysis (CFA) was applied to the data in order to test the validity of the four-factor structure obtained from the principal component analysis. Compliance of the data obtained from the study with the measurement model was tested with X^2/sd, RMSEA, GFI, CFI, and NFI indices, and good fit criteria for each index obtained are given in Table 1. Since the X^2/sd value (4.38) of the four-factor model is less than 5, the model meets the compliance criteria in this respect. In addition, it seems to be compatible with the data in terms of the GFI=0.92, CFI=0.93, NFI=0.91, and RMSEA=0.05 indicators (33,34).

Internal validity: Whether the items, which were decided to leave in the scale, had internal validity, was tested by the "independent samples t-test." The test scores obtained from the scale were ranked from small to large, and 27% of the sample consisted of 324 people. Afterward, according to the scale score, 324 people with the lowest score were re-coded as the "subgroup," and 324 people with the highest score were re-coded as the "supergroup." The remaining persons were not included in the process. After this process, whether the difference between the subgroup and the supergroup was significant was examined by the "independent samples t-test." The findings obtained are presented in Table 4.

When the findings of internal validity were examined, it was observed that the difference between the mean scores of the clinical practice attitude scale of the subgroup and the super group was significant ($p<0.001$). According to this finding, it can be said that the clinical practice attitude scale distinguishes individuals with positive attitudes towards clinical practice from individuals with negative attitudes, in other words, it has internal validity.

Table 3. Factor Items and Item Factor Load Values					
Item No	Statement	Factor 1	Factor 2	Factor 3	Factor 4
M2	I feel sufficient in clinical practice.	.828			
M3	In practice, I see myself as a member of the clinic.	.766			
M4	I am making efforts to solve problems related to the practice.	.699			
M5	I'm trying to take advantage of clinical learning opportunities.	.663			
M1	I feel happy in the field of clinical practice.	.548			
*M6	I do not feel comfortable in the field of clinical practice.	.509			
*M18	I often disregard form integrity in clinical practice.		.710		
M27	I prefer clinical practice rather than the classroom setting.		.700		
M19	I like working with the clinical team.		.686		
M30	Clinical practice makes it easier for me to learn professional skills.		.669		
*M11	Clinical practice turns me against this profession.		.645		
*M10	I feel nervous on the day of clinical practice.		.629		
*M22	I do not think that clinical practice prepares me for the profession.		.606		
*M21	I have difficulty in following the rules in clinical practice.		.603		
M40	Being in the clinic increases my learning motivation.		.544		
M26	I find clinical practice enjoyable.			.774	
*M17	I look forward to the end of clinical practice.			.710	
M32	I think clinical practice is an essential part of my education.			.518	
*M33	In my opinion, clinical practice is a waste of time.			.494	
*M39	I feel bad as long as I am in clinical practice.				.724
M36	I would like to have a longer clinical practice.				.691
M29	Clinical practice makes me love my profession.				.585
*M9	The clinical practice environment makes me very nervous.				.531
*M16	I feel trapped in clinical practice.				.531
*M25	If I had a choice, I wouldn't want to participate in clinical practice.				.479
* Reversed items					

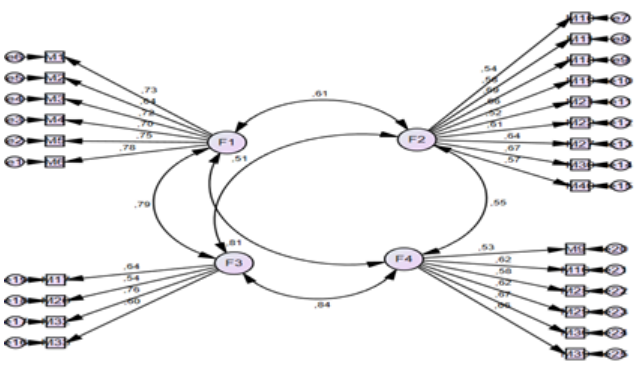

Figure 1. Confirmatory Factor Analysis (CFA) of a Four-Factor Structure

Table 4. Findings on the Internal Validity of the Clinical Practice Attitude Scale					
Group	n	Mean	Standard Error	t	p
Subgroup	324	69.65	.397	-72.840	.000
Supergroup	324	107.33	.332		
*P<0.001					

Table 5. Findings on the Internal Validity of the Korzul Clinical Practice Attitude Scale		
Factor	Factor name	Cronbach's α value
Factor I	Adoption	.846
Factor II	Harmony	.840
Factor III	Caring	.715
Factor IV	Clinical preference	.770
Total		.895

Reliability

In Likert-type scales, firstly, internal consistency should be ensured. Internal consistency is related to the extent to which the items of the scale are compatible with each other. The best way to do this is to calculate Cronbach's α reliability coefficient. In addition, reliability can be tested by means of test-retest if necessary (27,35). In this study, Cronbach's α reliability coefficient and test-retest consistency were calculated to test the reliability of the scale.

Cronbach's Alpha: Reliability coefficients can be calculated by using different methods in the development of measurement tools developed to measure cognitive and affective characteristics. One of these methods is Cronbach's alpha (Cronbach's α) reliability. It is desirable that the reliability coefficient, which can be considered sufficient in a Likert-type scale, is above .70, but it should be as close to 1 as possible (23,35). For research scales, the Cronbach's α value below .60 is unacceptable; the value between .60 and .65 is not desirable; the value between .65 and .70 is acceptable at a minimum; the value between .70 and .80 is remarkable; the value between .80 and .90 is very good, and it is suggested that the researcher should consider shortening the scale if it is far above .90 (23).

In this study, the Cronbach's α value was determined to be .90 for the overall scale. This value determined indicates that the reliability of the items in the scale is high and they aim to measure the same attitude. In other words, it can be said that this scale reliably distinguishes attitudes towards clinical practice. Cronbach's α values of the scale and its sub-dimensions are presented in Table 5.

Test-Retest Consistency

In addition to the Cronbach's α reliability coefficient, the test-retest consistency of the scale was calculated for the reliability of the scale. This method was preferred because it was not expected that there would be a significant change in students' attitudes towards clinical practice. Test-retest reliability is a measure of the ability of a measurement tool to deliver consistent results from application to application (35). In this study, the 25-item form, which was validated with 54 individuals from the study population, was applied at 4-week intervals for test-retest reliability. As a result of this application, there was no statistically significant difference between the two measurements ($p>0.05$). According to this finding, it was determined that the scale obtained was reliable and it measured attitudes towards clinical practice reliably.

Finalization of the scale

In this study, the "Korzul Clinical Practice Attitude Scale" was aimed to be developed in order to measure the attitudes of students receiving education in healthcare branches towards clinical practice. The analyses show that the Korzul Clinical Practice Attitude Scale is acceptable in terms of scope, content, and structure. The 25-item scale obtained was renumbered from 1 to 25, with item numbers ranging from small to large, and the form was finalized (Appendix 1).

Scale instruction

According to the findings obtained, it is observed that this scale, of which validity and reliability studies have been carried out, can perform measurements in a valid and reliable way in order to measure attitudes towards clinical practice.

The developed "clinical practice attitude scale" consists of 4 sub-dimensions and 25 items and can explain 52.9% of the total variance for attitudes towards clinical practice. The 1st factor consists of items 1, 5, 12, 13, 19, and 23, and its Cronbach's α reliability coefficient is .85. The 2nd factor consists of items 4, 6, 7, 10, 11, 14, 15, 16, and 20, and its Cronbach's α reliability coefficient is .84. The 3rd factor consists of items 2, 18, 21, and 24, and its Cronbach's α reliability coefficient is .72. The 4th factor consists of items 3, 8, 9, 17, 22, and 25, and its Cronbach's α reliability coefficient is .77. The overall Cronbach's α reliability coefficient of the scale was calculated to be .90, and this value indicates high reliability.

In the scoring of the scale, items 2, 3, 4, 6, 8, 9, 10, 16, 17, 20, 21, and 23 are scored inversely. The total score that can be obtained from the overall scale varies between 25 and 125. A score above 75 indicates positive attitudes towards clinical practice, and a score below 75 indicates negative attitudes. In the studies, the sub-dimensions of the scale can be evaluated separately, and researchers who require a high level of reliability and validity in their studies are recommended to carry out processes based on the total score of the scale.

The validity and reliability studies of the scale were performed with at least associate degree students in healthcare branches nursing, midwifery, elderly care program, emergency medical technician, medical imaging, and home health care. It is recommended that researchers, who will carry out studies in other branches other than

these branches, should test the reliability of the scale in their studies.

CONCLUSION AND RECOMMENDATIONS

Attitudes consist of individuals' feelings, thoughts, and behaviors towards an object of attitude. The individual's feelings, thoughts, and behaviors towards the object of attitude shape the perception of that object of attitude and relationship with the object of attitude. Therefore, the determination of attitudes towards the object of attitude will allow us to know the reactions of the person to the object of attitude in advance and to plan initiatives for this. The clinical setting, which is an important object of attitude for students involved in clinical practice, creates various positive or negative attitudes in the student. The clinical performance of the student, his/her clinical and academic achievement, quality of patient care, job satisfaction, student-team relationships, professional satisfaction, and many other factors that cannot be counted are shaped according to the developing clinical attitude of the student. For this reason, it is important to determine the attitudes of students towards clinical practice and to make initiatives for this. This developed scale is intended to provide researchers with opportunities in this regard.

Limitations and further research

There are some limitations in this study. First, this study focused on students in healthcare branches nursing, midwifery, elderly care program, emergency medical technician, medical imaging, and home health care. We have not examined other healthcare branches. Second, this study was conducted only in Turkey. Therefore, we do not know how differences between countries may affect the validity of the scale. In future research, studies should be conducted in other countries to develop a cross-culturally.

Ethical approval

Ethics committee approval was received for this study from the Non-interventional Clinical Trials Ethic Committee of University (number: 2017-E.9032).

Author Contributions

Concept/Design: YK, PT, EI; Data acquisition: EI, ÖA; Data analysis and interpretation: YK, AA; Drafting manuscript: YK, PT, EI; Critical revision of manuscript: YK, PT, EI, ÖA, AA; Final approval and accountability: YK, PT, EI, ÖA, SÇ.

Conflict of Interest

Authors declared no conflict of interest.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

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Attitudes and Practices of Operating Room Nurses toward COVID-19 in Turkey

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ABSTRACT

The aim of this study was to determine attitudes and practices of operating room nurses toward COVID-19. The study had a descriptive design. The study sample included 210 operating room nurses working between June and October 2020. The rate of the operating room nurses infected with COVID-19 disease was 12.4%. In this study, 91% of the nurses considered that insufficient precautions were taken against the COVID-19 pandemic in the operating rooms. 44.3% of the nurses wore an N95 respirator for the mean duration of 8.6+4.7 hours in operating room and 45.2% reused their masks. The most frequent precaution was disinfection of the containers for infected material using agents containing active chloride 5.000 mg/L for 30 minutes at the rate of 95.2%. 81% of operating room nurses were fearful of contracting COVID-19 infection, and 96.2% were fearful of transmitting the disease to their families. The study found that most nurses considered that insufficient precautions were taken against the COVID-19 pandemic in the operating rooms. In addition, one-third of operating room nurses stated that they had difficulty adapting during the process in COVID-19. Hospital administration should provide education at regular intervals for operating room nurses about COVID-19 and prepare workflow algorithms to facilitate their compliance.

Keywords: COVID-19, Operating room nurses, Practices, Attitudes

Türkiye'de Ameliyathane Hemşirelerinin COVID-19'a Karşı Tutum ve Uygulamaları

ÖZET

Bu çalışmanın amacı ameliyathane hemşirelerinin COVID-19'a yönelik tutum ve uygulamalarınının belirlenmesidir. Araştırma tanımlayıcı bir tasarımdı Araştırmanın örneklemini Haziran-Ekim 2020 tarihleri arasında görev alan 210 ameliyathane hemşiresi oluşturdu. COVID-19 hastalığı tanısı konulan ameliyathane hemşirelerinin oranı %12.4'idi. Çalışmada hemşirelerin %91'i ameliyathanelerde COVID-19 salgınına karşı yeterli önlem alınmadığını belirtti. Hemşirelerin %44,3'ü ameliyathanede ortalama 8,6+4,7 saat süreyle N95 maskesi kullandığını ve %45,2'si maskelerini tekrar kullandığını belirttti. En sık alınan önlem, enfekte olmuş malzeme için kapların %95,2 oranında aktif klorür 5.000 mg/L 30 dakika süreyle dezenfeksiyonuydu. Ameliyathane hemşirelerinin %81'i COVID-19 enfeksiyonuna yakalanmaktan ve %96,2'si hastalığı ailelerine bulaştırmaktan korkuyordu. Bu araştırmada, hemşirelerin çoğunun COVID-19 pandemisine karşı yetersiz önlem alındığını düşündüğü saptandı. Ayrıca ameliyathane hemşirelerinin üçte biri COVID-19'da süreç içinde uyum sağlamakta zorlandıklarını belirtti. Hastane yönetimlerinin COVID-19 salgınına yönelik ameliyathane hemşirelerine düzenli aralıklarla eğitim vermesi ve uyumlarını kolaylaştıracak iş akış algoritmalarını hazırlamaları önerilmektedir.

Anahtar Kelimeler: COVID-19, Ameliyathane hemşireleri, Uygulamalar, Tutumlar

The coronavirus disease 2019 (COVID-19) is a contagious respiratory tract disease caused by severe acute upper respiratory syndrome coronavirus-2 (SARS-CoV-2) (1). It appeared in Wuhan, China, in 2019, quickly spread worldwide, becoming a pandemic (2). At the time of writing, about 80 million people had been infected, and 2 million had died in 220 countries, according to data from the World Health Organization (WHO) (3). Diagnosis of the first COVID-19 case was confirmed in Turkey on 10 March 2020. After that, as the number of the tests increased, so did the number of the cases. Due to the increased number of cases, various isolation measures were taken, including lockdown. On 24 December 2020, the total number of the people infected with the virus reached 2.100.712, and 19.115 people had died (4). As the COVID-19 outbreak quickly spread throughout the world, the governments, health professionals and researchers in the affected countries developed policies and procedures to provide appropriate treatment and to prevent waves of rapid recurrences (5–7).

The risk of COVID-19 transmission is high in operating rooms because of the presence of patients with suspected or confirmed diagnosis of this disease, the use of high-risk equipment (surgical devices and anesthetic gases etc.) (8,9) and the closed and confined working area (10). It has been emphasized in the literature that elective surgeries should be postponed, emergency surgeries only should be performed (traumas, cancer or cardiac surgery etc.) (7) and the necessary precautions should be taken. It has also been shown that COVID-19 can lead to severe hospital infections, threatening the surgical staff (11,12). Therefore, it is important to plan and take precautions against COVID-19 regarding the following issues: use of personal protective equipment (PPE) by the surgical team, the preparation and transport of the patient for surgery, the type of surgery performed (open or laparoscopic), and the type of anesthesia and management of anesthetic gases used during surgery (8,10,12–14). In literature, there have been limited number of studies about practices against COVID-19 in operating rooms, and institutional compliance with these. The aim of this study was to determine attitudes and practices of operating room nurses toward COVID-19.

