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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Medical Biochemistry / Tıbbi Biyokimya

Proteome Analysis of Human and Goat Colostrum: A Closer Look at Whey Fractions

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ABSTRACT

Background/Purpose: Human colostrum, the first form of milk produced by mammary glands, is crucial for newborn development. Nowadays, there is a great interest in finding alternative colostrum from different species to replace the extremely scarce human colostrum. In this study, we investigated the proteomic profiles of whey fractions of human and goat colostrum samples to understand the proteomic differences and gain insight into the potential functions of these proteins.

Methods: Proteomic profiles of human (n=6) and goat (n=6) colostrum that were collected at the early stages of lactation were investigated using two-dimensional difference gel electrophoresis (DIGE). Spot intensity differences were detected and spots were identified by MALDI-TOF/TOF mass spectrometry. Functional annotation analyses were performed.

Results: In total, 533 spots were detected and identified in human and goat colostrum samples. Immunoglobulin, casein, lactoferrin, lactoglobulin, albumin, lactotransferrin, and lactalbumin proteins were found to be abundant. Low abundance proteins such as α1-antitrypsin, cathelicidin, galectin-3-binding protein, lactadherin, tenascin, and apolipoprotein J were also detected. Functional annotation analysis showed that human colostrum proteins were commonly involved in the phagosome, complement and coagulation pathways, and disease-related pathways.

Conclusion: Our results provide a preliminary proteomic comparison between human and goat colostrum samples. The proteins detected in the whey fractions of human and goat colostrum showed a remarkable number of common proteins. Moreover, human colostrum showed disease-related pathway enrichments and further suggests the role of passive immunization that might protect the newborn from diseases.

Keywords: 2-DIGE, goat colostrum, human colostrum, MALDI-TOF/TOF, whey proteins

İnsan ve Keçi Kolostrumunun Proteomik Analizi: Whey Fraksiyonuna Yakından Bakış

Giriş/Amaç: Meme bezleri tarafından üretilen sütün ilk formu olan insan kolostrumu, yenidoğan gelişimi için çok önemlidir. Günümüzde, miktar olarak az olan insan kolostrumunun yerine farklı türlerden alternatif kolostrum bulmaya yönelik büyük bir ilgi mevcuttur. Bu çalışmada, kolostrumdaki proteomik farklılıkların ve bu farklılığa sebep olan proteinlerin potansiyel işlevlerinin anlaşılması için, insan ve keçi kolostrum örneklerinin whey fraksiyonlarının proteomik profilleri araştırılmıştır.

Yöntemler: Laktasyonun erken döneminde toplanan insan (n=6) ve keçi (n=6) kolostrum örneklerinin proteomik profilleri iki boyutlu diferansiyel jel elektroforezi (DIGE) kullanılarak incelenmiştir. Protein spot yoğunluğu farklılıkları tespit edilmiş ve bu spotlar MALDI-TOF/TOF kütle spektrometresi ile tanımlanmıştır. Proteinlerin fonksiyonel anotasyonları analiz edilmiştir.

Bulgular: İnsan ve keçi kolostrum örneklerinde toplam 533 protein spotu tespit edilmiş ve tanımlanmıştır. İmmünoglobulin, kazein, laktoferrin, laktoglobulin, albümin, laktotransferrin ve laktalbumin proteinlerinin bol miktarda bulunduğu görülmüştür. Bunun dışında, α1 antitripsin, katelisidin, galektin-3 bağlayıcı protein, laktadherin, tenascin ve apolipoprotein J gibi düşük yoğunluklu proteinler de tespit edilmiştir. Fonksiyonel anotasyon analizine göre, insan kolostrum proteinlerinin yaygın olarak fagozom, kompleman ve pıhtılaşma yolları ve hastalıkla ilgili yolaklarda yer aldığı gösterilmiştir.

Sonuçlar: Elde edilen bulgular ile insan ve keçi kolostrum örnekleri arasında bir ön proteomik karşılaştırma yapılmıştır. İnsan ve keçi kolostrumunun whey fraksiyonlarında yapılan bu proteomik çalışma ile çok sayıda ortak proteinin varlığı gösterilmiştir. Ancak, insan kolostrumunda çeşitli hastalıklarla ilişkili yolakların ön plana çıktığı ve bu durumun yenidoğanı hastalıklardan koruyabilecek pasif bağışıklıkla ilgili olabileceği düşünülmüştür.

Anahtar Kelimeler: 2-DIGE, keçi kolostrumu, insan kolostrumu, MALDI-TOF/TOF, whey proteini

Human milk is the most suitable nutrition for a newborn that provides growth, developmental factors, bioactive components, and immunity for a newborn's survival in short and long lifetime periods (1, 2) . The high level of immunoglobulin A (IgA) in human colostrum protects newborns from potential infections (3) . Additionally, colostrum supports the formation of a normal and healthy gut microbiome in the infant.

Human mature milk and colostrum mainly consist of high abundant proteins (HAPs), such as alpha-lactalbumin and lactoferrin (4), whereas complement factors, acute phase proteins, anti-microbial proteins, peptides, and cytokines are known as low abundant proteins (LAPs) and commonly found in whey fraction (5). Low abundant proteins are physiologically important since they protect against pathogens and other environmental challenges (6) and participate in the passive immune transfer, and are fundamental for the growth and development of newborns (4).

Recently, there is an ongoing research interest in using alternative sources of colostrum to replace extremely scarce human colostrum. The composition of colostrum is known to be different in animals and humans. Yet, cow milk-containing products are predominantly used in newborn formulas and protein supplements. However, cow milk allergy is frequently seen in infants (7). Due to the compositional changes and allergenic properties, goat milk has been recommended as a substitute for patients allergic to cow milk (8). Still, studies assessing the potential of goat colostrum to replace human colostrum remains limited.

It is well-known that the milk fat globule membrane (MFGM) fraction of the colostrum does not vary (9); whereas LAPs in the whey fraction seem to alter during lactation (10). Therefore, it is important to assess LAPs in colostrum to gain deeper information about their functionality. A substantial number of papers were published about the nutritional importance and complex molecular components of milk over the years (11). Recently, proteomic methodologies in milk/colostrum research are becoming increasingly important to discover the functional contribution of human milk proteins or milk proteins from different species to infants' development (12). In this concept, the whey fractions and MFGM compositions of goat colostrum and mature milk have been extensively studied (13,14). However, the comparison of the whey fraction proteomic profiles of human and goat colostrum remains inconclusive.

In the current study, we investigated the proteomic profiles of the whey fractions of human and goat colostrum using two-dimensional difference gel electrophoresis (DIGE) followed by mass spectrometric analysis. Proteomic analysis of human and goat colostrum samples is important to detect proteomic pathways and determine over-and/or under-represented LAPs in each group.

Material and Methods

Sample Collection

Human colostrum samples were collected from subjects who agreed to sign an informed consent form from Zeynep Kamil Research and Training Hospital Istanbul-Turkey, a state hospital that specialized in obstetrics and gynecology. Mothers who delivered singleton-term newborns at 38-41 weeks of their pregnancy participated and mothers with illnesses; such as cold, mastitis, and flu were excluded from the study. Six colostrum samples were collected up to 24h of lactation by manual expression or manual breast pump into 50 ml polypropylene containers. Goat colostrum (GC) samples were obtained from Saanen breeds from a family farm in Izmir-Turkey. Six samples were obtained from healthy goats on their first day, 2h after their partum, by manual expression into 50 ml polypropylene containers. All colostrum samples were stored at –80°C until analysis. The study was approved by the Acibadem University Ethical Committee (ATADEK-2013-507).

Protein Extraction

Colostrum samples were centrifuged at 15.000xg for 10 min at +4°C and the cream layer at the top was removed. Skimmed milk was collected as a supernatant. Protease inhibitor mix of 10 µl (100X, (GE Healthcare) was added to prevent any protein degradation. Samples were then ultracentrifuged using a swinging bucket rotor (SW40ti) at 110.000xg for 1 h at +4°C (Beckman Coulter, optima L-90K ultracentrifuge). Whey fraction was collected as a supernatant and the protein concentration was determined by a 2-D Quant kit (GE Healthcare).

Proteomics Analysis

Human colostrum and GC samples were labeled with three types of fluorescent cyanine dyes (Cy2, Cy3, and Cy5) for the DIGE method. Human and goat samples were divided into two groups. The first group included H1, H2, H3 as human and G4, G5, G6 as goat samples and were labeled with Cy3. The second set included H4, H5, H6 as human and G1, G2, and G3 as goat samples which were then labeled with Cy5. Internal Standard (IS), generated

by pooling aliquots of 12 samples including entire goat (n=6) and human samples (n=6), was labeled with Cy2. All six gels contained one Cy3-labeled sample, one Cy5-labeled sample, and one Cy2-labeled internal standard.

Isoelectric focusing was performed by an Ettan IPGphor 3 system (GE Healthcare) using strips (pH 3-10, 24 cm, NL) that were rehydrated overnight with the labeled samples diluted in a solution consisting of 7M Urea, 2M Thiourea, 0.5% CHAPS, 0.6% Destreak Reagent, and 2% Servalytes as rehydration buffer. Separation in the first dimension was 21h with a total of 90 kVh. The strips were equilibrated for 15 minutes with equilibration buffer (6 M urea, 30% glycerol, 2% SDS, 50 mM Tris (pH 8.8), and 1% dithiothreitol (DTT)). Then the same equilibration buffer including 2.5% iodoacetamide rather than DTT was applied for another 15 minutes. The horizontal electrophoresis system (Serva-HPE) was used for the separation in the second dimension with non-fluorescent 12.5% gels. The temperature was set at 15 °C and the running conditions were as: 100V, 30min; 200V, 30 min; 300V, 10min. After 70 minutes run, strips were removed from the gel, and the process was completed by working at 220 V, overnight, and 1000V, 3h. Gels were then fixed in 15% ethanol for 2 hours.