MATERIAL AND METHODS

Study Design and Sampling

This descriptive study was performed in Turkey between June 15, 2020 and October 30, 2020.

The study population included 1456 ORNs, who were members of Turkish Operating Room Nurses Association (TORN). Inclusion criteria were as follows: at least 18 years of age, able to read and write in Turkish, working in the operating room, and voluntarily participating in the study. In the determination of sample size, the formula for sample sizes within a known universe was used. The universe of the study consisted of 1456 ORNs, who were members of Turkish Operating Room Nurses Association. According to the formula of sample size within a known universe, the sample size was calculated to be 190 ORNs with a 95% confidence interval and 5% error margin. In case of the loss of the participants, the sample size was increased by 30, and 210 ORNs formed the study sample.

Data Collection and Analysis

The data were collected using a data collection form were developed by the researchers in light of the relevant literature (6–9). The study was prepared based on universal recommendations in the literature. There is not a reliable and valid scale evaluating the practices and compliance against COVID-19 disease. A pre-application was made on 5 nurses (three ORNs and two academician nurses) to determine the comprehensibility of the form. The data collection form was created electronically using Google Form. Then, this form was submitted to ORNs members of TORNA online using communication networks (e-mail, social media, etc.). Those who volunteered were invited to participate in the study.

Data collection was performed online by using a general characteristic form for ORNs and Attitudes and Practices in Operating Room Nurses toward Covid-19 Questionnaire.

General Characteristics Form for Operating Room Nurses; The form was composed of seven questions about age, gender, education, duration of overall work experience, workplace, current city, and duration of work experience in the current city.

Attitudes and Practices of Operating Room Nurses toward COVID-19 Questionnaire; The questionnaire was developed in light of the recommendations in the guidelines for COVID-19, and is composed of 55 questions about COVID-19 infection attitudes and practices in operating rooms, and compliance with these (6–9,14).

Statistical Package Program for Social Sciences 22 (IBM Corporation, New York) was used to analyze the data. Data about ORNs' sociodemographic features were performed using measures of numbers, percentages and mean values.

Ethical Considerations

This study was performed in accordance with the principles of the Declaration of Helsinki. Permission was taken from the Scientific Research Platform of the Ministry of Health (2020-07-10T14_49_31) and ethical approval was obtained from the Clinical Studies Ethics Committee of University (approval no. 2020/27, 26.06.2020). Participants joined the study after reading the informed consent form and checking the box that read *"I fully agree to participate in this study".*

RESULTS

The study comprised 210 ORNs from 123 different hospitals in 35 cities. There are four categories of hospital in Turkey: state hospitals, private hospitals, education and research hospitals, and university hospitals. Of all the ORNs in this study, 92 (43.8%) were in state hospitals, 46 (21.9%) in education and research hospitals, 41 (19.5%) in university hospitals and 31 (14.8%) in private hospitals. The mean age of the nurses was 38.75 ± 6.98 years (min=23, max:55) and the mean duration of operating room work experience was 17.61 ± 9.07 years (min=1, max=38). 85.7% of the nurses were female. 84.3% had a bachelor's degree and 14.3% had an MSc degree. 62.4% of the nurses reported working 8 hours in a day (Table 1).

81.9% participated in surgery for a COVID-19 patient and 15.7% worked in an operating room transformed into an intensive care unit. 85.2% of the nurses received education about precautions taken in operating rooms against COVID-19 pandemic and 82.4% of these received this education in the hospital where they worked. 44.3% of the nurses wore an N95 respirator for the mean duration of 8.6±4.7 hours (min=6, max=24) in operating room, 45.2% reused their masks and of these (only) 36.7% checked permeability of their masks. 91% of the nurses found insufficient precautions against COVID-19 in the theater and 12.4% of the nurses reported being infected with COVID-19. In addition, 81.9% were fearful of contracting COVID-19 infection, and 96.2% were fearful of transmitting the disease to their families. The most frequent precaution was disinfection of the containers for infected material using agents containing active chloride 5.000 mg/L for 30 minutes at the rate of 95.2%. Three quarters of operating room nurses state that if present, macroscopic contamination such as blood and bodily fluids are removed and cleaned before disinfection procedures. About half of ORNs stated that the surfaces of all the medical devices are cleaned with 1000 mg/L chloride and this must be repeated three times daily or when there is contamination and the air in spaces occupied by the staff is disinfected with a plasma air purifier or by turning on ultraviolet lamps for one hour.

Table 1. Descriptive Information about Operating Room Nurses

Descriptive Characteristics	X+ SD	Min	Max
Age	38.75	23	55
Years of experience in the operating room	17.61	1	38
	Category	**n**	**%**
Gender	Female	180	85.7
	Male	30	14.3
Education	High school + Two-year university program	33	15.7
	University	147	70
	Master of Science	30	14.3
Years of experience in the operating room	5 years or less	28	13.3
	6-10	23	11
	11-15	35	16.7
	16 years and over	124	59
Type of hospital	State Hospital	92	43.8
	Research and Education Hospital	46	21.9
	University Hospital	41	19.5
	Private Hospital	31	14.8
Daily working time	8 hours	131	62.4
	More than 8 hours	79	37.6

In addition, 93.3% of the nurses reported that the whole surgical team wore an N95 or FFP2/FFP3 respirator, 93.8% reported using only conventional methods for decontamination and sterilization of the equipment, and 81.9% received education about procedures for putting on and removing PPE. However, 75.2% of the nurses reported the failure to measure body temperatures of all the staff with an electronic thermometer and record these electronically twice daily and 52.4% of the nurses could not access spare masks when their masks were extremely dirty or damaged, or when these caused difficulty in breathing. In addition, 39% of the nurses were not certain that all the patients presenting to hospital were administered the questionnaire developed by the Turkish Ministry of Health to determine suspected or confirmed case of COVID-19 (Table 2).

Table 2. Attitudes and Practices of Operating Room Nurses toward COVID-19

	Yes		No		Not Know	
	n	%	n	%	n	%
1. Have you taken part in surgeries for patients with possible or definitive COVID-19?	172	81.9	38	18.1		
2. Some operating rooms had to be converted into intensive care units for COVID-19 cases during the pandemic. Was the case in operating room where you work?	33	15.7	177	84.3		
3. Some operating rooms had to be converted into intensive care units for COVID-19 cases during the pandemic. Did you work in these units?	58	27.6	152	72.4		
4. When you take/took part in care for COVID-19 cases, do/did you stay isolated, away from your family?	69	32.9	97	46.2	44	21
5. Have you received education about precautions against COVID-19 in operating rooms?	158	75.2	52	24.8		
6. Do you check the permeability of your mask before each use?	77	36.7	91	43.3	42	20
7. I think precautions taken against COVID-10 are sufficient.	19	9	191	91		
8. I am afraid of contracting COVID-19.	172	81.9	38	18.1		
9. I am afraid of transmitting COVID-19 to members of my family.	202	96.2	8	3.8		
10. All patients presenting to hospital are administered the questionnaire prepared by the Ministry of Health to determine possible or definitive COVID-19 cases.	101	48.1	27	12.9	82	39
11. Health professionals are either assigned to care to COVID-19 cases, or those offering care to other patients, or they give care to both groups of patients.	171	81.4	34	18.6		
12. Health care workers wearing insufficient PPE are not allowed to work while the infectious diseases team evaluates them.	90	42.9	75	35.7	45	21.4
13. Body temperatures of all the staff are measured with a digital thermometer and recorded in an electronic database.	45	21.4	158	75.2		
14. All cleaning staff receives education about the rules that they have to obey to prevent COVID-19.	130	61.9	31	14.8	49	23.3
15. Elective surgeries have been postponed and only emergency surgeries (for traumas, cancers, aneurism and appendicitis etc.) are performed.	89	42.5	121	57.6		
16. Work flow algorithms directed towards prevention of COVID-19 in the operation rooms are available	158	75.2	52	24.8		
17. There are suitable places where the staff can put on and take off their PPE	142	67.6	68	32.4		
18. Education about how to put on and take off PPE has been/is offered to all the staff.	172	81.9	38	18.1		
19. Information about COVID-19 pandemic is available on the hospital website or sent to all through email.	166	79	20	9.5	24	11.4
20. Patients scheduled to have surgery are immediately operated without losing time considering whether these patients may have COVID-19.	130	61.9	80	38.1		
21. Doctors and nurses wear all PPE (caps, N95 or FFP respirators, googles or facial shields, two pairs of gloves and shoes covering feet completely) during examination of the patient before surgery.	121	57.6	60	28.6	29	13.8
22. Patients with possible or definitive COVID-19 are transferred from the ward to the operating room by a nurse wearing N95 or FFP respirators, googles/facial shields, water-proof aprons and overshoes completely covering the feet.	124	59	56	26.7	30	14.3

Table 2. Attitudes and Practices of Operating Room Nurses toward COVID-19 (Continuation of Table 2)						
	Yes		No		Not Know	
	n	%	n	%	n	%
23. There is a small, isolated surgical complex in the operating room accessed through a separate entrance to perform surgeries for patients with possible or definitive COVID-19.	134	63.8	76	36.2		
24. All unutilized equipment is taken out of the operating room.	145	69	56	26.7		
25. All the members of the surgical team wear a surgical gown, a water-proof suit and a sterilized surgical apron, in that order.	170	81	40	19		
26. All the members of the surgical team wear N95 or FFP2/FFP3 respirators	196	93.3	14	6.7		
27. To extend the use of an N95 respirator, we wear a surgical mask over it.	186	88.6	24	11.4		
28. All the members of the surgical team wear protective goggles.	163	77.6	47	22.4		
29. The staff members wear a facial shield when aerosols spread during surgeries.	178	84.8	32	15.2		
30. The number of the health professionals in the surgical team is kept at minimum and the mobility of the surgical team inside and outside the operating room is minimized.	188	84.8	22	15.2		
31. The surgical team members do not wear accessories like a wrist watches, rings or bracelets during surgeries in the pandemic.	141	67.1	69	32.9		
32. The surgical team members keep such devices as phone or pager in plastic shields.	108	51.4	76	36.2	26	12.4
33. The gloves worn under the sterilized surgical gloves are washed with antiviral agents or alcohol-based antiseptics.	130	61.9	80	38.1		
34. We prefer to use extended cuff gloves reaching well above the wrist during surgery.	95	45.2	115	54.8		
35. The surgical team members have a shower and change their clothing after taking off all their PPE.	121	57.6	89	42.4		
36. There are intervals of at least two hours after each surgery.	100	47.6	82	39	28	13.3
37. During the two-hour intervals, the operating room is cleaned three times at 30-minutes intervals.	84	40	126	60		
38. Surgeries are not performed at night if possible.	115	54.8	18	8.6	77	36.7
39. If patients have no signs of COVID-19 or proven COVID-19, they are not given treatment for the disease.	168	80	42	20		
40. Patients diagnosed as COVID-19 are given treatment for the disease.	176	83.8	34	16.2		
41. Disposable equipment is put in the biological waste bags.	145	69	44	21	21	10
42. No additional procedures are needed for decontamination and sterilization of the surgical equipment, except for normal sterilization procedures.	197	93.8	13	6.2		
43. If present, macroscopic contamination such as blood and bodily fluids are removed and cleaned before disinfection procedures.	157	74.8	22	10.5	31	14.8
44. The surfaces of all the medical devices are cleaned with 1000 mg/L chloride and this must be repeated three times daily or when there is contamination.	114	54.3	70	33.3	26	12.4
45. The air in spaces occupied by the staff is disinfected with a plasma air purifier or by turning on ultraviolet lamps for one hour.	104	54.3	33	12.4	73	33.3
46. Containers for infected material are disinfected with 5.000 mg/L active chloride for 30 minutes.	200	95.2	10	4.8		
47. I can access a spare mask when my mask is extremely dirty or damaged or when I have difficulty breathing.	99	47.1	111	52.9		
48. It was easy to convert the operating room for COVID-19 pandemic in our hospital.	1102	52.4	68	32.4	32	15.2
49. It was easy to educate the operating room staff, and they readily complied with the pandemic process.	127	60.5	83	39.5		

DISCUSSION

Health professionals are three times more likely to contract COVID-19 compared to the general population (15); the rate of the health professionals with COVID-19 positivity ranges from 1.5% to 20.7% (10,16,17). Consistent with the literature, in the present study, 12.4% of the ORNs were found to have contracted COVID-19.

The main factors increasing the risk of contracting COVID-19 are insufficient precautions for prevention of the infection, and inability of the healthcare systems to manage the pandemic (18). Ti et al. proposed that use of algorithms and protocols about how to deal with COVID-19 cases in operating rooms can reduce the risk of transmission.(8) In the current study, 75.2% of the ORNs reported that a written work flow was used in the operating rooms, which is congruent with the literature (8,19). Forty-eight-point-one percent of the nurses implemented the questionnaire created by the Ministry of Health to detect possible COVID-19 cases; however, 39% reported no awareness of the questionnaire. ORNs' lack of awareness may be because this questionnaire is conducted in the preoperative period.

Transmission routes for COVID-19 are coughing, sneezing and spread of large droplets containing viral particles.(20) These droplets can be suspended in the air for a few seconds and can travel a short distance before descending to the ground due to their weight (21,22). However, the droplets may lose their liquid content, diffuse into air and produce aerosols during such procedures as intubation, extubating, tracheal aspiration, use of electrical devices and medical gases and endoscopic examinations (23). These aerosols can remain in the air for as long as three hours, and even longer on surfaces. COVID-19 can result from inhalation of these aerosols or contaminated hands coming into contact with the mouth, nose or eyes (23). Since conventional surgical masks do not protect against these aerosols, it is recommended that N95 or FFP respirators should be utilized (24). In the current study, 93.3% of the ORNs utilized N95 or FFP2/FFP3 respirators during surgery and 84.8% also used face shields. The mean duration of wearing masks was 7.6±4.3 hours; 44.3% of the nurses reused their masks and 29.5% used them for longer period. Reusing a mask refers to wearing the same N95 respirator during surgery for multiple patients and removing it at certain intervals. In many guidelines (CDC, FDA, OSHA, WHO), longer use of masks is recommended rather than reusing the same mask. It is important to adopt the policy of single use of N95 respirators in suspected or confirmed case of COVID-19, since their long-term use or limited reuse poses the risk of droplet infection, of disrupted filtration efficacy, of cross contamination during storage, and of contamination during attachment and removal (7).

Two important needs of the health professionals during the pandemic have been reported as being PPE and adequate rest periods (25). In the present study, about half of the nurses reported being able to access a spare mask. It is stated in the literature that masks are the PPE most frequently needed by health professionals, and that (only) about half of health professionals have access (26,27). Guidelines directed towards reduction of COVID-19 transmission recommend that health professionals are classified either as frontline healthcare workers or others (7). In the current study, 81.9% of the nurses were frontline health workers. Health organizations should take further precautions in addition to temperature measurements to determine whether health professionals have be exposed to COVID-19. In this study, only 21.4% of the ORNs reported that their body temperatures were measured with a digital thermometer twice daily.

It is important to plan and implement precautions against the spread of COVID-19 pandemic in operating rooms. In the present study, 81.9% of the nurses reported receiving education about the appropriate wearing and removal of PPE, 75.2% reported receiving education about precautions to be taken in operating rooms, and 79% reported that information about COVID-19 pandemic was available on their hospital website. However, 91% of the nurses found the precautions taken insufficient, possibly due to their fear of contracting COVID-19. Health professionals experience anxiety due to the sudden outbreak of the pandemic, its rapid spread and lack of information about exposure to and treatment for the disease. Consistent with the literature, the present study revealed that 81.9% of the nurses feared being infected and 96.2% feared transmitting the disease to family members. ORNs' limited experience of respiratory tract diseases may lead to greater difficulty in stress management and increased anxiety (28).

It is necessary to take isolation precautions during surgery for COVID-19 cases, in addition to pre-existing measures; it is recommended that ORNs be supplied with third-line precautions (N95 respirators, disposable water-proof aprons, protective googles, face shields and foot protectors) in addition to first-line precautions taken under normal conditions (disposable caps, surgical aprons, medical

masks and gloves).(29) In the present study, high rates were found for the use of surgical gowns, water-proof suits and sterilized surgical aprons in order (81%), facial shields (84.8%), protective googles (77.6%) and masks (93.3%), consistent with the results of the relevant studies (19). However, only about half of the nurses' PPE included an N95 or FFP respirator, googles/facial shields, water-proof aprons, and overshoes completely covering the feet while evaluating and transferring suspected or confirmed case of COVID-19.

Postponement of elective surgeries, avoidance of surgery at night and allocation of negative-pressure operating rooms for COVID-19 cases are recommended to prevent cross infection (30). In the current study, 42.5% of the nurses reported that elective operations were postponed, and 54.8%, that surgeries performed at night were minimized. In fact, 57.6% of the ORNs said surgeries were not postponed. This may be because cancer and emergency surgeries are more frequently carried out in these hospitals. It can also be associated with the time of data collection, when pandemic-related restrictions were loosened, allowing an increase in the number of surgeries. Forty percent of the nurses in this study noted that surgeries were performed at two-hours intervals, during which the operating rooms were appropriately cleaned. Lack of a sufficient interval between surgeries may lead to improper cleaning of the equipment and increased risk of transmission. Therefore, intervals of at least one-hour between surgeries are recommended so that all surfaces, including screens, keyboards, cables, monitors and anesthesia machines, can be decontaminated (8). In the current study, although about half of the nurses reported unproblematic conversion of the operating rooms for COVID-19 cases. In fact, it was more difficult for hospitals to adapt operation rooms during COVID-19 pandemic, possibly due to inappropriate architectural designs of the operation rooms, staff shortages and financial problems.

To conclude, most of the ORNs reported using PPE and receiving education for it. However, they also considered that the precautions taken were insufficient. ORNs' mean years of operating room experience, combined with their lack of experience providing care for patients with respiratory/droplet infections, may have caused anxiety while offering care to COVID-19 cases. Therefore, it can be recommended that information on precautions against respiratory/droplet infections and management of infected patients should be incorporated into in-service training programs, nursing curricula, and certificate programs for operating room nursing. More than one third of the ORNs reported difficulties in converting operating rooms during COVID-19 pandemic and adapting to this process. To facilitate the conversion of operating rooms and the adaptation of health professionals, hospital administration should give regular structured education to health professionals and create workflow algorithms.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Healthcare Sciences and Services / Sağlık Bilimleri ve Hizmetleri

The Effect of Chronic Kidney Disease Treatment on The Quality of Life Assessed by Using SF-36 in Turkey: A Systematic Review

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ABSTRACT

Objective: Quality of life assessment of chronic kidney patients is becoming increasingly common in both research and clinical practice. One of the most commonly used tools for quality of life measurement is the SF-36. The aim of the study is to make a systematic analysis of researches on adult patients receiving hemodialysis treatment and measures the quality of life using the SF-36 in Turkey.

Materials and Methods: Researches in the literature on quality of life were determined by using data sources. The studies that did not meet the criteria determined within the scope of the study were eliminated and in total 28 studies conducted between 2013-2019 including 3028 patient samples were reached.

Results: The mean age of the samples was 53.06(±5.62) years; the mean duration of hemodialysis treatment was 4.97 years and the mean of female patients was 44.64%. Researches were mostly applied in Marmara Region. 40% of the studies examined the effects of anxiety and depression and 11% of the studies examined the effects of self-care and coping skills on quality of life. When the means of the SF-36 were examined, it was found that the lowest subdimension averages were "Role Physical" and "General Health". In addition, the patients' physical quality of life was found to be less than the mental dimension.

Conclusion: In general, when the findings are evaluated, it is seen that chronic kidney patients have a greatly decreased quality of life. With this research findings, a general view has been put forward. Thus, it is thought that it will guide researchers about chronic kidney disease management.

Keywords: Quality of Life; Chronic Kidney Disease; Systematic Review; Turkey

Kronik Böbrek Hastalığı Tedavisinin Türkiye'de SF-36 Kullanılarak Değerlendirilen Yaşam Kalitesi Üzerine Etkisi: Sistematik İnceleme

ÖZET

Amaç: Kronik böbrek hastalarının yaşam kalitesi değerlendirmesi hem araştırma hem de klinik uygulamada giderek yaygınlaşmaktadır. Yaşam kalitesi ölçümünde en sık kullanılan araçlardan biri 36 maddelik Kısa Form Yaşam Kalitesi'dir (SF-36). Bu çalışmanın amacı, Türkiye'de hemodiyaliz tedavisi alan yetişkin hastalar üzerinde yapılan ve Türkiye'de SF-36'yı kullanarak yaşam kalitesini ölçen araştırmaların sistematik bir analizini yapmaktır.

Gereç ve Yöntem: Literatürde yaşam kalitesi üzerine yapılan araştırmalar veri kaynakları kullanılarak belirlenmiştir. Araştırma kapsamında belirlenen kriterleri karşılamayan çalışmalar elenmiş, 2013-2019 yılları arasında yapılmış ve toplamda 3028 hasta örneklemine sahip 28 çalışmaya ulaşılmıştır.

Bulgular: Örneklemin ortalama yaşı 53,06(±5,62); hemodiyaliz tedavisi aldıkları ortalama süre 4,97 yıl ve kadın hastaların ortalaması %44.64'dür. Araştırmalar daha çok Marmara Bölgesi'nde uygulanmıştır. Çalışmaların %40'ı anksiyete ve depresyonun, %11'i ise öz bakım ve baş etme becerilerinin yaşam kalitesi üzerindeki etkilerini incelemiştir. SF-36 ortalamaları incelendiğinde, en düşük ortalamanın "Fiziksel Rol" ve "Genel Sağlık" alt boyutları olduğu bulunmuştur. Ayrıca hastaların fiziksel yaşam kalitesi boyutu, zihinsel yaşam kalitesi boyutundan daha az bulunmuştur.

Sonuç: Genel olarak bulgular değerlendirildiğinde kronik böbrek hastalarında yaşam kalitesinin önemli ölçüde azaldığı görülmektedir. Bu araştırmanın bulgularına genel bir bakış getirilmiştir. Bu nedenle araştırmacılara kronik böbrek hastalığı yönetimi konusunda rehberlik edeceği düşünülmektedir.

Anahtar Kelimeler: Yaşam Kalitesi; Kronik Böbrek Hastalığı; Sistematik İnceleme; Türkiye

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Chronic diseases are increasing gradually around the World and put burden on patients, service providers and health system. According to the National Turkey Burden of Disease Study (2013), the rate of life-adjusted years of chronic diseases (DALY) constitutes 81% of the total disease burden (1). The World Health Organization (WHO) stressed that chronic diseases kill 40 million people each year, which is equivalent to 70% of all deaths (2). Chronic diseases are a global public health problem, both with high mortality and increased health spending.

Chronic kidney disease is also caused by different chronic diseases and irreversibly changes the structure of renal function (3). Chronic kidney disease is a global health problem with its increasing incidence (4) and it is the twelfth most common cause of death (5) and is associated with increasing global health problems such as diabetes and hypertension (6). Treatment methods such as dialysis and renal transplantation make kidney disease one of the most costly diseases with increasing costs. All these results show that chronic kidney disease puts great burden on patients and health systems. Effective management of the disease to minimize this burden is only possible by establishing a disease management model that will improve health outcomes (6). In this sense, measuring health outcomes is very important.

Quality of life comes to the forefront as one of the most frequently used methods in evaluating health outcomes (7). It is important to evaluate the quality of life, to document the burden of chronic diseases, to monitor changes in health over time, to evaluate the effects of treatments and to measure the return on health investments (8, 9). Patients with chronic kidney disease spend the majority of their lives on dialysis treatment, the effects of symptoms such as fatigue and fatigue after dialysis treatment, their dependence on their relatives, may cause poor physical and mental quality of life (10, 11).

Quality of life assessment of chronic kidney patients is becoming increasingly common in both research and clinical practice. One of the most commonly used tools for quality of life measurement is the 36-item Short Form Quality of Life (SF-36). This scale is frequently used to provide summary information for the health outcomes of chronic patients, so this is the reason why this scale is handled within the scope of this research. This scale has two dimensions: physical and mental quality of life. These dimensions have 4 sub-dimensions in themselves and there are 8 sub-dimensions in total. "Physical function, role physical, pain and general health" are the sub-dimensions of physical quality of life dimension. "Vitality, social function, role emotional and mental health" are the sub-dimensions of mental quality of life dimension (12).

The aim of this study was to review the findings of the study aiming to determine the quality of life of patients with chronic kidney disease and receiving hemodialysis treatment and to present a general view on the quality of life of the patients. For this purpose, it was aimed to summarize the quality of life scores of the quality of life studies measured using the SF-36 scale in the sample of chronic kidney patients, to see the distribution of the studies over the years, to reveal their relationships with other variables, and to determine the common direction and basic tendencies of these studies and to make a systematic review. On the other hand, it is thought to be important in terms of guiding the researchers who want to contribute to this field.

MATERIAL AND METHODS

The aim of the study is to make a systematic analysis of researches on adult patients with chronic kidney disease, receiving hemodialysis treatment and measures the quality of life using the SF-36 in Turkey. Within the scope of the study, firstly the researches in the literature about quality of life were determined by using appropriate data sources. Google academic, PubMed, Ebscohost, ISI Web of Knowledge, ProQuest, Science Direct, Scopus electronic databases were scanned. Scanning is performed using "quality of life", "SF-36", "chronic kidney disease" and "hemodialysis" keywords.

Eliminations were made according to the criteria determined by the researcher. Studies that meet the following criteria are included in this research:

1. Studies have been made in Turkey
2. Performed in a sample of patients with chronic kidney disease and receiving hemodialysis treatment
3. Quality of life was assessed using the SF-36 scale
4. All take place as the mean and standard deviation for the 8 dimensions of the SF-36 scale study

In line with the above criteria, compiled studies without research, studies that measure the quality of life with

other measurement instruments other than SF-36, studies that did not include sufficient information about scale dimensions were excluded from the scope of this study. The flow chart for the selection of the researches is summarized in Figure 1.

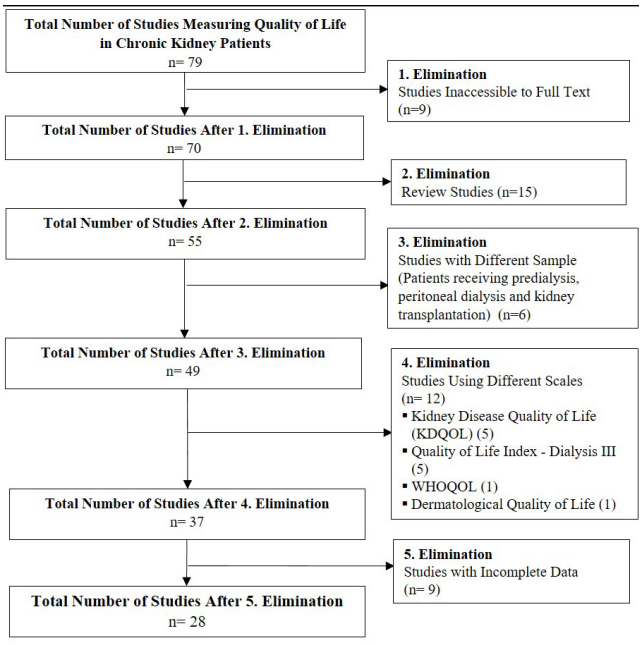

Figure 1. Flow chart for selection of research to be evaluated within the scope of the study

A total of 79 studies measuring the quality of life of chronic kidney patients were reached after screening from the databases. The full text of 9 of these studies could not be reached. 15 of the studies are review article, 12 of them used scales other than SF-36 and there is a lack of data in 9 of them. 6 of them in the sample group, hemodialysis patients were not included. After the studies that did not meet the criteria were excluded, 28 studies were reached conducted between 2013-2019 and these studies constituted the sample of this study. The 28 studies included in the study have a total of 3028 patient samples.

Studies within the scope of the research; type of publication, year of publication, number of samples, mean age of patients in the sample group, duration of dialysis, gender, type of health institution where researches were applied, regions and variables examined with quality of life were investigated. In addition, subscales of the SF-36 "physical function, role physical, pain, general health, energy, social function, role emotional and mental health" dimensions of the average and confidence intervals distributions were given to provide an overview of the quality of life of chronic kidney patients.

RESULTS

When the publication types of the 28 studies included in the research were examined, it was determined that 39.3% of the studies were master's thesis, 28.6% were articles, 21.4% were specialized in medicine and 10.7% were doctoral dissertations. Figure 2 shows the distribution of the researches by years within the scope of the study. When the distribution of the studies by years is examined, it is seen that they were published between 2003 and 2019. About half of the researches were published in 2015 and beyond.

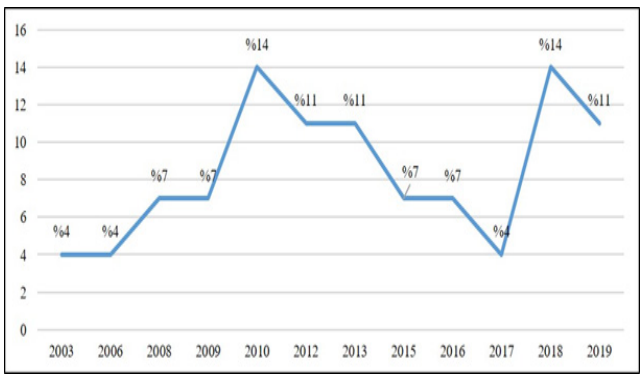

Figure 2. Distribution of studies by years (%)

Table 1 summarizes the information about the researches covered in the study. When the sample numbers of the researches are examined, it is seen that the number of samples varies between 30 and 446 and the average number of samples is 108.14. The mean age of the samples was 53.06(±5.62). The mean duration of hemodialysis treatment was 4.97(±1.37) years. When the gender distributions of the sample were examined, it was found that at least 34% of the patients and at most 57,50% of the patients were women. The average of female patients was 64%.