Typhoon FLA 9500 Gel Imaging Scanner (GE Healthcare) was used to visualize protein spots. Spot detection and quantitative analysis were performed for all the six gels based on their fluorescence signals using DeCyder 2D (V7.0, GE Healthcare). Selected protein spots (ratio >1.5 and $p<0.01$) were picked with a robotic system (Ettan Spot Picker, GE Healthcare) and transferred to 96-well plates. Spots were then treated with an EVO 2 liquid handling workstation (TECAN). Spots were washed twice for 20 minutes with 50 mM ammonium bicarbonate in 50% methanol. Spots were then dried with 75% acetonitrile (2 times, 20 minutes) before being incubated with 40 ng trypsin in 20 mM ammonium bicarbonate at 37°C for 6 hours. The peptides were eluted from the gel and subjected to further analysis using a mass spectrometry method.

MALDI TOF/TOF Analysis

Dry peptides were solubilized in 2 µl 50% acetonitrile with 0.1% TFA. Following solubilization, 0.7 µl of peptide sample were spotted on a MALDI target with an equal volume of 7mg/ml α–cyano–4– hydroxycinnamic acid in 50% acetonitrile with 0.1% TFA. Mass spectra were acquired on a 5800 MALDI TOF/TOF analyzer (ABsciex) in a positive reflector mode. The MALDI-TOF/TOF spectra were searched against a database composed of the entries of the "homo sapiens" (txid9606) and "capra" (txid9922) taxonomies from the NCBI database, downloaded on the 24th of January 2017 and containing 1118538 sequences, using Protein Pilot (ABsciex) with MASCOT v2.6 (Matrix Science, Boston, MA) as the search engine. The search parameters were; enzyme: trypsin, the maximum number of miscleaveage allowed: 2, peptide mass tolerance: ±100 ppm, and fragment mass tolerance: w±0.5Da for MS/MS fragments. Additionally, Carbamidomethyl (C) was set as fixed modification and Dioxidation (W), Oxidation (HW), Oxidation (M), and Trp -> Kynurenin (W) were variable modifications. All identifications were manually validated. Unless noted, only proteins with a minimum of 2 peptides identified with MASCOT identity scores greater than 30 were reported.

Statistical Analysis

For each detected spot, the student's t-test and average signal ratios, automatically calculated by Decyder software, were used for spot comparison. For spots having single protein identifications, the initial filtering was based on the ratio (ratio>1.5) and p-value ($p<0.01$) obtained from DeCyder software. Next, the separation into two groups was performed as follows: (i) if ratio > 0, the group was assigned as GC, (ii) if ratio < 0, the group was assigned as HC. Keratin proteins and proteins with no matching gene symbols were excluded from the statistical approaches. The distinct groups of proteins were then used for functional annotation analyses using the DAVID tool (https://david.ncifcrf.gov/). Multiple protein identifications within the same spots were further evaluated by Kyoto Encylopedia of Genes and Genomes (KEGG) pathway analysis to assess the affected pathways.

Results

Common Proteins in Whey Fraction Determined by Two-Dimensional DIGE Analysis

To assess the whey fraction proteomic profile of human and goat colostrum samples, we performed DIGE analysis. In each experiment, every DIGE gel included a Cy2 internal standard of pooled goat and human colostrum proteins. Besides, the proteins labeled with Cy3 and Cy5 were compared in each gel that was normalized with Cy2 labeled samples. A representative Cy5 labeled human colostrum and Cy3 labeled goat colostrum DIGE gels are given in Figures 1 and 2. The master gel was selected based on clarity and the highest number of spots out of six gels. In total, 533 spots were detected and identified in human and goat colostrum samples ($p<0.05$) (Supplementary Figure 1, Supplementary Table 1).

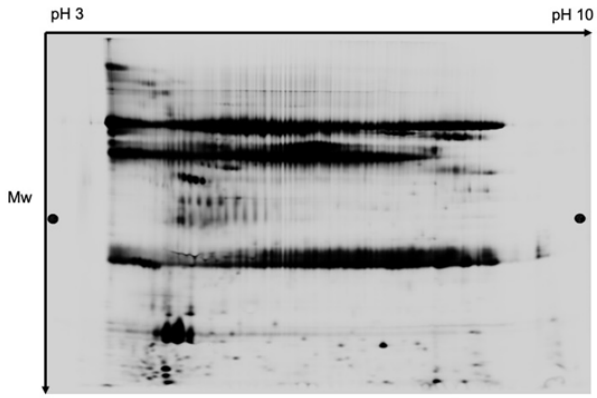

Figure 1. *Representative Cy5 labeled human colostrum DIGE gel*

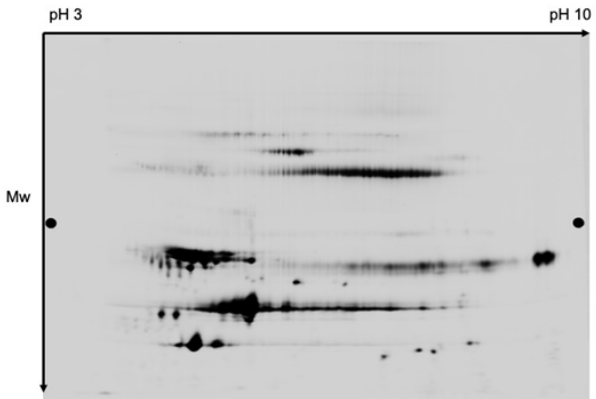

Figure 2. *Representative Cy3 labeled goat colostrum DIGE gel*

Functional Annotation Analyses for Human and Goat Colostrum Samples

For all the proteins identified in human and goat colostrum samples, we determined the gene symbols that were found to be common between HC and GC (Figure 3). For example, *ALB*, *B2M*, *C3*, *IGHG1*, *JCHAIN*, *LALBA*, *LTF*, and *SERPINA3* were the major genes that contributed to the common proteins. Proteins identified in the human colostrum resulted in the enrichment of five KEGG pathways; phagosome, complement and coagulation, pathogenic *E. coli* infection, Legionellosis, *Staphylococcus aureus* infection. Due to the limited number of different proteins identified in goat colostrum, KEGG pathway analysis could not be performed. However, proteins related to the casein fractions and immunoglobulins were the majority of proteins determined in GC.

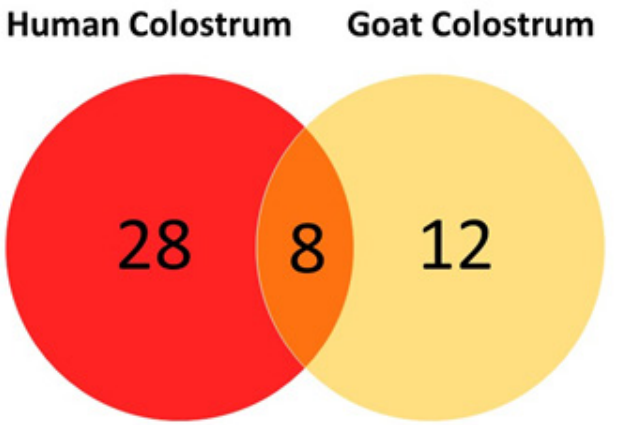

Figure 3. *Venn Diagram of gene symbols that correspond to the proteins identified in human colostrum and goat colostrum.*

Among all the identified proteins in HC and GC, 156 of them were identified in single spots (ratio>1.5 and p<0.01). Sixty-two out of 156 proteins were found to be relatively increased in HC than GC, and 94 out of 156 proteins relatively increased in GC than HC (Supplementary Table 2). Functional annotation analyses were further performed to assess the functional significance of the detected proteins in whey fractions of colostrum samples. Those proteins identified in HC and GC samples were classified based on their "UP-Keywords" (Figure 4). The first three functional categories for proteins in human colostrum were; secreted (20.1%), signal (20.1%), and glycoprotein (20.1%); whereas in goat colostrum samples the first three functional categories were detected as; milk protein (25%), secreted (33.3%), and phosphoprotein (25%). Compared with goat colostrum, human colostrum showed more functional categories. In HC, gene ontology-based biological process pathways were related to homeostatic functions, immune system, and cellular metabolic functions (Figure 5).

Discussion

The benefits of colostrum to the newborn are very well-known, but human colostrum is scarce; therefore, there is a great interest in finding alternative colostrum sources to replace human colostrum. In the present study, we aimed to assess common and differential proteins that were detected in both colostrum types to determine the goat colostrum proteomic coverage of human colostrum. In total, we detected and identified 533 proteins in human and goat whey colostrum samples including;

immunoglobulin, caseins, albumin, lactoferrin, lactotransferrin, and lactoglobulin as HAPs; and α1-antitrypsin, integrin, cathelicidin, galactin-3-binding protein, lactadherin, tenascin, and apolipoprotein J as LAPs.