When the type of health institutions where the researches were applied was examined, it was found that the researches were mostly applied in university hospitals and private dialysis centers. When the geographical regions where the researches are applied are examined, it is seen that the Marmara region is in the first place. (42.86%). This situation shows that almost half of the researches took place in the Marmara Region sample. Istanbul is the city where most of the research done in the Marmara Region.

Table 1. Information about the researches in the study				
	Mean	**Sd.**	**Min.**	**Max.**
Sample size	108.14	84.72	30.00	446.00
Mean age	53.06	5.62	41.01	64.30
Mean hemodilaysis treatment duration (years)	4.97	1.37	2.40	8.20
Women (%)	44.64	7.25	34.00	57.50
	n		**%**	
Type of health institution where the research took place*				
Public hospital	8		23.53	
University hospital	12		35.29	
Free-standing dialysis center	12		35.29	
Private hospital	2		5.88	
Geographical Regions where the research took place				
Marmara Region	12		42.86	
Central Anatolia Region	5		17.86	
Black Sea Region	3		10.71	
Mediterranean Region	2		7.14	
Aegean Region	2		7.14	
Eastern Anatolia Region	2		7.14	
Southeastern Anatolia Region	1		3.57	
not mentioned	1		3.57	
Other variables examined with quality of life*				
Anxiety, Depression	18		40.00	
Self-Care Power, Coping Skills	5		11.11	
Nutritional Status	4		8.89	
Sleep Quality	4		8.89	
Training Provided by Health Personnel	4		8.89	
Other**	10		22.22	

* Percentages were calculated on the basis of column totals, since one study was conducted in more than one health institution and more than one variable was used in one study.
** Adherence to Treatment, Health Literacy, Care Burden, Sexual Function, Illness Perception, Life Satisfaction, Social Support, Pain, Psychological Endurance, Gastrointestinal Disorders

When the distribution of the variables discussed together with the quality of life were examined, 40% of the studies examined the effects of anxiety and depression, 11.11% of the patients' self-care power and coping skills on quality of life. Nutritional status of the patients, sleep quality and the effect of the education provided by the health personnel on the quality of life are the other studied topics.

Figure 3 shows the SF-36 quality of life dimensions' mean, minimum and maximum values and the prevalence of the means in the 95% confidence interval. When the average distribution of the dimensions is examined, it is seen that the lowest average belongs to the dimensions of Role Physical (35.67±18.14) and General Health (38.03±8.81). The dimensions of Pain (57.01±14.50) and Social Function (55.17±14.75) were the highest average. In general, when the averages of all dimensions are evaluated, it can be said that chronic kidney patients have a greatly reduced quality of life.

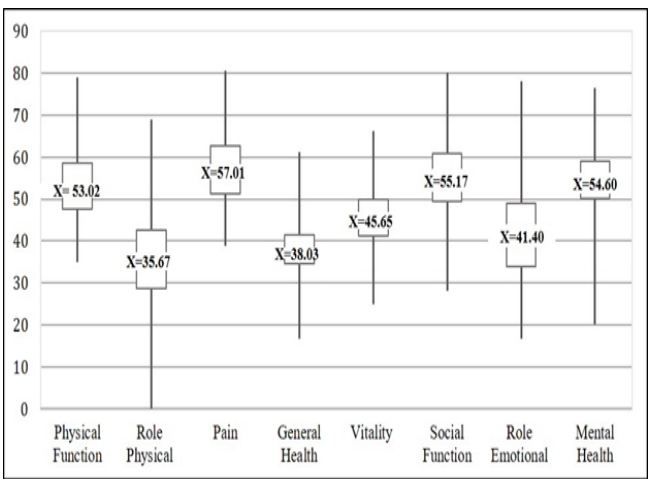

Figure 3. Mean distribution of SF-36 quality of life subscales

On the other hand, when the distribution ranges of the averages are examined; The difference between minimum and maximum mean values of physical role, emotional role difficulty and mental health dimensions is high. The wide distribution range of these dimensions shows that the distribution is heterogeneous. That is to say, there are large differences between the results of research on these dimensions.

Figure 4 shows the average distribution of SF-36 physical and mental quality of life dimensions of the 28 studies in the study. When both distributions are examined, it is seen that they take values between 25 and 70 average. The mean of Physical Quality of Life dimension was found to be 45.89(±11.41) and the average of Mental Quality of Life dimension was 49.20(±10.73). The average physical quality of life of patients was found to be less than the mental quality of life in almost all studies.

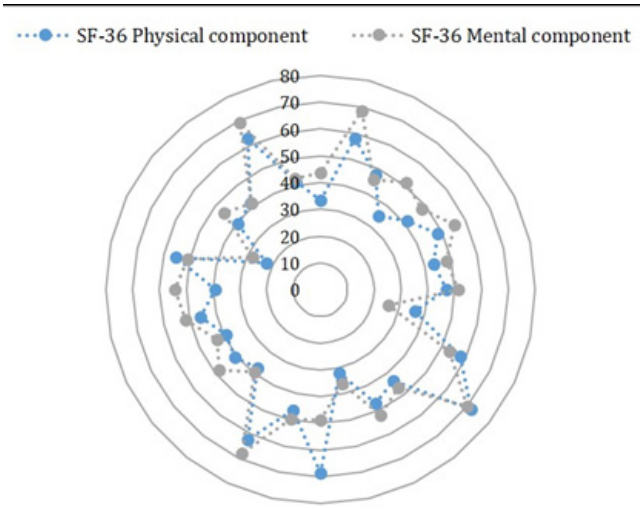

Figure 4. Mean distribution of sf-36 physical and mental quality of life dimensions

DISCUSSION

Improving the quality of life of patients with chronic diseases is one of the main goals of health care. Evaluation of quality of life allows to determine the burden of the disease on the patient, the effect on the patient's life and patient satisfaction. By compiling the results of the studies investigating the quality of life of patients with chronic kidney disease in Turkey, intended to reveal general view of patients' quality of life and basic trends.

As a result of the study, when the gender distribution average of the studies was examined, it was seen that 44.64%(±7.25) of the patients were female. Similar to this research, Nişel et al. (2016) conducted a comparative analysis about patients receiving dialysis treatment in Europe, Japan, America and Turkey by country. They were determined that 57.9% of patients in European countries, 62.6% of patients in Japan, 52.8% of patients in the United States and 55.1% of patients in Turkey were male. The mean age of the patients included in the study sample was found to be 53.06 (13). Department of Health Technology Assessment (2017) report on the work they have done throughout Turkey, the average age of patients with chronic kidney was calculated as 52.28±16.74 (14). Ricardo et al. (2013), in their study, the average age of patients receiving dialysis treatment is 57.00±11.06 (15). The average age of patients in the study of Chow and Tam (2014) is 58.21±15.22 (16). This may be due to the prevalence of chronic kidney disease in middle-aged and older patients.

In the samples of the studies, patients' mean duration of hemodialysis treatment was found to be 4.97(±1.37). Kim et al. (2013) found that 30% of the patients in their study received dialysis treatment for more than 5 years (17). Nişel et al. (2016) conducted a comparative analysis of patients receiving dialysis treatment by country. Approximately 45% of Turkish patients, 40% of patients in Japan, 24.1% of patients in Europe and 12.1% of patients in America have been on hemodialysis treatment for more than 7 years (13).

When the average distributions of SF-36 quality of life dimensions of the studies were examined, it was found that the average physical quality of life of the patients was less than the mental quality of life. In addition, the lowest mean of the sub-dimension was found to be Role Physical (35.67±18.14) and General Health (38.03±8.81). Wyld et al. (2019) found that the physical quality of life score of the patients was lower than the mental quality of life as a result of their research with the data of 1112 chronic kidney patients in Australia (18). Martini et al. (2018), in their study with patients receiving dialysis treatment, stated that the lowest subdimension average was General Health (51.6 ± 13.9) (19). In their study with 256 chronic kidney patients, Kefale et al. (2019) found that the lowest subdimension means were Role Physical (44.3±41.9) and Pain (49.3±26.2) (20). Soni et al. (2010) compared patients with different stages of chronic kidney disease and concluded that Role Physical and General Health were the lowest subdimensions in all stages (21). In general, when the findings are evaluated, it can be said that chronic kidney patients have a greatly decreased quality of life. Determining the quality of life levels of patients and determining the factors that affect this level are important for disease management.

When the distribution of the variables discussed together with the quality of life were examined, 40% of the studies examined the effects of anxiety and depression, 11.11% of the patients' self-care power and coping skills on quality of life. In future studies, it may be suggested to plan studies with variables such as relations with physicians, nurses and other dialysis personnel, satisfaction level from the institution, patients' knowledge about disease and treatment, compliance with treatment, health belief level and health literacy.

CONCLUSION

Improving the health outcomes of chronic kidney disease requires management of the disease with a multidimensional approach. Achieving all targets with the potential for improvement in understanding, measuring, preventing and treating disease; contribute to reducing the burden of disease in future generations. In this way, it will be possible to maximize the health and welfare of patients while ensuring the best use of limited resources. The most important steps in this process are identifying the current situation about the magnitude of the disease, identifying the opportunities that may improve the current situation and the risk factors that may affect it, applying preventive strategies and planning the resources correctly. Within the scope of this research, a general evaluation of the health outcomes of chronic kidney patients was made and it was aimed to direct the future studies.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

The Effect of COVID-19 Pandemic Knowledge Levels of Students Studying in Health-Related Departments on Their Resilience and Mental Well-Being

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ABSTRACT

Objective: The aim of the study is to determine the effect of the COVID-19 pandemic knowledge level of students studying in health-related departments on their resilience and mental well-being state.

Materials and Methods: The population of this descriptive-cross-sectional design study consisted of students studying in health-related departments of two universities in Turkey. The students were under quarantine, so the data were collected between 15-25 March 2020 using an online questionnaire form created by the researchers, the Brief Resilience Scale, and the Warwick-Edinburgh Mental Well-Being Scale. Percentage, mean, standard deviation, Mann Whitney U Test, Kruskal-Wallis Test, and Spearman correlation analysis were used to evaluate the data.

Results: According to the results, the mean age of the students was 20.0±1.87, 71.9% were female, and 62.8% were studying in an associate degree program. The mean scores of the brief resilience scale and the mental well-being scale were 19.0±4.4 and 42.0±7.0, respectively. The students' mean knowledge level of COVID-19 disease was 26.5±3.5. There was a moderate positive correlation between the brief resilience scale and mental well-being scale ($p<0.05$), and a positive correlation between the knowledge level score of COVID-19 disease and the mean scores of resilience and mental well-being ($p<0.05$).

Conclusion: It is thought that there is a significant relationship between the resilience scale and mental well-being scale of students in the quarantine due to the COVID-19 pandemic.

Keywords: COVID-19, Psychology, Mental Well-Being, Pandemic, Health Department Students

Sağlıkla İlgili Bölümlerde Öğrenim Gören Öğrencilerin COVID-19 Pandemisi Bilgi Düzeyinin Psikolojik Sağlamlık ve Mental İyi Oluş Üzerine Etkisi

ÖZET

Amaç: Bu çalışma, sağlıkla ilgili bölümlerde öğrenim gören öğrencilerin Covid-19 pandemisi bilgi düzeyinin psikolojik sağlamlık ve mental iyi oluş üzerine etkisini belirlemek amacıyla gerçekleştirildi.

Gereç ve Yöntemler: Tanımlayıcı ve kesitsel tipte tasarlanan araştırmanın evrenini Türkiye'de iki devlet üniversitesinin sağlıkla ilgili bölümlerinde öğrenim gören öğrenciler oluşturdu. Öğrencilerin karantina sürecinde olması nedeniyle veriler online anket formu kullanılarak 15-25 Mart 2020 tarihleri arasında araştırmacılar tarafından geliştirilen soru formu, Kısa Psikolojik Sağlamlık Ölçeği ve Warwick-Edinburgh Mental İyi Oluş Ölçeği ile toplandı. Verilerin değerlendirilmesinde yüzdelik, ortalama, standart sapma, Mann Whitney U Testi, Kruskal-Wallis Testi ve Spearman korelasyon analizi kullanıldı.

Bulgular: Öğrencilerin yaş ortalamasının 20.0±1.87 olduğu, %71.9'unun kadın ve %62.8'inin ön lisans programında öğrenim gördüğü bulundu. Çalışmaya katılan öğrencilerin kısa psikolojik sağlamlık ölçeği puan ortalamasının 19.0±4.4 ve mental iyi oluş ölçeği puan ortalamasının 42.0±7.0 olduğu saptandı. Öğrencilerin COVİD-19 hastalığına ilişkin bilgi düzeyi puan ortalaması 26.5±3.5 olarak tespit edildi. Kısa psikolojik sağlamlık ölçeği ile mental iyi oluş ölçeği arasında orta düzeyde pozitif bir ilişki olduğu görüldü ($p<0.05$). COVİD-19 hastalığına ilişkin bilgi düzeyi puanı ile psikolojik sağlamlık ve mental iyi oluş puan ortalamaları arasında pozitif yönde anlamlı bir ilişki olduğu belirlendi ($p<0.05$).

Sonuç: COVID-19 pandemisi nedeniyle karantina sürecinde olan öğrencilerin psikolojik sağlamlık ölçeği ve mental iyi oluş ölçeği arasında anlamlı bir ilişki olduğu ve sürecin uzaması sonucunda olumsuz psikolojik etkilerin ortaya çıkabileceği düşünülmektedir. Çalışma sonucunda, devlet destekli psikolojik eğitimlerin de karantina sürecinde verilmesi önerilmektedir.

Anahtar Kelimeler: COVID-19, Psikoloji, Mental İyi Oluş, Pandemi, Sağlık Bölümü Öğrencileri

Wuhan, the capital of Hubei Province, China became the center of pneumonia pandemic cases of unknown etiology in December 2019. Chinese health authorities have started research on this new viral condition by quarantining suspect cases and, Chinese scientists isolated a new coronavirus on February 7, 2020. The genetic sequence of the new coronavirus (2019-nCoV) has enabled the rapid development of RT-PCR diagnostic tests, and the virus was called "2019-nCOV" by the World Health Organization (WHO) (1-3).

Human coronaviruses are recognized as insignificant pathogens that cause colds in healthy people. However, in the 21st century, Severe Acute Respiratory Syndrome coronavirus (SARS-COV) and the Middle East Respiratory Syndrome coronavirus (MERS-COV) have caused global outbreaks with morbidity and mortality. Membrane penetrating glycoprotein is critical for the binding of host cell receptors. The symptoms of SARS, which are more than the common cold, include fever, cough, shortness of breath, and sometimes watery diarrhea, resulting in mortality, especially in older individuals. The basic virology in nosocomial spreading shows that the SARS-S glycoprotein human angiotensin-converting enzyme 2 (ACE2) is in the lower respiratory tract rather than the upper respiratory tract. In the study published in The Lancet, Chaolin Huang et al. defined the clinical features of 41 patients admitted to a hospital in Wuhan and confirmed to be infected until January 2, 2020, as ARDS and lymphopenia in the prodromal phase, including fever, dry cough, and weakness. In another study conducted with 99 patients retrospectively, in addition to these symptoms, muscle pain, headache, chest pain, and diarrhea were detected, and 8% of patients had Acute Respiratory Failure Syndrome (ARDS), 3% had acute renal dysfunction, 4% had septic shock, and 1% had ventilator related pneumonia. In the same study, a decrease in lymphocyte, platelet, and hemoglobin levels was observed. Although it was thought that the presence of the Huanan seafood wholesale market accelerated the spread of infection, this assumption has lost validity with the increasing number of other cases (2-5).

The coronavirus pandemic (COVID-19) has started to pose political and scientific problems in addition to being a serious public health problem worldwide (6,7). In China, as the primary target, high-cost public health measures have been implemented to ensure early diagnosis of cases, acceleration of laboratory tests, diagnosis-based isolation in all cases, and quarantine. Although the rest of the world has been warned about the issue nowadays, this new pandemic has not yet been understood in the global community (8). In this period, investigating the physiological effects of COVID-19 on human body has been considered as a priority area; however, the psychological health of young generation individuals, especially those with or without COVID-19, and who are in quarantine due to a pandemic, has been neglected.

Mental well-being is defined as a mentally healthy individual (9). Mental well-being is conceptualized by the World Health Organization as being aware of abilities, making a positive contribution to society, feeling supported, contentment, coping with ups and downs in life, being confident and robust (10). Psychological resilience is the individual's adaptation to difficulties and the ability to cope with them (11), like being exposed to significant adversity or a successful adaptation process despite threats and serious negativities that disrupt the developmental periods (12). The mental well-being of people affects their ability to cope with the problems they encounter. Literature has citations that (13,14) individuals with high mental well-being have good physical and psychological health.

In this context, it is aimed to determine the effect of the level of knowledge of the COVID-19 pandemic of the students studying in health-related departments on their psychological resilience and mental well-being. For this purpose, answers to the following questions were sought:

1. What are the students' mental well-being levels?
2. What are the students' psychological resilience levels?
3. What are the students' COVID-19 knowledge levels?
4. Is there a significant relationship between students' knowledge of COVID-19 levels and their psychological resilience and mental well-being?
5. Is there a significant difference between the sociodemographic characteristics of the students and their psychological resilience, mental well-being, and knowledge levels about COVID-19 disease?

METHODOLOGY

Type of the Study

This study was conducted in a descriptive and cross-sectional type to determine the effect of COVID-19 pandemic knowledge level on resilience and mental well-being of students studying in health-related departments.

The Universe and the Sample of the Research

The data were collected between 15 and 25 March 2020. The population consisted of students studying in health-related departments of two public universities (N=2800). It was aimed to reach all the students studying in the Nursing Department, Health Management Department, and Vocational School of Health Services the relevant universities without using a sampling method. The inclusion criteria were studying in the health-related departments of the specified universities and agreeing to take part in the study. An online questionnaire was created for the study, and data were collected online. The study was completed with 640 voluntary students.

Data Collection Tools

The Questionnaire Form

Developed by the researchers, the form consists of two parts. In the first part, there are four questions, including the socio-demographic characteristics of the students (gender, age, department, university). The second part involves 16 questions to measure students' knowledge about COVID-19 disease, and the options are "Right", "Wrong", and "I don't know". The correct answer to half of the questions is "Right", and the other half is "Wrong". The lowest and the highest scores on the scale are 0 and 32.

The Brief Resilience Scale

The Turkish adaptation of the scale, developed in 2008 by Smith et al., was performed by Doğan in 2015 (15,16). Item factor loads of the scale range between 0.63 and 0.79. It is a five-point Likert scale with six items. The scoring system is Not suitable at all=1, Not suitable=2, Somewhat suitable= 3, Suitable=4, and Completely suitable=5. Items 2, 4, and 6 are reverse coded. High scores indicate a high resilience level. Cronbach's alpha value of the original scale was 0.83, and it was found to be 0.81 in our study.

The Warwick-Edinburgh Mental Well-Being Scale

The Turkish adaptation of the scale (17), developed in 2007 by Tennant et al., was done by Keldal in 2015 (18). It is a five-point Likert-type scale, including 14 items. The lowest and the highest scores are 14 and 70 points. The items are scored as; 1= disagree, 2= disagree, 3= somewhat agree, 4= agree, 5= totally agree. All the items on the scale are positive. High scores indicate high mental well-being. Cronbach's alpha value of the scale was determined as 0.89. In this sample group, Cronbach's alpha value was found to be 0.89.

Ethical Considerations

The ethics committee approval was obtained from the Non-Interventional Clinical Research Ethics Committee of the relevant university with decision number 2020/4, and informed consent was obtained from the students in line with the principle of volunteering. The study was performed in accordance with the Declaration of Helsinki.

Evaluation of the Data

In the study, SPSS 22.0 statistical package program was used for statistical analysis. In the evaluation of the data, descriptive statistical methods such as percentage, average, standard deviation, and median were used, and the Kolmogorov-Smirnov distribution test was employed to examine the normal distribution. $p< .05$ was considered statistically significant in variables that did not show normal distribution between groups.

Results

The results showed that the mean age of the students was 20.0±1.87 (min: 18- max: 34), 71.9% were women, and 62.8% were studying in the associate degree program.

The students correctly knew that no vaccine for COVID-19 disease was developed (55.6%), COVID-19 spreads from person-to-person (93%), the interpersonal distance should be one meter (94.7%), the virus is transmitted through droplets (81.1%), and the disease is contagious even when it is not symptomatic (67.5%). The students expressed that they would not keep in contact with somebody previously COVID-19 positive (47.5%), it was wrong to wear a mask wherever they went (60.3%), and the virus can be transmitted after contact with contaminated hands, mouth, nose, and eyes (82.3%) (Table 1).

It was determined that the mean scores of the students for the brief resilience scale and mental well-being scale were 19.0±4.4 and 42.0±7.0, respectively. The students' mean knowledge level regarding COVID-19 disease was found to be 26.5±3.5 (Table 2).

A moderately significant positive correlation was observed between the brief resilience mean score and mental well-being mean scores of the students (p=0.00). There was a positive correlation between the knowledge level score of the students about COVID-19 disease and the mean scores of resilience and mental well-being (Table 3).

Table 1. Students' knowledge regarding COVID-19 disease (n = 640)		
	n	%
1. COVID-19 spreads mainly from person to person.		
Right	595	93.0
Wrong	32	5.0
Don't know	13	2.0
2. People who are in close contact with one another must maintain one meter of distance.		
Right	606	94.7
Wrong	19	3.0
Don't know	15	2.3
3. Coughing and sneezing of an infected person is sufficient for infectious transmission by droplet.		
Right	519	81.1
Wrong	95	14.8
Don't know	26	4.1
4. The infected individual does not transmit the disease when he is not symptomatic.		
Right	37	5.8
Wrong	432	67.5
Don't know	171	26.7
5. Virus may be transmitted after contact of contaminated hands with mouth, nose and eyes.		
Right	527	82.3
Wrong	101	15.8
Don't know	12	1.9
6. COVID-19 differs from region to region.		
Right	84	13.1
Wrong	463	72.4
Don't know	93	14.5
7. A vaccine has been developed for COVID-19.		
Right	91	14.2
Wrong	356	55.6
Don't know	193	30.2
8. Chemicals used in household and personal cleaning give definitive results in virus protection.		
Right	95	14.8
Wrong	413	64.5
Don't know	132	20.6
9. If I were infected with COVID-19, I could recover at home.		
Right	70	10.9
Wrong	493	77.0
Don't know	77	12.1
10. Infection symptoms appear 1-14 days after exposure.		
Right	578	90.3
Wrong	27	4.2
Don't know	35	5.5
11. If I notice the signs of infection at an advanced stage, I should go to the health institution by my own means.		
Right	121	18.9
Wrong	501	78.3
Don't know	18	2.8

Table 1. Students' knowledge regarding COVID-19 disease (n = 640) (Continuation of Table 1)		
	n	**%**
12. If I notice the signs of infection at an advanced stage, I should inform the health institutions.		
Right	631	98.6
Wrong	7	1.1
Don't know	2	0.3
13. If the symptoms tend to increase during my stay at home, I should apply family isolation.		
Right	584	91.3
Wrong	35	5.5
Don't know	21	3.2
14. I have to go around with a face mask constantly.		
Right	202	31.6
Wrong	368	60.3
Don't know	52	8.1
15. Coronavirus is a virus that can spread with water.		
Right	82	12.8
Wrong	295	46.1
Don't know	263	41.1
16. I should not contact an individual who has recovered from COVID-19 disease.		
Right	304	47.5
Wrong	199	31.1
Don't know	137	21.4

Table 2. The students' resilience, mental well-being and knowledge level scores regarding COVID-19 disease		
	Mean ±SD	**Min-Max**
The Brief Resilience Scale	19.0 ± 4.4	(6-30)
Mental Well-Being Scale	42.0 ± 7.0	(11-55)
A Questionnaire Form of COVID-19	26.5 ± 3.5	(2-32)

Table 3. Relationship between students' resilience, mental well-being and knowledge levels of COVID-19 disease			
	1	**2**	**3**
The Brief Resilience Scale			
Mental Well-Being Scale	0.473*		
A Questionnaire Form of COVID-19	0.083**	0.117***	
r*(correlation coefficient) p < .001, r** p < .01, r*** p < .05			

In our study, the resilience score of male students was found to be significantly higher (p= .000). There was a significant difference between mental well-being and knowledge level score of COVID-19 disease according to gender (p>.05). The mean scores of the resilience and knowledge level of COVID-19 disease were found to be significantly higher in the students studying in the vocational school of health services (p<.05). No significant difference was observed among the mental well-being scale mean scores based on the students' departments (p> .05). In addition, there was no significant relationship between age and psychological well-being, mental well-being, and knowledge level scores of COVID-19 disease (p>.05) (Table 4).

Table 4. The comparison of students' mean scores of brief resilience scale, mental well-being scale and knowledge level of COVID-19 disease according to some their socio-demographic characteristics.

Socio-demographic Characteristics	n (%)	Brief Resilience Scale Median (25.75. Percentile)	Mental Well-Being Scale Median (25.75. Percentile)	A Questionnaire Form of COVİD-19 Median(25.75.Percentile)
Age				
18-19	155 (24.2)	19.00 (17-22)	41.00 (35-46)	26.00 (24-29)
20-21	336 (52.5)	19.00 (17-22)	41.50 (37-45)	27.00 (24-29)
22-36	149 (23.3)	19.0 (17-22)	42.00 (37-44)	26.0 (23-28)
		[b]p = .617	[b]p = .802	[b]p = .275
Gender				
Female	460 (71.9)	18.00 (17-21)	41.00 (36-45)	27.00 (24-29)
Male	180 (28.1)	20.00 (18-24)	42.00 (37-46)	26.00 (23-28)
		[a]p = .000	[a]p = .385	[a]p = .167
Department				
Nursing	162 (25.3)	18.00 (17-20)	41.00 (36-44)	26.00 (23-28)
Health Management	76 (11.9)	18.50 (16-21)	41.00 (36-44)	25.00 (22-28)
Vocational School of Health Services	402 (62.8)	19.0 (17-22)	42.00 (37-46)	27.0 (24-29)
		[b]p = .024	[b]p = .145	**[b]p = .002**

[a]p. Mann-Whitney U test [b]p. Kruskal-Wallis test

DISCUSSION

In response to the COVID pandemic, formal education in schools has been suspended to prevent the spread in Turkey and worldwide. Stressors such as fear of being ill, lack of information about the disease, inability to meet face-to-face with friends and teachers, and lack of personal space at home can have long-lasting and permanent effects on individuals (19). This study was carried out to determine the effect of knowledge levels of the COVID-19 pandemic of students studying in the field of health on their resilience and mental well-being.

According to the Centers for Disease Control and Prevention (CDC), the distance between individuals should be one meter to prevent transmission since a vaccine for coronavirus has not been developed yet, and the virus spreads from person to person. It is also reported that the disease spreads by droplets through coughing, sneezing, and individuals can transmit the virus even if they do not show COVID-19 symptoms (20). In the study conducted by Wang et al., 92.1% of the participants stated that the coronavirus is mostly transmitted through droplets (21). Our study demonstrated that most students correctly responded to the questions regarding vaccine development, virus spread, transmission routes, and interpersonal distance.

The World Health Organization (WHO) recommends that healthy people wear masks only if they need to look after someone with suspected COVID-19 infection, or if they are coughing and sneezing (22). In our study, most students stated that it was wrong to wear a mask wherever they went. It can be accepted that students studying in health-related departments are expected to know the conditions in which the mask should be used.

In the relevant sources, it is recommended that the hands be washed with soap or rubbed with alcohol-based hand sanitizers as they can touch many surfaces and carry the virus (20). In our study, most students correctly knew that the virus is transmitted after the contact of contaminated hands with the mouth, nose, and eyes.

Cao et al. noted that the university students' relatives or acquaintances infected with COVID-19 increased their anxiety (23). In our study, most students would not want to meet and communicate with an individual who was previously COVID-19 positive, which suggests that students experience anxiety because those infected with COVID-19 may get infected again and can infect others.

Governments and healthcare professionals should inform the public about the preventive measures in the pandemic, the things to do in case of the symptoms of disease and avoiding false information about the disease (24). Elrggal et al. observed that the students had a high level of knowledge about MERS (25). In our study, students' knowledge level about COVID-19 was found high, and this result is thought to be an indication that students will provide a better quality of care to patients in the future.

In the literature, it has been reported that individuals knowing about drugs, vaccines, ways of transmission, and the number and location of infected cases for COVID-19 disease have reduced stress and anxiety levels and experience fewer psychological problems (19). In our study, as the level of knowledge of students about COVID-19 disease increased, their resilience and mental well-being levels increased. Likewise, as the students' resilience levels increased, their mental well-being scores increased. It is thought that as the number of studies about COVID-19 increases, the level of knowledge of individuals will have a positive influence on their psychological and mental health.

Relevant studies report that young people experience more psychological problems during the epidemic periods (19, 26). A study investigating the stress levels of university students after the Middle East Respiratory Syndrome-Corona Virus (MERS-CoV) found that, although not significant, young students had higher stress levels (27). In our study, no significant correlation was found between students' resilience and mental well-being scores. This result is thought to be due to the limited age range of university students.

In the literature before the pandemic, it was noted that the resilience levels of the students did not differ according to gender (28-30). However, some studies suggest that the psychological resilience levels of male students were higher than female students (31). In our study, the psychological resilience score of male students was found to be significantly higher. The reason for the contradictory results may be due to individuals' previous experiences, living conditions, and stress factors that were exposed, which are uncontrolled factors in this research.