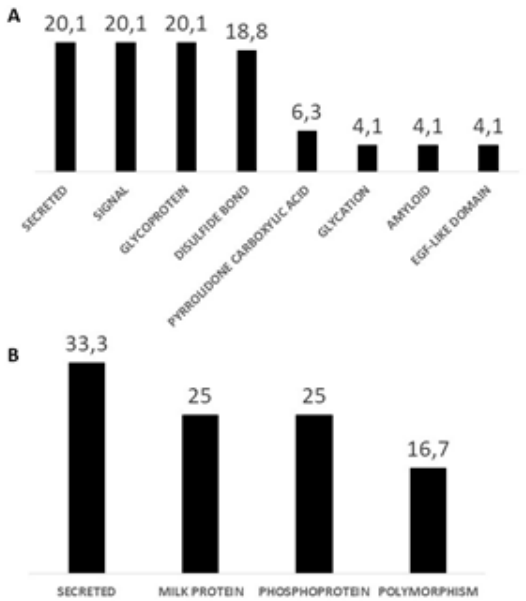

Figure 4. *Functional categories of single spot single protein identifications in the whey fractions of A. Human Colostrum, and B. Goat colostrum using David Tool (UP-Keywords) (ratio>1.5 and p<0.01)*

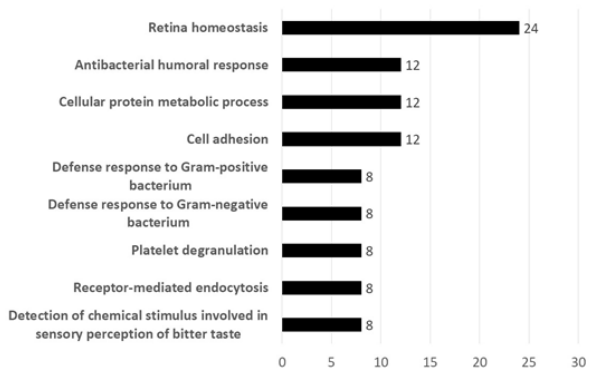

Figure 5. *Gene Ontology classification of human colostrum proteins from the whey fraction based on biological process*

The total protein amount and protein composition change in human mature milk and human colostrum. Additionally, human colostrum had high levels of proteins and a higher proportion of whey fraction when compared with human mature milk. Still, they can share common proteins as well. For example, major and minor proteins like α-1 antitrypsin, α-lactalbumin, carbonic anhydrase 6, cordin like protein 2, galectin-3- binding protein, lactadherin, lactoferrin, prolactin-stimulator protein, and tenascin were common in our human colostrum study and a study in human mature milk (15). Importantly, we detected the aforementioned proteins in goat colostrum; whilst, proteins like α-1 antitrypsin, carbonic anhydrase 6, cordin like protein 2, prolactin-stimulator protein, tenascin, and integrin were not reported in bovine colostrum and milk studies (16).

To find a potential replacement for the scarce human colostrum, it is a priority to deeply understand the protein composition and protein functioning in human colostrum. As an early comprehensive work, Palmer et al. identified 151 proteins in the whey fractions of human colostrum, and 83 out of 151 were reported in human colostrum for the first time (17). Since then, different fractions of human colostrum were investigated using proteomic and phosphoproteomic approaches (18, 19). Similar to our results, proteins involved in complement and coagulation cascades, immune system processes, and signaling pathways were commonly detected in published studies (19, 20). In a human skim colostrum study, metabolism-related proteins such as fructose-bisphosphatase aldolase A were detected and changes in the levels on different days were reported (21). We were not able to detect any specific metabolism-related proteins in human and goat colostrum samples, although proteins in HC were categorized in "cellular and metabolic functions". Detection of no specific metabolism-related proteins might be due to the limitations of the proteomic approach that we used or metabolism-related proteins may not be distinguishable in the time that we collected the colostrum samples. The HAPs, such as IgA, lactoferrin, and human serum albumin, that were detected in human colostrum were in line with the published literature (21). Additionally, we confirmed the presence of these HAPs in goat colostrum as well.

The nutritional benefits of goat milk paved the way for detailed functional assessments of goat colostrum. The protein content is important to further assess the properties of goat colostrum. Yet, there are limited proteomic studies in this field (14).

Recently, Sun et al. showed that proteins involved in extracellular regulated protein kinases (ERK1 and ERK2) signaling and calcium-binding were detected in goat colostrum samples (13). Interestingly, the authors demonstrated that goat colostrum and mature milk proteins were involved in disease-related pathways, like Staphylococcus aureus infection (13). In our study, the detected proteins in human colostrum samples were also enriched to Staphylococcus aureus infection based on the KEGG pathway analysis. However, due to the limited number of proteins identified in goat colostrum, we could not show any enrichment of proteins in the whey fraction of goat colostrum. In the cited study, goat MFGM proteins in the colostrum and mature milk were compared, and both MFGM proteins originated either from colostrum or mature milk showed an enrichment to disease pathways including Staphylococcus aureus infection, pertussis, and legionellosis (13). The enrichment of the disease-related pathways in human and goat colostrum may be the reason for passive immunization that protects the newborn from potential diseases. This is rather critical for ruminants as colostrum is of great importance for the immunization (22). Enrichment of disease-related pathways in human colostrum demonstrated in our study was also in line with the published literature (23). For example, the detection of N-linked glycans and multiple fucosylation products in human MFGM highlighted the potential of preventing infants from infection and disease (23).

In our study, we detected considerable amounts of common proteins in whey fractions of human and goat colostrum, suggesting a relatively high proteomic coverage of human colostrum by goat colostrum. However, an important issue regarding ruminant milk and/or colostrum in humans is the potential allergic reactions they might cause. Food allergies in infants are frequently due to the consumption of cow milk (24). The milk contents of goat and cows are comprised of HAPs including β-lactoglobulin, α-lactalbumin, κ-casein, αS1-casein, and LAPs such as lactoferrin, transferrin, and prolactin (25). However, one case study suggested a role for goat allergy in infants caused by the casein fraction of the goat milk (24). For example, alphaS1-casein levels in ruminant milk can be responsible for allergic reactions in humans (26). Although the whey fraction of goat colostrum and/or milk may not be influential in allergic responses, comprehensive analyses on allergy are required to investigate the potential of goat colostrum to replace human colostrum for newborns.

The content of skim milk (Caseins and whey proteins are named after "skim milk") continuously changes because of the variable whey and casein fraction ratios (9). Whey protein: casein ratio of milk is 80:20 at the beginning, 60:40 at the middle, 50:50 at the end of the lactation period (27). Depending on a variation of skim milk proteins, human milk amino acid composition also changes during lactation. In the cow and goat milk studies, whey protein: casein ratio was reported as 20:80 (27,28).

Although we focused on the whey fraction and used the ultracentrifugation approach to eliminate casein from colostrum, we still detected casein proteins, especially in GC, in our gels. We believe that the significant casein fraction in GC hampered the casein elimination in the sample preparation procedures. Still, the rest of the HAPs and LAPs in whey fraction provided a preliminary but important proteomic comparison between the goat and human colostrum.

Conclusions

The whey proteins of human and goat colostrum were a remarkable number of common proteins. Additionally, the enrichment of disease-related pathways in human colostrum suggested a role for passive immunization which might protect the newborn from diseases. Further research in terms of potential allergic responses is needed to better understand whether goat colostrum can be used as an alternative formula for scarce human colostrum in the future.

Statements and Declarations

Declarations of Interest

The authors declare no conflict of interest.

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Ethical Approval

The study was approved by the Acibadem University Ethical Committee (ATADEK-2013-507)

Consent to Participate

Human colostrum samples were collected from subjects who agreed to sign an informed consent form.

Consent to Publish

All authors consent to publish.

Authors Contributions

CAL: Investigation, Resources, Writing-original draft; YU: Formal analysis, Writing-original draft, Writing-review and editing, Visualization; SP: Methodology, Investigation, Writing-review and editing; EU: Formal analysis, Writing-review and editing; US: Formal Analysis, Writing-review and editing; PA: Resources, Writing-review and editing; PAU: Resources, Writing-review and editing; AO: Conceptualization, Supervision, Writing-review and editing, Project administration

Availability of data and materials

All relevant data are within the paper.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Anatomy / Anatomi

First-Year Medicine Faculty Student Opinions On Web Videos About Anatomy And Histology Courses

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ABSTRACT

Purpose: The purpose of this study is to evaluate how accurate and safe the information in the course videos on the web is, together with student comments. It is extremely important for the future of medical education to evaluate students' perspectives and pass them on to the literature.

Method: 98 (Female N:49, Male N:49) students participated in the study. The answers given by the students were evaluated with a five-point Likert test.

Results: The study data were evaluated as percentage and frequency in excel and reflected in the table. Then, the answers given by the female and male students were compared in terms of significance with the chi-square test. When the answers given by male and female students to the fourth question were compared, a significant difference was found (p=0.012).

Conclusion: As a result of the study, a significant difference was found between male and female students in the fourth question (Results were evaluated within the 95% confidence interval, p <0.05 was considered significant). The demand for anatomy videos is slightly higher than for histology videos. In addition, students are more determined to watch videos that pass the information control.

Keywords: Video medical education, Anatomy education, Histology education, Audit of medical lecture videos

Tıp Fakültesi 1. Sınıf Öğrencilerinin Anatomi Ve Histoloji Dersleri İle İlgili Web Videoları Hakkındaki Görüşleri

ÖZET

Amaç: Bu çalışmanın amacı, web ortamında yer alan ders videolarında yer alan bilgilerin ne kadar doğru ve güvenli olduğunun öğrenci yorumlarıyla birlikte değerlendirmektir. Öğrencilerin bakış açısının değerlendirilip literatüre geçmesi, tıp eğitiminin geleceği açısından son derece önemlidir.

Yöntem: Araştırmaya 98 (Kız N:49, Erkek N:49) öğrenci katılmıştır. Öğrencilerin verdikleri cevaplar beşli likert testi ile değerlendirilmiştir.

Bulgular: Çalışma verileri excel ortamında yüzde ve frekans olarak değerlendirilerek tabloya yansıtılmıştır. Daha sonra kız ve erkek öğrencilerin verdikleri cevaplar ki-kare testi ile anlamlılık açısından karşılaştırılmıştır. Erkek ve kız öğrencilerin dördüncü soruya verdikleri cevaplar karşılaştırıldığında anlamlı bir fark bulunmuştur (p=0,012).