In studies examining the effects of pandemics on healthcare workers, nurses were reported to have higher levels of anxiety than other healthcare workers (32-34). Lia et al. highlighted that trauma scores of nurses caring for COVID-19 patients were lower than those working in other clinics, but their psychological resilience was stronger (35). In our study, although the psychological resilience levels of the students studying at the vocational school of health services were higher, no significant relationship was seen between the mental well-being scores according to the education department. Different results are thought to result from individuals' perceptions of profession and risk.

Limitations of Study

The main identified limitation of the study is that face-to-face interview techniques could not be performed due to the pandemic, and the questionnaire was applied online, so the comprehensibility of questions could not be determined.

CONCLUSION AND SUGGESTIONS

Anorexia, fatigue, sleep disturbance, nervousness, carelessness, fear, and hopelessness are among the symptoms of psychological deterioration. It is inevitable for individuals to experience certain symptoms in the quarantine period during the pandemic for infectious diseases. For this reason, a brief psychological resilience scale and mental well-being scale were used in our study, and as a result, a positive relationship was observed between them, and the scale scores of the students were found high. It is thought that if the quarantine period is prolonged, it will affect the psychological and mental health of the students. Therefore, it is recommended that the government and schools should create crisis-oriented psychological support programs for students in the quarantine, apart from the school curriculum. The mentioned support programs will directly affect the students and lead to indirect dissemination of information through the students who will correctly inform their relatives. It is believed that this situation will prevent information pollution, create a safe process, and support individuals in the psychological adjustment period.

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The Lived Experiences of the Partners of Breast Cancer Survivors: Psychosocial Difficulties and Changes

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ABSTRACT

Purpose: The aim of this study was to explore lived experiences of partners of breast cancer survivors.

Methods: A descriptive phenomenological study approach was used. Participants were purposively sampled from a university hospital in Turkey. Semi-structured individual interviews were conducted with 12 partners. The data were analysed using Colaizzi's data analysis method in descriptive phenomenological research.

Results: Three themes were identified from the data. These themes are difficulties, re-adaptation to life and new perspectives in relationship and life. The difficulties theme consisted of two sub-themes as difficulties about the post-treatment care of the survivor and individual difficulties. Re-adaptation to life theme was related to two sub theme as prioritizing the wife's needs, changes in responsibilities. The new perspectives in relationship and life theme consisted of sub themes of strengthening in relationship with wives, a new perspective on life.

Conclusion: Healthcare professionals should investigate the stressors and psychosocial well-being of the partners in follow-ups. In addition, partners should be supported with psychoeducational programs for understanding women's changes, post-treatment symptom management, emotional expression and open communication.

Keywords: Partners, breast cancer, post-treatment, qualitative design.

Meme Kanseri Tedavisini Tamamlamış Kadınların Eşlerinin Yaşam Deneyimleri: Psikososyal Güçlükler ve Değişimler

ÖZET

Amaç: Bu çalışmanın amacı meme kanseri tedavisini tamamlamış kadınların eşlerinin yaşam deneyimlerinin belirlenmesidir.

Yöntem: Çalışmada tanımlayıcı fenomenoloji yaklaşımı kullanılmıştır. Katılımcılar Türkiye'de bir üniversite hastanesinden amaçlı örnekleme yöntemi ile belirlenmiştir. Yarı yapılandırılmış bireysel görüşmeler 12 eşle yürütülmüştür. Veri analizinde Colaizzi'nin tanımlayıcı fenomenoloji araştırmalara yönelik veri analiz yöntemi kullanılmıştır.

Bulgular: Çalışmada güçlükler, yaşama yeniden adaptasyon ve ilişkilerde ve yaşamda yeni bakış açıları olmak üzere üç tema belirlenmiştir. Güçlükler teması: eşin tedavi sonrası bakımına yöenlik güçlükler ve bireysel güçlükler olarak ilki alt temadan oluşmaktadır. Yaşama yeniden adaptasyon teması: eşin gereksinimlerine öncelik verme ve sorumluluklarda değişim alt temalarını içermektedir. İlişkilerde ve yaşamda yeni bakış açıları teması eşle ilişkinin güçlenmesi ve yaşamda yeni bakış açıları alt temalarından oluşmaktadır.

Sonuç: Sağlık profesyonelleri tedavi sonrası dönem izlemlerinde eşlerin stresörlerini ve psikososyal iyi oluşluklarını değerlendirmelidirler. Ayrıca, eşler, tedavi sonrası semptom yönetimi, kadının deneyimlediği değişimler, duygu ifadesi ve açık iletişim konularında psikoeğitim programlarıyla desteklenmelidir.

Anahtar Kelimeler: Eşler, meme kanseri, tedavi sonrası dönem, kalitatif araştırma.

Today, more people in the society maintain their lives as breast cancer survivors. In 2019, it is estimated that five-year relative survival rates of almost 91% after initial diagnosis (1). Similarly, the five-year overall survival rate is 86% in Turkey (2). However, breast cancer is a stressor affecting the psychological adaptation and well-being of both the survivors and their partners (3). In the post-treatment period, breast survivors face the long-term effects of the treatment, psychological distress and various difficulties related to social life (4-6). The survivors' support needs are mostly fulfilled by their partners and this support is important for the survivor's adjustment to life after treatment (7-9). Similarly, the interdependence of psychological distress in breast cancer survivors and their partners has been emphasized (10). However, data on partners' experiences are based on breast cancer survivors' perspectives or on the results of studies focusing on experiences of couples. This study aimed to provide a comprehensive understanding related to experiences in post-treatment period by gathering data directly from partners.

Partners are a significant source of support during both the treatment and recovery from breast cancer (9). Similarly, breast cancer survivors state that support of their partners is a crucial source for coping with the post-treatment stressors (11). Furthermore, studies point at fewer depressive symptoms in the breast cancer survivors who perceive greater empathy and emotional support from their partners (9, 12). However, it is revealed in some studies that partners might fail in providing this support and exhibit avoidance behaviours (13, 14). The studies focusing on the partners' experiences in the post-treatment period are limited. Studies in the treatment process show that spouses have difficulty in understanding their wives' emotions and helping them in symptom management, and have uncertainty about how they should support them (15, 16). Similarly, it was determined in a qualitative study in Turkey that women and their spouses experienced biopsychosocial difficulties and positive changes during from diagnosis to completion of treatment (17). In a follow-up study, husbands' domestic role strains and breast cancer-related concerns were determined to continue during and after the breast cancer treatment (18). In a qualitative study conducted with a dyadic approach, the changes experienced by the survivors and their partners in their roles, responsibilities and relationships during early post-treatment period were determined. Moreover, couples expressed their concerns about communication, intimacy and sexuality (7). In an another study in which spouses' support strategies for patients were explained, husbands stated that they maintained their family caregiver role even after treatment, focused on their wives' needs and helped them to adapt to family and social life (19). The male partners can feel excluded by the female partner after breast cancer surgery, and experience difficulties related to caregiving and providing emotional support to partner, financial and work related difficulties, worries about the effects of the cancer on their children, fear of cancer recurrence and anxiety (20). Similarly, in the study, male partners stated that emotional difficulties, changes in responsibilities the household chores and work life, worries about caring to children, and changes in relationship with their partner as impact of breast cancer (21). A systematic review study showed that the male spouses experienced negative changes in the area of emotional, financial and family life in the breast cancer treatment period (22). Besides drawing attention to the difficulties undergone by the partners, it is also stated that partners experienced positive changes such as the strengthening of the relationship, spiritual development and personal growth after breast cancer (16, 19, 20, 21, 22).

To sum up, the studies focusing on the partners' experiences in the post-treatment period are limited. In the present study, the focus was on the partners' experiences in the post-treatment period. More specifically, the aim of this study was to explore the partners' post-treatment psychosocial difficulties and their perceptions of changes in their lives. The results of the study are expected to provide guidance for healthcare professionals who will carry out the planning of interventions such as psychoeducation and counselling aimed at developing the psychosocial well-being of the partners of breast cancer survivors.

Material and Methods

Design

A descriptive phenomenological study approach was adopted. The reason for using descriptive phenomenology was to better understand the fundamental structure of each partner's lived experience (23).

Participants

This research was conducted with male partners of the breast cancer survivors followed by the medical oncology outpatient clinic of a university hospital in Turkey. Purposeful sampling method that aims to achieve maximum variation in participants' socio-demographic characteristics was used. Participants were eligible if they were over 18 years of age, and a partner of a breast cancer survivor whose initial hospital-based treatment had been

completed at least six months, maximum five years prior to the study commencement. The study sample consisted of 12 marital partners of breast cancer survivors.

Data collection

Data were collected between February 2016 and January 2017 with semi-structured interviews. In the study, we used a personal information form and semi-structured interview guide. The personal information form included questions on sociodemographic characteristics such as age, educational status, and time since treatment completed. The semi-structured interview guide that consisted of open-end questions was prepared by the researchers in line with the relevant literature. Interview questions are given in Table 1.

Table 1. Semi-structured interview questions.
How did your life change after breast cancer?
What are your breast cancer-related difficulties?
How do you feel emotionally?
How do you evaluate your current social life?
How do you evaluate your relationship with your wife?

Firstly, the physicians assessed the characteristics of the breast cancer survivor in terms of sampling criteria during the follow-ups and explained the purpose of the study to the survivors and their partners who met the inclusion criteria. Then, interested partners were contacted by phone and interviews were scheduled by interviewer. Interviews were conducted by the first author who was experienced in studying with breast cancer survivors and had knowledge and experience in qualitative researches. Interviews were held face to face and one to one in the researcher's office. The mean duration of the interviews was 24 minutes. Field notes were taken during the interview. Interviews continued until reaching the saturation point. Data saturation was achieved at the 10th interview.

Data analysis

The data were analysed using Colaizzi's data analysis method in descriptive phenomenological study. Firstly, each audiotape was repeatedly listened, and each transcript was read several times in order to obtain a general sense about the whole content. Next, significant statements and phrases that related to the investigated phenomenon were extracted from the transcripts and highlighted on each transcript pages. After this stage, the researchers reached a consensus. Then, meanings are formulated for each significant statement, and the formulated meanings were organised into clusters of themes. Each cluster was named with words unique to the content. The researchers re-examined and incorporated all the theme clusters, emergent themes and formulated meanings into an exhaustive description of the investigated phenomenon. Then the fundamental structure of the phenomenon was defined by discussion by the researchers. As a result, three themes revealing the experiences of partners were determined. Finally, the fundamental structure of the phenomenon was returned to available participants. Participants approved the findings be a reflection of their experiences (24).

Trustworthiness

The Consolidated criteria for reporting qualitative research (COREQ) was used to report this research (25). Trustworthiness of this study was achieved by adopting the criteria of credibility, transferability, confirmability, and dependability defined by Lincoln and Guba (26). To ensure the credibility of the study, at the beginning of the interviews, the participants were explained that they could express their opinions and emotions freely. After the interviews, the researcher made a summary of obtained data for participant checking. The researcher focused on participants' lived experience by maintaining her self-awareness in the interview and analysis process. To ensure the transferability of the study, purposive sampling method was used. A variety was obtained in terms of the parameters like age, and duration of ending the treatment in order to increase the data variety. Additionally, the study methods are detailed described. To ensure consistency of the study, all the interviews were conducted by the first researcher and she used the same interview guide and voice recorder during all interviews. Data were analysed independently by first two authors. The researcher who participated in the data collection and analysis attended courses for qualitative research methods. For depentability, the expert opinion was obtained for semi-structured interview guide (26).

Ethical consideration

This study was approved by the Ethics Committee of the university (decision no. 2016/02-02). Participants were informed about the aim of study and written consent was obtained before interview.

Results

Participants Characteristics

Participants' average age was 51 years. Of the participants, five were university graduates, and six were unemployed. Participants reported that their wives had completed their hospital-based treatment of 21 months on average, prior to participation in the study (Table 2).

Table 2. Sociodemographic characteristics of the participants (n: 12).

Participant	Age, Years	Education	Employed	Marital years	Time since treatment completed (months)
P1	65	Primary School	Not Employed	32	9
P2	59	Primary School	Not Employed	25	38
P3	40	University	Not Employed	10	32
P4	62	Primary School	Not Employed	42	18
P5	32	High School	Employed	6	10
P6	42	University	Employed	9	16
P7	67	High School	Not Employed	23	24
P8	55	University	Employed	24	14
P9	60	University	Not Employed	37	4
P10	41	High School	Employed	17	40
P11	36	University	Employed	5	21
P12	53	Primary School	Employed	29	33

Results were classified as three themes. These themes are difficulties, re-adaptation to life and new perspectives in life and relationship (Table 3).

Theme 1: Difficulties

The difficulties theme consisted of two sub-themes as difficulties about the post-treatment care of the survivor and individual difficulties.

Sub-theme 1: Difficulties about the post-treatment care of the survivor. Partners were aware of the negative effects of some symptoms, which continued after breast cancer, on the lives of the wives. At this point, they were eager to support their wives, but they pointed at difficulties in providing support. "*Let's say her arm got swollen. I tell her not to worry about it, but she doesn't listen to me.... I try to stop her.*" (P2) Some of the partners said that their sexual lives were affected negatively due to wives' lack of interest in sex after cancer and the problems with body image, and they could not talk about these issues openly. "*We never talked about sexuality between us. When she doesn't want it, I don't force her. But she has been quite distant within the last one or two years, because she worries about this thing a lot.*" (P7)

Another issue which partners find difficult to manage is the emotional changes in the wives. They stated the feelings, which they found difficult to manage as sensitivity, unhappiness, anger and fear of recurrence. "*When we go there every 3 months, she keeps saying that something will come up, so she is always stressed and nervous. "She has the issue of 'will this be over?'*" (P9)

The partners stated that they tried to support their wives' re-integration to social life. On the other hand, community's negative attitudes towards cancer and recovery from cancer were a challenge affecting their wives' social involvement. "*For instance, some talk ironically. They say, 'You look fine, you are fine, right?' There was someone who had the same, it kept spreading, it never comes to an end…*" (P4)

Table 3. Themes and subthemes.

Themes	Subthemes
Difficulties	Difficulties about the post-treatment care of the survivor
	Individual difficulties
Re-adaptation to life	Prioritizing the wife's needs
	Changes in responsibilities
New perspectives in life and relationship	Strengthening in relationship with wives
	A new perspective on life

Sub-theme 2: Individual difficulties. There are also individual difficulties explained by the partners directly about themselves. Experiencing sadness due to remembering the treatment process and having the fear of recurrence were among the emotional challenges affecting the partners' life. Although they were happy that the treatment was over, they were worried about whether they would return to normal life and whether recovery from cancer would be permanent. "*I sometimes tell myself 'I hope it never happens again.' These doubts are always there…*" (P8). Another emotional challenge mentioned by some partners was that they blamed themselves for the emergence of their wives' illness. "*I think about whether I made mistakes or made her sad in a way that she came to this point… Asking to myself...*" (P4)

The partners stated that they had difficulty in coping with these difficult feelings. They thought they should be a source of morale for their wives. They also stated that they refrained from sharing their feelings with their wives because thought that this might increase their wives' distress level. "*There is a heavy responsibility. All the burden is on me. But I have to be a source of morale!*" (P5)

The partners were eager to restart social activities they used to do before cancer. However, they stated that they were neither able to achieve this balance in their lives nor to allocate time for themselves to socialize and feel good. "*When I want to distract myself a little bit and turn the computer on, she tells me not to deal with that tin can, but with her. I sometimes feel bored and fed up. I don't go anywhere on my own*" (P6). In addition, the social networks of the partners also decreased. They kept a distance with their acquaintances who did not support them disease period. "*She paid attention to who called and asked about her, and who didn't, she got offended or didn't want to see them. She doesn't want them now. And I only say hello to them.*" (P12)

Theme 2: Re-adaptation to life

The partners tried to adapt to the new situation after breast cancer treatment. They expressed that they prioritized their wives' needs, performed domestic roles and assumed responsibility in post-treatment follow-ups and treatments.

Sub-theme 1: Prioritizing the wife's needs. The partners were aware of the challenging process their wives undergo and the physical and emotional effects of this process. They stated that they supported their wives in the recovery process by putting their wives in the centre of their lives and adjusting their lives according to their wives' needs. "*Mostly, I look for things, which will make my wife happy. I help my wife in every sense so that she doesn't get sad. When I'm buying something, I am trying to buy it for her.*" (P7). Partners also try to protect their wives against both physical and emotional difficulties. "*We have to be a bit more protective after the disease. Both materially and morally. I mean she shouldn't do physical work; we shouldn't let her do it.*" (P1)

Sub-theme 2: Changes in responsibilities. The partners stated that their domestic responsibilities changed during the treatment process. However, in the post-treatment period, they expected their wives to continue their domestic roles as they used to do before cancer. However, they stated that they tried to compensate their wives' roles in performing domestic responsibilities, and that they continued to take these responsibilities when necessary. "*After she got the disease, I helped her with household chores more often. Now I clean the house, but I'm trying to get her back to those old days.*" (P4)

In addition, partners try to support the medical follow-up and treatments of their wives. They don't leave their wives alone while going to the follow-up and consider it as their responsibility. "*You adjust all of your schedules; you adjust all of your life according to her. You take all the situations into account: She has an appointment on that day, what will happen if the results are bad?*" (P10)

Theme 3: New perspectives in relationship and life

Although breast cancer is a difficult process for partners, they said that struggling with it helped them adopt a positive perspective on life, and their relationships with their wives got stronger.

Sub-theme 1: Strengthening in relationship with wives. The partners stated that their relationship with their wives deepened and strengthened. In the cancer trajectory, there was an increase in the sharing and commitment among the spouses. The partners thought that they valued their wives more, and that their wives were worth every sacrifice. "*I feel more attached, because we shared a lot, unbelievable things during the cancer as well. The more sacrifice and effort I make the bigger value it gains.*" (P8)

Sub-theme 2: A new perspective on life. This challenging process experienced by the partners also led to some positive changes in their view of life. The partners stated that they understood the value of life after cancer and their priorities changed. "*Living well and living by making others happy is what is important in life, this is my perspective on life now…*" (P11)

Discussion

In this study, partners expressed that they had difficulty in managing post-treatment symptoms and providing emotional support for the wives. In additionally, partners have difficulties maintaining their emotional well-being because of caregiving. Likewise, attention is drawn to the individual and mutual difficulties of the partners in the literature (6, 7, 20, 22, 27). In this study, similarly to the literature, body image and sexual matters were defined as a taboo, which couldn't be shared with the partners and the health professionals (6). In Turkish culture, it can be difficult for partners to share their emotions in private matters such as body image and sexuality. However, attention is attracted in a study to the protective role of the empathy perceived by the woman from the partner in her depression related to the problems of body image (12). At this point, it is necessary for the health professionals to do identification in respect of body image and sexuality in both survivors and their partners and to provide support for open communication in survivorship care. Furthermore, another difficulty defined by the partners was the stigmatization of the community about cancer. Partners stated both the effect of the stigmatization on the survivors and the decrease in their social supports due to stigmatization as a difficulty. In Turkey, cancer is a stigmatized disease and mostly refers to the terms of pain, suffering and death in the community. Similarly, breast cancer survivors explained the stigmatization as a stressor (11). At this point, health professionals must be aware of the effects of stigmatization about cancer on both the survivors and the partners during the follow-ups.

Partners talked about the individual difficulties caused by caregiving as well. Similarly, partners had difficulties in managing their own health and well-being (20, 22, 28). In the literature, attention is drawn to the burden of caregiving experienced by the husbands, and the caregiver burden is stated as the predictor of the psychological distress among husbands after breast cancer (18). In Turkish culture, family members are primarily responsible for the care of the patient. The best possible care is aimed for the patient. At this point, the suffering of the survivor from the permanent symptoms and emotional problems may cause the partners to feel incompetent in caregiving and to have negative feelings. In addition, partners both have difficulty in managing the survivor's fear of recurrence and try to cope with this fear on his own. Fear of recurrence is a dyadic difficulty (20, 29). For feeling guilty, it is important to explain the perceptions of the partners about the causes of cancer and to provide them with the appropriate consultancy.

Partners cannot fulfill their own needs for psychosocial well-being. The barriers were not prioritizing own needs, not being able to share feelings with wives and decrease in their social networks during cancer. Similarly, it is reported in studies that partners put the needs of their wives in the centre of their lives and concentrate on their sick spouse/partner' health and well-being (7, 19, 30). Partners should be supported with psychoeducational interventions for maintaining their social relationships, sharing their feelings with their wives and developing effective coping strategies.

Partners who have undertaken the caregiver role in the treatment process would probably undertake a new role and identity in the survivorship period. However, the post-treatment period is related to uncertainties and complexities, including those relating to personal and social identities for the partners (31). In this study, partners described a restructuring process. They assisted the survivors during the post-treatment medication and follow-ups and attended to household tasks that survivor can barely do. These findings are similar to the literature (18). Symptoms such as lymphedema, tiredness, pain and movement restriction that continue after the treatment affect the women's performance of domestic roles. At this point, the support provided by the family members is important (11). However, exhibition of an excessively protective approach in providing support may affect the recovery process of the survivor negatively. Health professionals' investigation of the domestic roles, quality of the roles and tasks and the partners' approach to them is important.

Partners said that they adopted a positive perspective on life, and their relationships with their wives got stronger after breast cancer. After life-threatening diseases such as cancer, not only patients but also their partners experience positive changes (16, 19, 22, 32). In a review, spousal caregivers for cancer patients experienced enhanced relationship with the care-receiver, and the feeling of being rewarded, and a sense of personal growth were defined

(33). The another positive changes were described for partners as follows: a deepening sense of closeness with their wives, spiritual development, couple growth, and improved relationships with others (20). Here, the important point is the approach of healthcare professionals to these positive changes, which partners went through following the cancer struggle, as a source for coping with post-treatment difficulties.

Limitations

This qualitative study provides a deeper understanding of the experience of partners of breast cancer survivors. In addition, this is the first study to explore experiences of Turkish male partners in the breast cancer post-treatment period. However, there are some limitations of the study. Firstly, all participants were recruited from a large city and a single center in Turkey. In addition, volunteer partners who came to policlinic follow-ups with the survivors were included in this study.

Conclusion

The results of the study showed that partners experience psychosocial difficulties but also perceive growth after breast cancer. Moreover, partners focus more on meeting the survivors' needs, have difficulty in expressing their own emotional needs and disregard their own well-being. Partners' focus on the needs of their wives and inability to express their own needs may cause the health professionals not to understand the needs of this group and underestimate these needs. As a dimension of the survivorship care, psychosocial well-being of the partners should be investigated in the follow-ups and partners must be provided with coping support. Healthcare professionals can encourage affected partners to disclosure difficult feelings. Health professionals must be aware of the effects of stigmatization about cancer on both the survivors and the partners during the follow-ups. In addition, partners should be supported with psychoeducational programs for understanding women's changes, survivorship symptom management, providing emotional support, emotional expression, open communication, and developing effective coping strategies. Lastly, healthcare professionals should use the positive changes, which partners went through following the cancer struggle, as a source for coping with post-treatment difficulties.

It is recommended that qualitative studies be conducted in the future should focus on the quality of the relationship between survivors and partners, or on the coping characteristics of partners.

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The list of authors in article, which was published in the 2021-July issue, was made inadvertently. Considering the contribution of the author in the previous poster paper of the article in 2014, the list of authors has been changed. The correct version is as follows.

Comparison of Laparascopic and Open Adrenalectomy

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ABSTRACT

Purpose: Laparoscopic adrenalectomy, which was performed successfully for the first time in 1992, has become the preferred method in adrenal surgery especially in adrenal diseases. In this study, our aim is to compare the demographic and operative data of laparoscopic and open adrenalectomies performed in the general surgery clinic of our hospital.

Methods: The records of the patients who were operated in hospital due to a surrenal mass between August 2006 and December 2012 have been retrospectively assessed. Demographic characteristics of the patients, such as age, sex, the size and location of tumors were included. Surgical indications were classified in terms of their radiologic and biochemical investigations. Type of the surgery (lateral transperitoneal laparoscopic or open approach), the incision used in these surgeries (midline, subcoastal and paramedian), the length of operation, the length of hospital stay, postoperative complications and the final pathology results were all examined.

Results: During the afformentioned period, adrenalectomy was performed in 106 patients. Eighty of these patients (%75,4) were operated by open and 26 of them (%24,6) by lateral transperitoneal laparoscopic surgery. Subcostal incision was used 61 of 80 patients (% 82,4), whereas 17 patients (% 22,9) were operated by midline incision and 2(% 2,7) were by paramedian incision. No mortality was encountered. Operation time was statistically significantly shorter in the open group ($p<0,0166$). Duration of hospital stay was statistically significantly longer in open group ($p<0,0083$). Hospital stay time was statistically significantly longer in midline incision group ($p<0,0083$). Except for the weight of masses, statistically significant difference was not found between two groups (laparascopic and open surgery) in demographic and operative features (age,gender,side,pathological diagnose,size of mass) releated to postoperative complications.

Conclusion: In carefully selected group of patients laparoscopic adrenalectomy offered lesser postoperative hospital stay than the open adrenalectomy. The longer operative time can be decreased when more experience is gained in laparascopic adrenalectomy. Laparoscopic adrenalectomy should be preferred in adrenal disease as the gold standard in centers with completed learning curve.

Keywords: Adrenalectomy; Surgery ; Laparoscopy

Laparoskopik ve Açık Adrenalektominin Karşılaştırılması

ÖZET

Amaç: İlk olarak 1992 yılında başarılı bir şekilde gerçekleştirilen laparoskopik adrenalektomi adrenal hastalıklarda ilk tercih edilen yöntem olmaktadır. Bizim bu çalışmada amacımız; hastanemiz genel cerrahi kliniğinde yapılan laparaskopik ve açık sürrenalektomilerin demografik ve operatif sonuçlarını karşılaştırmaktır.

Method: Hastanemizde 2006 Ağustos-2012 Aralık tarihleri arasında genel cerrahi kliniğinde sürrenal kitle nedeni adrenalektomi uygulanmış hastaların kayıtları retrospektif olarak incelendi. Hastaların yaş, cinsiyet, tümör boyutu ve lokalizasyon gibi demografik özellikleri incelendi. Preoperatif klinik, radyolojik ve biyokimyasal özelliklerine göre operasyon endikasyonları gruplandırıldı. Operasyon tipi (lateral transperitoneal laparaskopik veya açık) , operasyonda kullanılan insizyon (median , subkostal , paramedian) , operasyon süreleri , ameliyat sonrası hastanede kalış süresi , postoperatif komplikasyon ve patoloji sonuçları incelendi.

Bulgular: Retrospektif olarak incelenen tarih aralığında 106 hastaya adrenalektomi uygulandı. Opere edilen hastaların 80'ine (%75,4) açık cerrahi , 26'sına (%24,6) ise laparaskopik lateral transperitoneal adrenalektomi uygulanmıştır. Açık cerrahi uygulanan 80 hastanın 61'inde (82,4%) subkostal , 17'sinde (22,9%) median ve 2'sinde (2,7%) paramedian kesi kullanıldığı görüldü. Herhangi bir mortaliteye rastlanmadı. Açık cerrahi uygulanan grupta operasyon sürelerinin istatistiksel olarak anlamlı kısa olduğu görüldü ($p<0,0166$). Açık adrenalektomi uygulanan hastalarda yatış süresinin istatistiksel olarak anlamlı yüksek olduğu görüldü ($p<0,0083$) . Median insizyonla opere edilen olguların yatış sürelerinin istatistiksel olarak anlamlı yüksek olduğu görüldü ($p<0,0083$). Demografik ve operatif özellikler (yaş, cinsiyet, taraf, patolojik tanı, kitle boyutu) açısından kitle ağırlığı dışında postoperatif komplikasyonlarla ilgili iki grup arasında (laparoskopik ve açık cerrahi) istatistiksel anlamlı bir fark bulunamadı.

Sonuç: Dikkatlice seçilmiş hasta gruplarında, laparaskopik adrenalektomi açık adrenalektomiye göre daha kısa postoperatif yatış süresine sahiptir. Laparaskopik adrenalektomilerde deneyim artıkça daha uzun olan ameliyat süresi kısalacaktır. Öğrenme eğrisi tamamlandığı zaman adrenal hastalıklarda laparaskopik adrenalektomi altın standart olarak tercih edilmelidir.

Anahtar Kelimeler: Adrenalektomi; Cerrahi ; Laparoskopi

Adrenal masses are pathologies that are at high risk of malignancy and can be presented with very different clinical, laboratory and radiological features. Today, there has been a significant increase in the introduction of high-tech radiological diagnostic methods and the development of diagnostic tests and the detection of adrenal gland masses (1).

Adrenal masses show a fairly deep and well-restricted settlement in the abdominal area. These masses can be benign or malignant, and hormone active or non-active. The separation of benign and malignant adrenocortical masses can be difficult (2). During radiological examinations for various reasons not related to adrenal glands, or during the laparotomies coincidentally found; in anamnesis, physical examination, asymptomatic adrenal masses that do not show adrenal mass or adrenal dysfunction are called incidentalome. Most of these masses, which are detected by chance, are benign lesions (cysts, adenomas) and are usually cortical adenomas that are not of disruptive properties and are randomly detected as a result of radiological examinations. Incidence ranges from 1.4% to 8.7% (4.5%).