Sonuç: Çalışma sonucunda dördüncü soruda kız ve erkek öğrenciler arasında anlamlı bir fark bulunmuştur (Sonuçlar %95 güven aralığında değerlendirilip, p <0,05 değeri anlamlı kabul edildi). Anatomi videolarına olan talep histoloji videolarına göre biraz daha fazladır. Ayrıca öğrenciler bilgi kontrolünden geçen videoları izleme konusunda daha kararlıdır.

Anahtar Kelimeler: Videolu tıp eğitimi, Anatomi eğitimi, Histoloji eğitimi, Tıp dersi videolarının denetimi

The indispensable and most basic element of anatomy education is the cadaver (1). In the histology department, the microscope and the high quality stained preparation are the most important and indispensable components of education (2). While these two important branches were previously called morphology in most universities, they have now become independent departments. In fact, anatomy examines the human body 'gross', that is, the human body in macro terms, while histology examines the human body at a smaller, micro level, as tissue (1,2).

At the present time, with the development of technology, besides the cadaver, three-dimensional simulations and various software programs have started to be produced (3). The same situation is observed through giant reflective and high resolution screens used in histology. In addition to all these advantages offered by technology, it has now become very easy for students to access information (4). Tablets and smart phones in the hands of many students provide the opportunity for students to access information from the internet, both visually and theoretically, whenever they want. Even in lessons, students can obtain photographs of cadavers, models and histological preparations with their phones or tablets (5,6).

Recently, videos with lecture content have increased considerably on websites and social media. There are countless videos on websites about anatomy and histology courses. However, it is controversial that these videos carry accurate information. While watching the videos of most instructors in anatomy and histology branches, no title (Professor professor, associate professor, assistant professor, PhD student etc.) is considered (7).

In this study, it is aimed to consider the web videos of anatomy and histology courses from the point of view of students and to bring their views to the literature. This approach can enable web videos to be moderated and made more painstakingly. Because the continuity of a situation that is wrong in education can harm generations who devote themselves to saving lives, such as medical students.

Materials and Methods

The study was conducted by taking the opinions of the first year medicine faculty students of Kafkas University in the 2021-2022 academic year. The data collection forms used in the study were prepared in the web environment and the students filled the forms on the web software. Ninety eight (98) students (Female: 49 students, Male: 49 students) answered the questions in the data collection form. Data collection questions were prepared with a 'Five-Likert Scale' (strongly agree, strongly disagree, undecided, agree, disagree) (8,9). The answers given by the students were analyzed through the web program and then the results were entered into Microsoft Excel. Then, the answers given by the second year female and male students to the questions were compared statistically with the chi-square test.

Statistical Analysis

In the statistical analysis, the answers given by female and male students were compared. In this analysis, the SPSS 22.0 coded version software program for Windows was used. Descriptive statistics for categorical variables were expressed as frequencies and percentages. Chi-square test was used in the analysis of categorical data. The results were evaluated within the 95% confidence interval and a p value of <0.05 was considered significant.

Ethical Consideration

This study was approved by the ethics committee of Kafkas University Faculty of Medicine (Approval number: 2022/04; Decision: 17). The study was carried out with the help of the 1964 Declaration of Helsinki and later ethical standards.

Results

Students' interest in practice videos; opinions on questions 1, 2, and 3

Both female and male students show a certain interest in the videos of anatomy and histology courses on the web, and it is evident from the percentage of 'agree' in the answers to these questions (51% for females, 49% for males) that students enjoy video applications. Quite a few students answered 'disagree' to the first, second and third questions. The students who were 'undecided' on these three questions were also quite few compared to the students who agreed with the opinion, but more than those who gave the answer 'I disagree' (the percentage of the first three questions is given in Table 1).

Comparison of interest in anatomy and histology web videos with students' responses; opinions on questions 4, 5, 6 and 7

In these questions, it was investigated which of the anatomy and histology courses the students were most interested in the video. As a result of this research, both male and female students were more interested in anatomy videos. Especially in the fifth question, only one of the female students answered "I do not agree" in the opinion that 'the number of anatomy videos should be increased'. Apart from that, a total of 7 students, both male and female, are 'undecided' and the remaining majority (90 people) want anatomy videos to be increased on the web. Those who want to increase histology videos are 77 students in total (The answers are given in the 6th question in table 1,2).

For the sharp distinction of the anatomy and histology course, the percentages of the fourth question and seventh question opinion are almost the same for both men and women. For example, in the fourth question; A comment was presented as 'ıt is wondered if only anatomy videos were increased and histology was not needed'. While the answers 'agree' and 'disagree' are almost the same in women (but the majority of them do not agree, so they want to have histology videos), a significant difference is observed in men. While 18.4% (agree and totally agree) said that men do not need to have histology videos, 63% (disagree and totally disagree) who wanted histology videos (Table 1,2; 4.,5.,6.and 7. questions).

Responses to inspection and control of videos in web systems; opinions on questions 8, 9,10

In the eighth, ninth and tenth questions, almost all of the male and female students want to have the supervision of the practical videos posted on the internet. When we elaborated the subject in the ninth question, both male and female students supported the quality of the videos to be increased and the control (against the wrong information transfer) with the answer of 'I totally agree' to a great extent. While none of the women gave the answer 'disagree', only one of the men gave the answer 'disagree'. This is one of the most impressive data of the study. In the tenth question, both male and female students, and almost all of the class, want the videos to be supervised and at the same time, experienced teachers to explain the lesson videos.

Web control system to prevent wrong learning; Opinions on questions 11,12,13

In the eleventh question, 'not every training video should be placed on the internet in order to prevent mislearning.' Almost all of the male and female students answered 'agree' to the opinion. The twelfth question brings with it a very controversial situation in terms of answers. educational videos posted on the internet caused the students to be 'undecided' or 'not agreeing' with this view, whether or not the academicians who taught the courses were concerned about making money. The rate of 'agreeing' and 'undecided' with this view is slightly higher than that of 'disagreeing' for both male and female students. In the thirteenth question, one of the most crucial points of the study was emphasized. While the control of the lecture videos can be evaluated by passing a jury (by listening, watching, as a referee), the fact that there are internet systems controlling this has created a very high level of satisfaction among the students.

Table 1. Percentage of frequency (f) that female students gave to the questions

Female Students N:49	Absolutely agree	Absolutely disagree	Undecided	Agree	Not Agree
1-I am interested in the fact that there are application videos on the websites of the anatomy course.	61,2		12,2	24,5	2
2-It is interesting to me that there are application videos on the websites of the histology course.	42,9		18,4	32,7	6,1
3- Application training videos for anatomy and histology on websites are useful for learning lessons.	51		8,2	40,8	
4- Anatomy practice videos on the websites are useful for learning the course, but I don't need a practice video for histology.	2	12,2	6,1	34,7	44,9
5- The number of anatomy practice videos on websites should be increased.	57,1		6,1	36,7	
6- The number of histology practice videos on websites should be increased.	38,8		16,3	34,7	10,2
7- The number of both histology practice videos and anatomy practice videos on the websites should be increased.	44,9		6,1	42,9	6,1
8- The application course videos on the websites should be audited (to prevent wrong information transfer or wrong learning).	71,4		4,1	24,5	

Table 1. Percentage of frequency (f) that female students gave to the questions (continued from Table 1)					
9- I would very much like to increase the quality and control of the application course videos on the websites (to prevent wrong information transfer or wrong learning).	77,6		2	20,4	
10- I would very much like the lecturers in the big universities in our country to explain the application course videos on the internet sites and to increase the quality and control them.	67,3		2	30,6	
11- In order to prevent wrong learning, not every training video should be placed on the internet (supervision should be brought).	63,3	2	4,1	26,5	4,1
12-Educational videos on websites such as Youtube can serve the purpose of making money rather than education for academicians.	6,1	10,2	30,6	16,3	36,7
13-There should be a system that measures the knowledge and narratives of academics who put educational videos on websites such as Youtube and prevents posting wrong videos.	51		4,1	40,8	4,1

Table 2. Percentage of frequency (f) that male students gave to the questions					
Male students N:49	**Absolutely agree**	**Absolutely disagree**	**Undecided**	**Agree**	**Not Agree**
1-I am interested in the fact that there are application videos on the websites of the anatomy course.	44,9		6,1	46,9	2
2-It is interesting to me that there are application videos on the websites of the histology course.	42,9		16,3	38,8	2
3- Application training videos for anatomy and histology on websites are useful for learning lessons.	49		2	44,9	4,1
4- Anatomy practice videos on the websites are useful for learning the course, but I don't need a practice video for histology.	8,2	22,4	18,4	10,2	40,8
5- The number of anatomy practice videos on websites should be increased.	57,1		12,2	28,6	1
6- The number of histology practice videos on websites should be increased.	53,1		12,2	30,6	4,1
7- The number of both histology practice videos and anatomy practice videos on the websites should be increased.	49		12,2	36,7	2
8- The application course videos on the websites should be audited (to prevent wrong information transfer or wrong learning).	67,3		4,1	26,5	2
9- I would very much like to increase the quality and control of the application course videos on the websites (to prevent wrong information transfer or wrong learning).	67,3		4,1	26,5	2
10- I would very much like the lecturers in the big universities in our country to explain the application course videos on the internet sites and to increase the quality and control them.	61,2		4,1	30,6	4,1
11- In order to prevent wrong learning, not every training video should be placed on the internet (supervision should be brought).	57,1		10,2	30,6	2
12-Educational videos on websites such as Youtube can serve the purpose of making money rather than education for academicians.	10,2	8,2	28,6	18,4	34,7
13-There should be a system that measures the knowledge and narratives of academics who put educational videos on websites such as Youtube and prevents posting wrong videos.	51		10,2	30,6	8,2

Table 3. P values of female and male students' answers to each question with chi-square tes

QUESTIONS	'p' Values
1-I am interested in the fact that there are application videos on the websites of the anatomy course.	0,111
2-It is interesting to me that there are application videos on the websites of the histology course.	0,787
3- Application training videos for anatomy and histology on websites are useful for learning lessons.	0,271
4- Anatomy practice videos on the websites are useful for learning the course, but I don't need a practice video for histology.	0,012
5- The number of anatomy practice videos on websites should be increased.	0,475
6- The number of histology practice videos on websites should be increased.	0,426
7- The number of both histology practice videos and anatomy practice videos on the websites should be increased.	0,509
8- The application course videos on the websites should be audited (to prevent wrong information transfer or wrong learning).	0,777
9- I would very much like to increase the quality and control of the application course videos on the websites (to prevent wrong information transfer or wrong learning).	0,557
10- I would very much like the lecturers in the big universities in our country to explain the application course videos on the internet sites and to increase the quality and control them.	0,480
11- In order to prevent wrong learning, not every training video should be placed on the internet (supervision should be brought).	0,572
12-Educational videos on websites such as Youtube can serve the purpose of making money rather than education for academicians.	0,947
13-There should be a system that measures the knowledge and narratives of academics who put educational videos on websites such as Youtube and prevents posting wrong videos.	0,446

Discussion

As technology develops, its reflections in medical education are increasing day by day. One of these developments is the spread of education systems on the internet in the internet age we live in (10). Especially in the field of health, the number of lecture videos is increasing day by day (11).

In this study, the presentation of the anatomy and histology videos on the web to the students' opinions and how the students responded to the questions was a research topic that was investigated with importance.

When the answers given to the questions are examined, both anatomy and histology videos attract the attention of the students. At the same time, they like to learn the lesson from videos. In the study, it was analyzed that the interest in anatomy videos was slightly more than the interest in histology videos. But students want to increase both anatomy and histology videos on the web.

In general, the response rates of male and female students are parallel to each other, except for only one question in all questions. However, in the fourth question, a significant difference was observed in both genders. 'Anatomy practice videos on the websites are useful for learning the lesson, but I don't need practice videos for histology.' In his opinion, both male and female students gave a high percentage of 'I disagree' answers. However, both male and female students are 'undecided' and there are proportional differences between those who 'agree' with this view (table1,2).

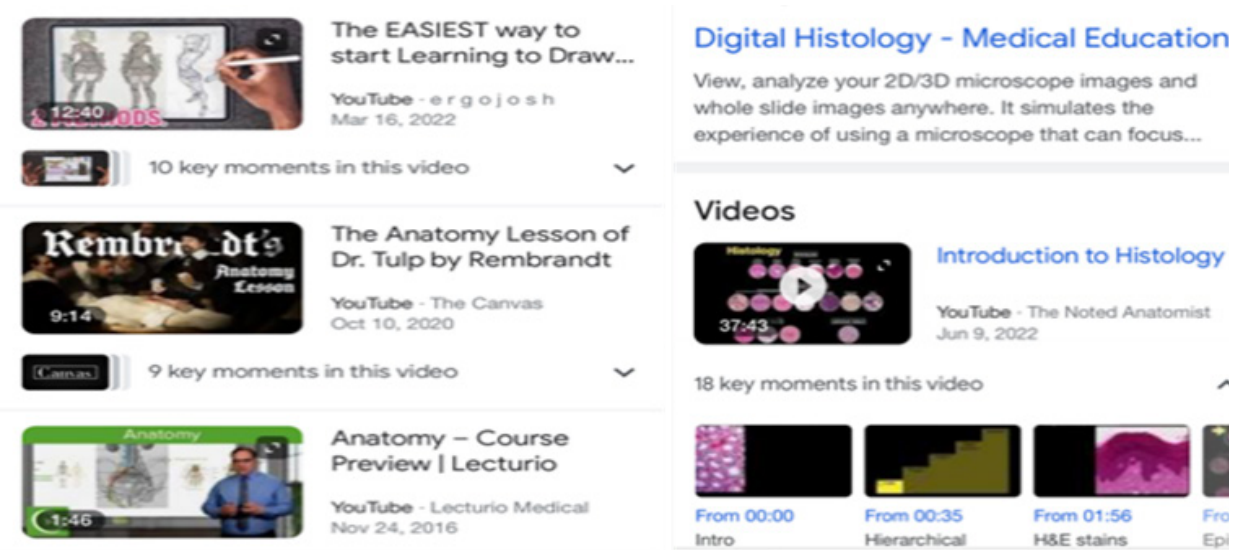

Figure 1. *Tutorial videos about anatomy and histology courses on the web*

More female students agree with this view than male students (those who think that anatomy application videos are more necessary than histology application videos).

Another important data of the study is that the students want the videos to be supervised. Social media and you tube software has been and continues to be the most popular area of recent years. When we write down any question we can think of, an incredible amount of data emerges. However, especially when it comes to medical education, how reliable the information is creates a question mark in the minds of the students.

The final questions asked in the study were about the reliability and moderation of videos on the web. In fact, this was one of the most important parts of the study. Interestingly, the students highly prefer to listen to the video topics from the experienced educators of the top universities in Turkey. Another important point is that the training videos on the internet are required to undergo an audit.

In the twelfth question, when asked whether it is possible for educators to make money through web videos, the vast majority of both male and female students answered 'I disagree'. However, in addition to this, a large number of students, both male and female, showed a skeptical attitude and marked the answer 'I am undecided'.

Considering that social media has been used a lot in recent years, we see that videos of medical courses are spread on various internet sites and social shares (12). In particular, it is a matter of great debate whether the educators who teach the course give the information correctly (13). At the same time, it is an obvious fact that students love such practices. The need for videos by students has led to the increase of educators who teach videos. Unfortunately, this situation can also lead to an uncontrolled information pollution (13,14,15).

In this study, the extent to which web videos attract the attention of the students and the level of use of these videos by the students are discussed. At the end of the study, very striking data were reached. In particular, the increase in such studies has a significant impact on future medical education. At the same time, a control mechanism can be created by increasing the quality of medical education.

Conclusion

Evaluation of web anatomy and histology videos according to student opinions is a very important issue that will accelerate medical education. The number of these training videos is increasing day by day on the internet sites. In addition, the accuracy of the information of the people who narrate the videos and whether these people are real educators are other issues that need to be investigated. It is thought that the study will be of great benefit to the literature. This kind of work should continue.

Conflict of Interest

The author declared that there is no conflict of interest

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Helicobacter Pylori Relationship in Cases of Coexistence of Gastritis and Gallbladder Disease

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ABSTRACT

Purpose: We aimed to investigate the effect of Helicobacter Pylorii (HP) on the development of gallbladder diseases and cholelithiasis and its relationship with gastritis.

Methods: 282 gastritis cases with follow-up and operated gallbladder material were included in the study. All histomorphological findings, presence of HP and other variables were compared. Active inflammation and presence of HP were examined in the gastritis group. The gallbladder (GB) disease group was evaluated in terms of cholelithiasis, inflammation, cholesterolosis, intestinal and pyloric metaplasia, and the presence of HP.

Results: Gallbladder HP (+) was higher in female patients than in male patients. The presence of HP in the GB was significantly higher in patients with cholelithiasis than patients without cholelithiasis. The incidence of HP in the GB was higher in patients with active gastritis than in patients with inactive gastritis. The presence of HP in the GB was found to be higher in patients with HP on gastric biopsy. HP was found to be less in cases without cholesterolosis in the GB ($p < 0.05$). Acute inflammation in the gallbladder, pyloric and intestinal metaplasia were not associated with the presence of HP. In HP (+) gastritis cases, the rate of stone and HP association in the GB was higher than the patients with HP (-) gastritis ($p < 0.05$). However, the presence or absence of HP in gastritis cases was not found to affect the rate of cholelithiasis or HP status in the group without cholelithiasis.

Conclusion: In our study, correlation with the presence of HP is clearly seen in patients with gastritis and accompanying cholelithiasis. However, there are many parameters affecting the formation of cholelithiasis and other diseases. Therefore, it will be more useful to interpret the effect of HP presence on the GB with prospective studies in series with more cases, using the control group and limiting the number of variables as much as possible.

Keywords: Gastritis, Gallbladder diseases, Helicobacter pylori

Gastrit ve Safra Kesesi hastalığının Birlikte Olduğu Durumların Helicobacter Pylori İlişkisi

ÖZET

Amaç: Bilinen gastrit olgularında, Helicobacter Pylorii'nin (HP) safra kesesi hastalıkları ve kolelitiyazis gelişimi üzerindeki etkisi araştırıldı.

Gereç-Yöntem: Takipli ve opere, safra kesesi materyali olan 282 adet gastrit olgusu çalışmaya dahil edildi. Tüm histomorfolojik bulgular, HP varlığı diğer değişkenler karşılaştırıldı. Gastrit grubunda aktif inflamasyon ve HP varlığı incelendi. Safra kesesi hastalığı grubu, kolelityazis, inflamasyon, kolesterolozis, intestinal ve pilorik metaplazi, HP varlığı açısından değerlendirildi.