The masses of the adrenal gland are classified as histopathological adenoma, adrenal gland cancer, pheochromocytoma, myelolipoma, ganglioneuroma, oncocytoma, adrenal gland cyst, hemangioma, metastases of the adrenal gland and other pathologies (3). In these masses, surgical treatment is applied to lesions, which are thought to be hyper secretive or malignant. Today, adrenalectomy is recommended on lesions of 5 cm or above, which are detected by abdominal tomography or magnetic resonance imaging techniques (4). Laparascopic and robotic surgery has been preferred in adrenal gland diseases in the last 30 years with an increasing rate (5). In this study, the diagnostic methods and surgical treatments of 106 patients who had adrenal mass were detected in the General Surgery Clinic and underwent adrenalectomies analyzed.

Material & Methods

In our study, 106 patients who were operated due to adrenal mass in our hospital general surgery clinic retrospectively examined by obtaining approval from the ethics committee of our hospital. (11.11.2013/208) Demographic information of all patients (age, gender, tumor size, tumor weight, localization, adrenal disease) were investigated from file records. Also, routine blood and urine hormone examinations were recorded and included in the study to determine whether the masses were functional for patients who were found to have adrenal mass with radiological examinations. Laboratory examinations of blood cortisol and aldosterone values were measured. Cortisol levels, valine mandelic acid (VMA), metanephrine and nonmetanephrine levels of urine samples of the patients were also assessed. All of the masses removed from the surgery were histopathologically examined.

The localization and size of the masses were determined using radiological examinations such as computed tomography (CT) and magnetic resonance imaging (MRI). Surgical intervention was performed on masses that were hormonally active, larger than 5 cm in diameter, suspected malignancy or symptomatic. Subcostal, paramedian or median incisions were prefered in open adrenalectomy. Laparoscopic interventions were performed with a transabdominal lateral approach. Morbidity, operative time and length of hospital stay of the patients underwent surgery were evaluated. Lapararoscopic and open surgery subgroups were compared in terms of postoperative early and late complications, mortality, and hospital stay time.

Statistical Analyses

The data were evaluated using a statistical package for the Social Sciences (SPSS) 25 for Windows (SPSS® Inc. Chicago, IL, USA program. Comparing categorical data between groups, Pearson Chi-Square, and Fisher's Exact test, comparing continuous data between two groups, Mann Whitney U, Kruskal Wallis H (post hoc Bonferroni corrective Mann Whitney U) statistical analyses were considered statistically significant.($p<0.005$)

Results

One hundred and six patients who had an adrenal mass and underwent adrenalectomy were retrospectively evaluated. The demographic characteristics, side and duration of the surgery, size and weight of the tumour, hospital stay time, number of early and late complications and preoperative functional status of the 106 patients are shown in Table 1.

When the indications of the patients were examined, 67 (63.2%) were operated due to non-functional adrenal mass. In the functional patient group, 10 (9.4%) patients were diagnosed with cushing syndrome and the other 29 (27.3%) patients were operated due to symptoms of pheochromocytoma. One of the patients diagnosed with cushing syndrome was radiologically bilateral mass and the remaining nine patients were operated due to unilateral

Table 1. Age, gender, side, size and weight of mass, operative time, length of hospital stay, imaging techniques, complications and preoperative functional status of patients

		Surgery Type		Total	p
		Laparoscopic	Open		
Gender	Male n(%)	8 (7.5%)	34 (32%)	42 (39.6%)	0.288
	Female n(%)	18 (16.9%)	46 (4.3%)	64 (60.4%)	
Age (years)		47.2±12.55	51.7±12.72	50,61±12,77	0.009
Side	Left n(%)	12 (11.3%)	26 (24.5%)	38 (35.8%)	0.047
	Right n(%)	11 (10.3%)	52 (49%)	63 (59.4%)	
	Bilateral n(%)	3 (2.8%)	2 (1.8%)	5 (4.7%)	
Size (cm)		4.67±1.72	6.35±3.07		0.072
Weight (gr)		35.38±26.12	96.67±120.16		0.001*
Operative time (min)		151.19±16.2	133.55±12.2		0.219
Length of hospital stay (day)		4±1.54	5.15±2.33		0.110
Early complication n(%)		0	16 (15%)	16	0.013
Late complication n(%)		0	9 (8%)	9	0.074
Preoperative functional status	Pheochromocytoma (n)	8 (7.5%)	21 (19.8%)	29 (27.3%)	0.789
	Cushing Syndrome (n)	3 (2.8%)	7 (6.6%)	10 (9.4%)	
	Non-functional (n)	15 (14.1%)	52 (49%)	67 (63.2%)	
Imaging technique	CT	5 (4.7%)	38 (35.8%)	43(40.5%)	
	MRI	21 (19.8%)	42 (39.6%)	63(59.4%)	
	CT+MRI	9 (8.4%)	15 (14.1%)	26(24.5%)	

cm: centimeter , gr: gram , min :minute, CT: Computerized Tomography, MRI: Magnetic Resonance Imaging

mass. The patient with a bilateral mass was also functional and unilateral subtotal adrenalectomy was performed. Five patients who were operated due to the clinic of pheochromocytoma underwent cortex preserving adrenalectomy. Sixtythree (59.4%) of radiologically detected masses were on the right and thirtyeight (35.8%) on the left as seen on Table 1. No statistically significant difference was found between the laparoscopic and open surgery groups in terms of demographic characteristics, except for the weight of the masses (p <0.005).

Radiological examination methods used for localization of masses are shown in Table 1. Histopathological examination of sixtyseven patients who were operated due to non-functional adenoma revealed that 37 (34.9%) of these patients actually have adrenocortical adenoma. The pathology results of ten (9.4%) patients who were operated due to clinical or subclinical Cushing syndrome was adenoma. Other pathological diagnoses (adrenocortical hyperplasia, malignant epithelial tumor metastasis, myelolipoma, schwannoma, cyst (haemorrhagic, adrenocortical, endothelial), ganglioneuroma) are shown in Table 2.

80 (75.4%) of the 106 patients detected were open adrenalectomy, and laparoscopic lateral transabdominal intervention was preferred for 26 (24.6%). Fifteen (57%) of patients started laparoscopically were suspended for various reasons such as bleeding, insufficent exposure, difficulty of manuplation and hemodynamic insatbility. These fifteen patients were included in open group for analyses. In 61 (82.4%) of the 80 patients undergoing open adrenalectomy were subcostal incision, 17 (22.9%) median incision, and paramedian incision was preferred in 2 (2.7%).

The mean duration of laparoscopic adrenalectomy was 151.19±16.27 minutes (min), while the mean time of the subcostal incision was 132.93±11.27 min, while the mean time of the median incision was 136.12±16.02 min. The mean operation time of the two patients who were operated by paramedian incision was 130.5±3.54 min. A statistically significant difference between the operation times of cases according to incision selection (p<0.05). Duration of surgery who were operated laparoscopically was statistically high in the duration of patients with median and subcostal incision (p=0.0083)(Table 3). The mean weight and size of the masses after histopathological examination were given in detail in Table 2.

Table 2. Functional status, average size and weight values of masses and distribution of pathologic diagnoses						
		Pathological Diagnose				Total
		Pheochromocytoma	Adrenocortical Adenoma	Adrenocortical Carcinoma	Other*	
Hormone Active	Pheochromocytoma n (%)	29 (27.3%)				29 (27.3%)
	Cushing Syndrome n (%)		10 (9.4%)			10 (9.4%)
Nonhormone active	Nonfunctional n(%)		37 (34.9%)	5 (4.7%)	25(23.5%)	67 (63.2%)
Weight (gr)		124,52±142,02	44,22±43,72	245±165,48	59,1±73,5	
Median(Min.-Max.)		65 (23-691)	25 (8-220)	190 (75-450)	40(5-310)	
Size (cm)		6,9±2,54	4,83±2,19	9±2,55	6,25±4,7	
Median(Min.-Max.)		6,75 (2-14)	4,75 (1,5-14)	9 (5-12)	5,5 (2,5-20)	

gr: gram , cm:centimeter, min:minimum, max:maximum
*Other diagnoses; adrenocortical hyperplasia, malignant epithelial tumor metastasis, myelolipoma, schwannoma cyst (hemorrhagic, adrenocortical, endothelial),ganglioneuroma

When file records are examined; in 16 patients (15%) wound infections, evisseration and postoperative bowel obstruction developed within first thirty days which were evaluated as early complications. Eight patients (7.5%) developed postoperative wound infection, while postoperative bowel obstruction was observed in three patients (2.8%). One of these three patients also developed evisseration (0.9%). Incisional hernias which developed in long-term from scars after discharge, were also evaluated as late complications. In 9 patients (8.4%) incisional hernia was observed during postoperative period. All of the patients who developed incisional hernia were found to have been operated by median incision. Postoperative complications in early and late periods were observed in surgeries that were performed with a preference of median and subcostal incision. Statistically significant difference between groups was found in terms of postoperative complication rates according to incision type (p=0.001) (Table 4). As a result of the operations, no patients had mortality.

Table 3. Type of incision subgroup and operative time				
	Operative time (min)			
Incision type	Time	Median	Min.	Max.
Laparoscopic (n=26)	151,19	148,5	130	195
Median incision (n=17)	136,12	133,0	115	170
Paramedian incision (n=2)	130,5	130,5	128	133
Subcostal incision (n=61)	132,93	132,0	112	160

According to type of operation, a statistically significant difference between the length of hospital stay of the patients (p<0.05). Open surgery group patients hospital stay times were found to be statistically significantly higher than laparoscopic patients staying in hospital (p=0.012) (Table 1).

A statistically significant difference between the length of hospitalization of cases according to incision subgroup (p<0.05). Duration of hospital stay for the patients operated by median incision was found to be longer than that of patients operated with laparoscopic adrenalectomy and subcostal incision(p=0.001)(Table4).

Table 4. Average distribution of length of hospital stay and postoperative complications by incision							
Incision type	Stay Time (day)				Postoperative complications		P
	Mean	Median	Min.	Max.	Early n (%)	Late n (%)	
Laparoscopic	4	3,5	2	9	-	-	0,001
Median incision	7,12	6,0	2	13	8 (7.5%)	9 (8.4%)	
Paramedian incision	3	3,0	2	4	-	-	
Subcostal incision	4,67	5,0	2	11	8 (7.5%)	-	

*Pearson Chi-Square p<0.05

Discussion

Adrenal masses can be presented with very different clinical, laboratory and radiological data. Furthermore, adrenal masses are lesions that carry an approxiamtely 4-12% risk of malignancy (6). In many publications, it is observed that patients are in the 6th decade (3, 7).

The incidence of incidental masses found in children is more likely to be malignant. It is also known that the risk of cancer increases as the size of the mass increases.

4 cm and greater adenomas in the 12,000 autopsy series 4 cm and greater adenomas 4; 6 cm and greater adenomas were rarely reported (8). In our series, the mean size of the masses detected in pheochromocytoma is 6.9±2.54 cm (2-14cm), the mean size of the masses detected in adenomas is 4.83±2.19 cm (1,5-14cm), the mean size of the masses detected in adrenal cortical carcinoma 9±2.55cm (5-12cm), benign reported (Myelolipoma, ganglioneuroma, adrenal cyst, schwannoma) was found to have an mean size of 6.25±4.07cm (2.5-20cm). In our series, 46 patients had a mass of more than 6 cm, and adrenocortical carcinoma was detected in 4 (8.6%) of these cysts.

Adrenal malignancies are generally large and very few are small. Some pathologists also report that size is the most important criterion for the differential diagnosis of benign or malignant adrenal masses (9). Based on these results and the lack of biochemical and imaging methods to make benign/malignant separation definitively in adrenal tumor, they recommend surgical excision in all nonfunctioning adrenal incidentalomas, taking into account that they encounter a high level of malignity (10). In our series, adrenocortical carcinoma was found in 5 patients (4.7%) and the mean size of these masses was found 9±2.55cm (5-12cm).

Among the exact diagnostic criteria are those who think that using the dimension can cause serious misconceptions. Waiting for a small audience to increase in size may mean giving time to turn into carcinoma and invasive. And once the disease progresses, it will be easier to diagnose malignancy. This will not allow early diagnosis and radical surgical intervention. Treatment of nonfunctional adrenal masses with diameters between 3 and 6 cm is controversial. Many surgeons are concerned about the follow-up of these masses and recommend surgery (11).

Adrenal malignancies may be cystic. Because some of the masses identified as adrenal cysts are pseudocysts caused by cystic degeneration in a pathological gland. Some recommend the exploration of all adrenal cysts to uncover an underlying malignancy (12). The adrenal cyst was detected in 5 patients in our series and no cancer was detected in the pathological examination of these cases.

Although adrenalectomy can be performed with classical open technique in very large tumors that show an invasive environmental tissue with no obvious boundaries, and give the image of heterogeneity, recent studies have shown the effectiveness of laparoscopic technique in adrenal tumors larger than 6 cm and no signs of malignancy.

Besides, laparoscopic surgery can now be performed with evolving techniques even in tumors with larger masses and surrounding tissue invasion (13). In our study, laparoscopic surgery was performed on unilateral and under 5 cm masses. However, as laparoscopic experience increases, it is also thought to be applied in larger tumors.

In the literature, the mean operation time in laparoscopic adrenalectomy performed with the transperitoneal approach was 80 to 360 minutes (14). In our series, the duration of operation of patients undergoing laparoscopic intervention was 151.19±16.27 minutes. According to the open approach, this difference, which is statistically significantly more than that, is thought to depend on our laparoscopic learning curve.

In literature, the transition to open approach in laparoscopic adrenalectomy is approximately 2% (0-13%)(15). The most common causes of exposure are small venous bleeding. Also, inferior vein or renal vein injuries may be included in this group. Local or vascular invasion due to malignancy during laparoscopy is another problem of exposure. Other situations include abdominal adhesions, organ injuries, diaphragma injury, obesity, massive hepatomegaly and giant benign tumors (16). In our series, 15 (36%) of the 41 patients we started laparoscopic were suspended and the majority of these cases were intended not to increase the complication rate due to lack of experience in laparoscopy.

The rate of operative complications is 5-10% in laparoscopic adrenalectomy performed in experienced centers, and this rate is often higher in open adrenalectomy (17). In our series, 21 patients (19.8%) developed complications early and/or late. Statistically significant difference between groups was found in terms of postoperative complication rates according to incision type (p=0.001).

In European and American publications, the mean length of hospital stay in the laparoscopic method is 3 days, and the open method is 6.5 days on average.(18) In our series, patients who underwent open surgery and preferred subcostal incision have an mean hospital stay of 4.67±1.76 days, median incision preferred patients 7.12±3.1 days, paramedian incision preferred patients 3±1.41 days, and laparoscopic surgery patients have an mean hospital stay period of 4±1.55 days. As a result, it can be argued that complications can be prevented, and that minimally invasive surgery can achieve its goal in terms of its advantages (19, 20).

Conclusion

In selected patient groups, laparoscopic adrenalectomy causes shorter postoperative hospitalization time and less postoperative complications than open adrenalectomy. Therefore, laparoscopic adrenalectomy preferences are increasing day by day, and even in large tumors and surrounding tissue invasions, laparoscopy is the first preferred method.

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