Bulgular: Safra kesesi HP (+)'liği, kadın hastalarda erkek hastalara göre daha yüksekti. Safra kesesinde HP varlığı, kolelitiazisli hastalarda, anlamlı olarak daha yüksekti. Safra kesesinde HP görülme sıklığı aktif gastritli hastalarda, inaktif gastritli hastalara göre daha yüksekti. Tüm HP pozitif gastrit olgularında, safra kesesinde HP varlığı daha yüksek bulundu. Safra kesesinde kolesterolozis olmayan olgularda, HP daha az bulundu ($p < 0.05$). Safra kesesinde akut iltihap, pilorik ve intestinal metaplazinin, HP varlığı ile ilişkisi yoktu. HP (+) gastrit olgularında, safra keselerinde taş ve HP birlikteliğinin oranı, HP (-) gastritli olgulardan yüksekti ($p<0.05$). Ancak gastrit olgularındaki HP varlığı ya da yokluğunun safra kesesi taşı olma oranına ya da safra kesesi taşı olmayan gruptaki HP durumuna etkisi bulunamadı.

Sonuç: Çalışmamızda gastrit ve beraberinde safra kesesi taşı olan olgularda, HP varlığı ile korelasyon açıkça görülmektedir. Ancak safra kesesi taşı oluşumunu ve diğer hastalıklarını etkileyen birçok parametre vardır. Bu nedenle, HP varlığının safra kesesindeki etkisi, kontrol grubunu kullanarak ve değişken sayısını mümkün olduğunca sınırlandırarak, daha fazla olgu içeren serilerde, ileriye dönük çalışmalarla yorumlamak daha faydalı olacaktır.

Anahtar Kelimeler: Gastrit, Safra kesesi hastalıkları, Helicobacter pylori

Although, Helicobacter pylori (HP) is especially common in the stomach, it's extra-gastric localization and it's relationship with diseases are evaluated. One of the organs investigated for the HP effect on extra-gastric localization is the gallbladder (GB) and its diseases. In patients with HP positive gastritis, there are few studies evaluating the incidence of GB inflammation and stone, and the presence of HP in the GB, and the results are contradictory. In this study, we aimed to investigate the effect of HP on the development of GB diseases and cholelithiasis and its relationship with gastritis.

In 1982, Marshall (Gastroenterologist) and Warren (Pathologist) isolated gram (-) spiral bacteria in the antral biopsies of gastritis cases. They described it as Campylobacter pyloridis, but it is now called HP. It is a gram negative, small (0.5-3 µm), spiral, curved, motile bacteria with 4-6 flagellas. Reproduces at 37 degrees in micro-aerophilic environment (1).

Although a large variety of helicobacter species have been isolated, the most important pathogen for humans is HP. Today, half of the world's population is considered to be infected with HP (2-4).

HP coexists with various diseases such as gastritis, ulcers and gastric lymphomas. There is a long list of potential effects of HP outside the stomach. It is thought to be associated with neurological, dermatological, hematologic, ocular, cardiovascular, metabolic, allergic, otorhinolaryngiatric, ophthalmologic, endocrinologic disorders, respiratory diseases, pancreatic diseases and hepatobiliary diseases. Epidemiological data are contradictory (2, 4-6).

Chronic cholecystitis and cholelithiasis are a common disease group worldwide. Many etiologic factors play a role in the development of cholelithiasis. Bacterial infection of the GB and bile ducts is recognized as an important risk factor for cholelithiasis (7). Therefore, the effect of HP on GB inflammation and stone formation is being investigated.

Epidemiological evidence that increases the risk of disease associated with HP infection is controversial. Different pathogenic mechanisms such as environmental factors, infectious agents, dietary habits or genetic disposition may be responsible. Most meta-analysis studies show that infection of the GB with Helicobacter pylori is closely associated with an increased risk of chronic cholecystitis and cholelithiasis (7, 8).

Materials and Methods

Resected GB materials and gastric biopsies of 282 cases with known gastritis between 2011 and 2018, were examined retrospectively in our center. These cases were selected from the patients who had close-range gastric biopsy and GB operations as well as patients with gastric and GB complaints at the same time. In the pathological examination of the tissue in biopsy or GB resections, cases with diagnostic clear or correct clinical-pathological records were used.

Patients without clinical follow-up, those who had long intervals between gastritis complaints and treatment and the period of GB operation, and those who had clinical complaints and treatment-free periods between the two diseases and could not establish a clinical connection were excluded from the study.

Preparations of Hematoxylene-Eosine (HE) and Warthin Starry (WS), which belong to all cases, were reexamined separately and blindly by 2 experienced pathologists. All histomorphological findings and HP presence were noted. There were rare cases with contradictions in the data and these were excluded from the study. The patients diagnosed with gastritis and operated for chronic cholecystitis and cholelithiasis were compared for the presence of HP as well as other variables. From the paraffin blocks of gastric biopsy and GB resection materials, 4 micron thick sections were obtained. Staining was performed with HE and WS (DAKO Artisan Warthin-Starry Stain Kit- EN / FR / DE Instructions for Use, Code AR181). Cases were evaluated using routine preparations and histochemical staining method. In the gastritis group, the presence of active inflammation and HP were examined. GB disease group was evaluated for acute / chronic inflammation, cholesterolosis, intestinal and pyloric metaplasia and presence of HP. The presence of stones in the GB was determined from the reports.

Statistical Analysis

SPSS 24.0 packet analysis program, Chi-square and Fisher exact test were used for statistical analysis. Statistical significance level was taken as 0.05 in all tests.

Results

Of the 282 cases, 178 were women. The initial diagnoses of gastric biopsies were active gastritis in 126 cases and inactive gastritis in 156 cases. There were HP (+) gastritis in 178 cases and HP (-) gastritis in 104 cases. There were GB stones in 194 cases. Cholecystitis was detected in all. HP

was detected in 65 (23%) of the 282 GBs. Cholesterolosis (84 cases), acute cholecystitis (22 cases), intestinal metaplasia (10 cases), pyloric metaplasia (6 cases) were detected. 57 of the 84 patients with cholesterolosis had no HP in the GB (68%). GB HP (+) had cholelithiasis in 59 of these 65 cases and active gastritis (47) was noted in the majority of these 65 cases. 126 (45%) of the patients had coexistence of HP (+) gastritis and cholelithiasis, and 50 of them had GB HP (+). In 68 (24%) of the cases, HP (-) gastritis / cholelithiasis coexistence, 9 of them had GB HP (+), while 59 of them had GB HP (-). There were HP (+) gastritis in all of the 6 patients with GB HP (+) without cholelithiasis.

The presence of HP in the GB was not associated with the presence of acute cholecystitis, intestinal metaplasia and pyloric metaplasia (p> 0.05).

GB HP (+) was higher in female patients than in male patients (p <0.05). The presence of HP in the GB was significantly higher in patients with cholelithiasis than patients without cholelithiasis (p <0.05). There was a statistically significant correlation between the absence of cholesterolosis in the GB and the absence of HP. HP was found to be less in cases without cholesterolosis in the GB (p <0.05).

The incidence of HP in the GB was higher in patients with active gastritis than in patients with inactive gastritis (p <0.05). The presence of HP in the GB was found to be higher in patients with HP on gastric biopsy (p <0.05). In other words, HP negativity was also prominent in GB of HP negative gastritis cases. No significant correlation was observed in the presence of cholelithiasis in patients with HP (+) or (-) gastritis (p> 0.05). The findings and statistical values are shown in Tables 1 and 2.

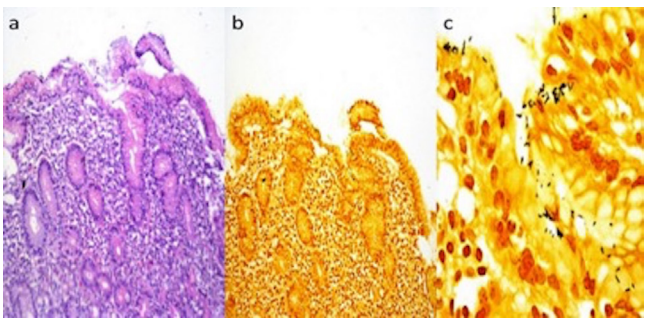

Figure 1: *HP is seen on the epithelial surface of the stomach, HE and WS preparations*
a) HE, X 40 b-c) WS, Histochemistry, X40 and X400

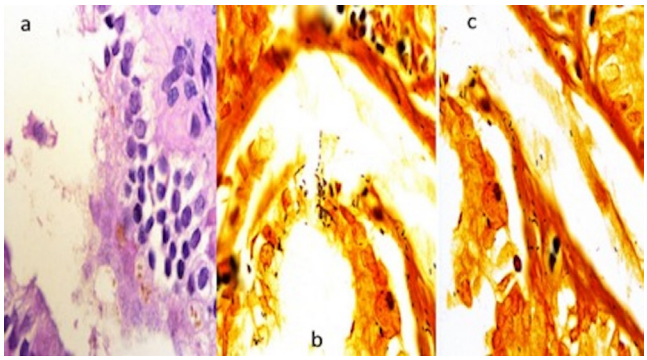

Figure 2: *HP is seen on the epithelial surface of the gallbladder, HE and WS preparations*
a) HE, X 400 b-c) WS, Histochemistry, X 400

Table 1: Comparison of Gallbladder Helicobacter pylorii status with other parameters

		GB HP (+) n (%)	GB HP(-) n (%)	P value
Gender	**Female**	50 (18)	128 (45)	0.008*
	Male	15 (5)	89 (32)	
Cholelithiasis	+	59 (21)	135(48)	0.000*
	-	6 (2)	82 (29)	
Active Cholecystitis	+	6 (2)	16 (6)	0.624*
	-	59 (21)	201 (71)	
Cholesterolosis	+	27 (10)	57 (20)	0.018*
	-	38 (13)	160 (57)	
Intestinal metaplasia	+	3 (1)	7 (2)	0.701#
	-	62 (22)	210 (75)	
Pyloric metaplasia	+	1 (0.3)	5 (0.2)	1.000#
	-	64 (23)	212 (76.5)	
Active gastritis		47 (17)	79 (28)	0.000*
Inactive gastritis		18 (6)	138 (49)	
HP status (Stomach)	+	50 (18)	122 (43)	0.002*
	-	15 (5)	95 (34)	

GB: Gallbladder, HP: Helicobacter pylorii

Table 2: Comparison of the presence of Helicobacter pylorii in the gallbladder with the presence of cholelithiasis in Helicobacter pylorii positive / negative gastritis cases

		HP (+) Gastritis n (%)	HP (-) Gastritis n (%)	P value
Cholelithiasis	+	126 (45)	68 (24)	0.344*
	-	52 (18)	36 (13)	
Cholelithiasis(+), HP status	+	50 (26)	9 (5)	0.000*
	-	76 (39)	59 (30)	
Cholelithiasis(-), HP status	+	6 (7)	0	0.077#
	-	46 (52)	36 (41)	

HP: Helicobacter pylorii

** This test was done with Chi-Square test.*
 # This test was done with the Fisher Exact Test

Discussion

It is being investigated whether HP has effects on many other systems and diseases other than the stomach. Cardiovascular diseases, neurodegenerative diseases, hemathologic disorders, hepatobiliary diseases, autoimmune diseases, respiratory diseases, eye, ear, nose, and throat disorders, dermatological diseases are some of them (2-9).

In many studies and meta-analysis, the possible relationship between HP and hepatobiliary system diseases has been evaluated. Meta-analysis studies report that HP infection correlates with cholelithiasis. In these assessments, the general trend of HP prevalence and cholelithiasis correlation is reported in many countries (7, 8). In addition, similar results have been suggested in Japan, China, Saudi Arabia and Pakistan populations (9-12). In many studies, the presence of HP in the GB was determined and its correlation with cholecystitis and cholelithiasis was shown (12-14). In our study, the correlation between the presence of cholelithiasis and HP was clearly seen. This data suggests us the close association between cholelithiasis and GB HP infection, as in many studies. However, there are investigations suggesting that this correlation is absent or there is insufficient evidence (15-17).

In our cases with HP in the gastric mucosa, there was also a significant correlation between HP infection in the GB and cholelithiasis. This shows similar results with studies involving large numbers of cases and concurrent stomach and GB tissue. As we aimed in our study, many studies also examined the association of GB diseases and HP in patients with gastritis. In many of these studies, the incidence of cholelithiasis and HP is reported to be high in HP-positive patients with gastritis, consistent with our results (18-22) . However, there are studies that suggest no significant correlation (23, 24) . The presence of HP in the GB was more prominent in our patients with active gastritis. This finding is contrary to the declarations (21). As stated in this study, the presence of intestinal metaplasia in the GB did not correlate with the presence of HP in our data. In our cases with pyloric gastric metaplasia in the GB, we did not see a significant difference in terms of HP colonization. However, there is a general approach in terms of HP colonization in GB tissue with areas of gastric metaplasia (25).

Studies questioning the relationship between cholesterolosis and the presence of HP are rare. In a study investigating the presence of HP in the GB of obese patients in the Taiwan population, no correlation was found between all GB diseases (including cholesterolosis) and the presence of HP (26) . Although our data suggest that patients without cholesterolosis have more HP (-), it is clear that more studies are needed in this area. Perhaps, studies that will question the relationship between obesity and the presence of HP indirectly over cholesterolosis can be considered.

As noted in one study (18), we did not see a correlation between acute cholecystitis and the presence of HP. We should note that the number of patients with acute cholecystitis, intestinal and gastric metaplasia was low. In fact, these histopathological changes are less common in the pathological examination of the GB, and the data on the relationship between these changes and HP are very few and contradictory in the literature. However, clearer results will be obtained in studies where the data of multiple and large centers are evaluated together.

As stated in one study (17) , HP infection in the GB was more common in our cases in female gender. In another study (15) , it was suggested that there were no gender differences. However, this correlation may have occurred due to the large number of female patients in our cases. We already know that GB diseases are more common in women.

There are also meta-analysis studies on the correlation of the presence of H. pylori in cirrhosis (27) and biliary tract carcinomas (28). It is also noteworthy that HP infection in the GB is closely associated with changes in tissue such as lymphocytic infiltration, metaplasia and hyperplasia, and there are predictions that this may increase the risk of cancer (29) . In a study conducted in India, studies examining the presence of HP infection and GB diseases in the world are summarized chronologically. In this article, the authors proposed a close association of GB carcinomas, cholelithiasis and HP infection (30) . Therefore, strong evidence that there is a relationship between colelithiasis and HP, which we have determined, can be questioned in terms of the development mechanisms of GB cancers in future studies.

The shortcomings of the study are that it is retrospective and the control group cannot be used. However, since the etiology of GB diseases is multifactorial, a cautious approach to research results is required.

The positive aspects are the large number of cases, the fact that they have clinical follow-ups, the use of routine preparations and histochemical method together for pathological evaluation, which was done blindly by two experienced pathologists.

Conclusion

In our study, the correlation between the presence of HP is clearly seen in patients with gastritis and cholelithiasis. HP infection should be considered not only for stomach diseases but also for GB diseases. Of course, we should not forget many factors that affect the formation of cholelithiasis and GB diseases. Therefore, it may be more useful to comment with prospective studies using the control group and limiting the number of variables as much as possible.

Declarations

Ethical Approval Statement

The study was approved by Sağlık Bilimleri Üniversitesi Şişli Hamidiye Etfal Eğitim ve Araştırma Hastanesi Sağlık Uygulama ve Araştırma Merkezi Klinik Araştırmalar Etik Kurulu (Date: 10.03.2020, Number: 2707).

Authors' contributions

All authors have made substantial contributions to this article being submitted for publications. All authors critically reviewed the manuscript and approved the final form.

Competing interests

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Availability of data and material

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Direct-to-Implant versus 2-Stage Expander Implant Immediate Breast Reconstruction: Comparison of Incidence and Predictors of Complications

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ABSTRACT

Purpose: The most important discussion about the direct-to-implant (DTI) reconstruction is the risk of ischemic problems. Therefore, there is an ongoing debate about the effectiveness and reliability of DTI reconstruction. The current study aimed to compare the outcomes of patients undergoing DTI and expander implant (EI) reconstruction and to determine the factors that may affect the occurrence of complications.

Methods: Sixty patients who underwent immediate implant reconstruction over a two-year period were included in the study. Demographic characteristics, operative characteristics and postoperative complications of the patients were retrieved retrospectively from patient records.

Results: Reconstruction was performed on 34 and 27 breasts in the DTI and EI groups, respectively. The mean follow-up period of the patients was 13.8 months (range 6–28 months). Although the postoperative complication rates were high in the DTI group, no statistically significant difference was found between the two groups ($p = 0.585$). No statistically significant difference was found between the two groups in terms of implant failure ($p = 0.579$). Implant volumes of patients with complications in the DTI group were significantly higher than those without complications ($p = 0.049$).

Conclusion: While DTI was similar to EI reconstruction in terms of implant failure, overall complication rates were higher than those in EI reconstruction. The volume of the implant is a factor that affects the development of complications in DTI reconstruction. DTI reconstruction is a reliable method that can achieve similar results to EI reconstruction with fewer surgical procedures in suitably selected patients.

Keywords: mastectomy; breast reconstruction; direct-to-implant reconstruction; expander implant reconstruction

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İmplant ile Tek Aşamalı ve Doku Genişletici İmplant ile İki Aşamalı Eşzamanlı Meme Rekonstrüksiyonu: İnsidans ve Komplikasyon Oluşumuna Etki Eden Faktörlerin Karşılaştırılması

ÖZET

Amaç: Direct to implant (DTI) rekonstrüksiyon ile ilgili en önemli tartışma, konulan kalıcı implantın mastektomi flebine bası yaparak iskemik problemlere yol açacağı ve bu durumun implant kaybına neden olarak rekonstrüktif başarı oranını düşüreceğidir. Bu sebeple DTI rekonstrüksiyonun etkinliği ve güvenilirliği hakkında halen süregelen bir tartışma mevcuttur. Bu çalışmanın amacı DTI rekonstrüksiyon ile expander implant (EI) rekonstrüksiyon uygulanan hastalara ait sonuçları kıyaslamak ve komplikasyon oluşumuna etki edebilecek faktörleri tespit etmektir.

Yöntemler: İki yıllık period içerisinde implant ile eşzamanlı rekonstrüksiyon uygulanan 60 hasta çalışmaya dahil edildi. Hastalara ait demografik özellikler, operatif karakteristikler ve postoperatif komplikasyonlar retrospektif olarak hasta kayıtlarından tespit edildi. Komplikasyona etki eden faktörlerin tespiti için logistik regresyon analizi uygulandı.

Bulgular: DTI grupta 34 memede EI grupta 27 memede rekonstrüksiyon uygulandı. Hastaların ortalama takip süresi 13.8 aydı (range 6 – 28). Postoperatif komplikasyon oranları DTI grupta daha yüksek olmasına karşın her iki grup arasında komplikasyon görülme sıklığı açısından anlamlı fark saptanmadı. (p=0,585) İmplant kaybı bakımından iki grup arasında anlamlı fark gözlenmedi. (p=0,579) DTI grupta komplikasyon olan hastaların implant volümleri komplikasyon olmayanlara göre istatistiksel olarak anlamlı yüksekti (p=0,049).

Sonuç: DTI rekonstrüksiyon implant kaybı bakımından EI rekonstrüksiyona benzer oranlara sahip iken total komplikasyon oranları EI rekonstrüksiyona göre yüksektir. Konulacak implantın volümü, DTI rekonstrüksiyonda komplikasyon oluşumunda etkili bir faktör olarak görülmektedir. DTI rekonstrüksiyon uygun seçilmiş hastalarda daha az cerrahi prosedür ile EI rekonstrüksiyona benzer sonuçlar elde edilebilecek güvenilir bir yöntemdir.

Anahtar sözcükler: mastektomi, meme rekonstrüksiyonu, kalıcı implant ile rekonstrüksiyon, expander implant ile rekonstrüksiyon

Immediate breast reconstruction with an implant after mastectomy is often preferred because of its short operative surgery time, the fact that it does not create donor area morbidity, and it is an easy-to-apply technique (1,2). Immediate reconstruction with an implant can be performed as a single-stage (direct-to-implant [DTI]) or two-stage (expander implant [EI]) surgery.

EI reconstruction is preferred more frequently as it is found to be more reliable than DTI reconstruction (3). The major reason for this is that DTI reconstruction may lead to ischemic complications with the pressure created by a permanent implant placed in a single session. Despite this negative opinion, the operation time is shortened with DTI reconstruction, the number of postoperative control visits is reduced, and breast reconstruction can be completed in a single session. DTI reconstruction is increasingly preferred in patients, because of the aforementioned advantages (4). The results obtained in studies comparing both methods are contradictory. While some studies report increased complication rates in DTI reconstruction (5,6), others report that the complication rates are high in EI reconstructions, or there is no statistically significant difference between both methods in terms of complication rates (7–11). On the account of the conflicting results in the literature, the selection of a method for immediate reconstruction with an implant after mastectomy is a matter of debate.

The aim of this study was to compare the long-term results of patients undergoing DTI and EI reconstructions in terms of complications and identify the variables that may affect complication rates in both groups.

Materials and Methods

A total of 61 immediate breast reconstruction surgeries performed for oncological purposes in 60 patients who underwent mastectomy between 2018 and 2020 were included in the study. Breast reconstructions performed for prophylactic purposes were not included in the study to obtain a homogeneous sample. The reconstructions were divided into two groups, the DTI group and the EI group. Medical records of patients were retrospectively reviewed and age, length of hospital stay, smoking, comorbidities, body mass index (BMI), mastectomy type (skin and nipple sparing), incision type, implant volume, chemotherapy, and radiotherapy findings were retrieved to examine the effects of these variables on complications.

Complications were classified as major and minor depending on the need for surgical intervention. Infection, seroma, hematoma, capsular contracture, and full-thickness necrosis over mastectomy flap were classified as major complications, while superficial necrosis over mastectomy flap and superficial necrosis over nipple areola complex were classified as minor complications.

Surgical Technique

All mastectomies were performed by the general surgery team. The breast tissue was carefully removed, preserving the subdermal plexus. In patients who had tumor positive for nipple during the operation, nipple areola complex was resected and skin sparing mastectomy was performed. In other patients, nipple sparing mastectomy was performed by preserving the nipple areola. Axillary curettage was performed in cases with positive sentinel lymph nodes based on frozen biopsy.

After mastectomy was completed, the circulation of the mastectomy flap and the condition of the pectoral muscle was clinically observed. DTI reconstruction was performed in sentinel lymph node negative patients in whom there were no circulatory problems in the mastectomy flap and the pectoral muscle was anatomically suitable. EI reconstruction was performed in patients with positive sentinel lymph node and who were thought to have circulatory problems in the mastectomy flap. All the implants and expander implants used were placed in a submuscular pocket prepared under the pectoral muscle. The entire surface of the implants was closed with muscle tissue. Acellular dermal matrix (ADM) and derivative materials were not used in any of the patients.

Statistical Analysis

Software SPSS version 15.0 for Windows (IBM Corp., Armonk, NY) was used for statistical analysis of the data. Descriptive statistics were presented as number and percentage for categorical variables and mean, standard deviation, minimum, maximum, and interquartile range for numerical variables. The ratios in the groups were compared with the Chi-Square Test. Since the data was not normally distributed, Mann–Whitney U test was used to compare variables between two independent groups. Logistic regression analysis was performed to examine the risk factors. The cut-off value was examined by ROC (receiver operating characteristic) curve analysis. $P < 0.05$ was accepted as statistically significant in all analyses.

Results

Between 2018 and 2020, DTI reconstruction was performed on 33 patients (Fig. 1), while two-session EI reconstruction was performed on 27 patients (Fig. 2). Both cohorts showed similar characteristics except for BMI, mastectomy type, axillary curettage, neoadjuvant chemotherapy, and radiotherapy characteristics (Table 1). The rate of nipple sparing mastectomy was higher in the DTI group than that in the EI group ($p = 0.017$). The rates of axillary curettage, neoadjuvant chemotherapy, postoperative radiotherapy, and mean BMI values of the DTI group were lower than those in the EI group ($p < 0.001$, $p = 0.023$, $p = 0.001$, $p = 0.015$, respectively). Mean age was 46.97 ± 11.5 years (range: 28–78 years) in the DTI group, while it was 46.96 ± 8.12 years (range: 31–65 years) in the EI group. Mean BMI was 23.73 ± 3.6 (range: 18.76–30.8) in the DTI group and 26.76 ± 5.1 (range: 19.47–37.64) in the EI group. The mean follow-up period of the patients was 13.8 months (range 6–28 months).

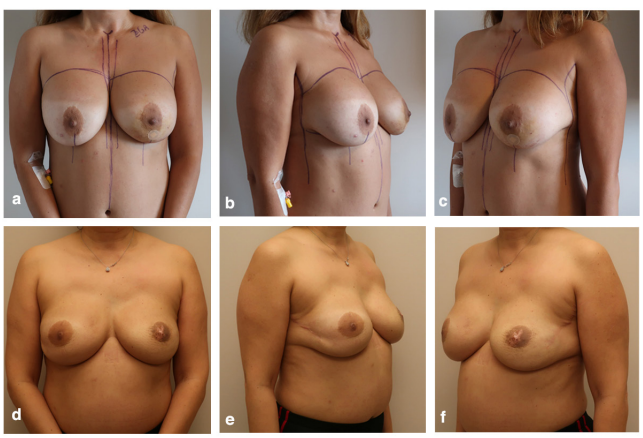

Fig. 1 *A 46-year-old patient. She had a history of left breast cancer and underwent bilateral nipple-sparing mastectomy followed by direct-to-implant reconstruction with medium height, moderate plus projection, anatomic 375 cc implants. Preoperative (a,b,c) and postoperative pictures at 15 months follow up (d,e,f)*

While bilateral reconstruction was performed in 14 patients (42.4%) in the DTI group, only one of these patients had bilateral breast cancer. Bilateral reconstruction was performed in 6 patients (22.2%) in the EI group, while unilateral reconstruction was performed in 21 patients (77.8%). Breasts that underwent prophylactic intervention for bilateral reconstructions were not included in the study. In the DTI group, nipple sparing mastectomy was performed in 31 breasts (91.2%) and skin sparing mastectomy was performed in 3 breasts (8.8%). In the EI group, nipple sparing was performed in 18 breasts (66.7%) and skin sparing mastectomy was performed in 9 breasts (33.3%). Lateral incision was most commonly preferred in both groups. (27 breasts [79.4%] in the DTI group, 20 breasts [74.1%] in the EI group).

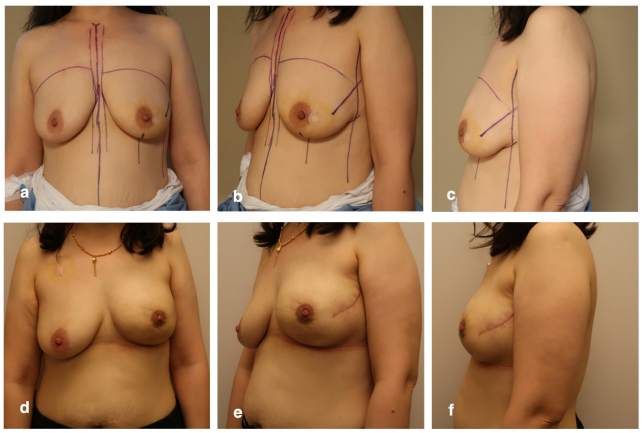

Fig. 2 A 34-year-old patient. She had a history of left breast cancer and underwent unilateral nipple-sparing mastectomy followed by expander implant reconstruction with Mentor Contour Profile Becker 35 (Mentor Worldwide, Santa Barbara, Calif.) 325 cc implant. Preoperative (a,b,c) and postoperative pictures at 9 months follow up (d,e,f)

Mentor CPG implants were used in DTI reconstructions (Mentor Worldwide, Santa Barbara, Calif.). The average implant volume was 339.55 ± 74.11 ml (range 155–475 ml) in the DTI group. Mentor Contour Profile Becker 35 implants were used in EI reconstructions (Mentor Worldwide, Santa Barbara, Calif.). The average implant filling volume in the EI group was 327.03 ± 114.6 ml (range 70–460 ml).

Although the postoperative complication rates were higher in the DTI group than those in the EI group, there was no statistically significant difference between the two groups (11 patients [32.4%] in the DTI group, 7 patients [25.9%] in the EI group; $p = 0.585$). The most common complication observed in the DTI group was superficial necrosis of the mastectomy flap (3 patients [8.82%]), while capsular contracture was the most common complication in the EI group (2 patients [7.41%]) (Table 2). Full-thickness necrosis of the mastectomy flap developed in two patients from the DTI group. In one of these two patients, the implant was lost and the reconstruction was failed, while reconstruction was successfully salvaged in the other patient. In the EI group, one patient experienced implant loss due to full-thickness necrosis developing on the mastectomy flap, and another patient experienced implant loss due to infection, and reconstruction were failed in both patients. The implant failure rate was 2.94% in the DTI group and 7.4% in the EI group. There was no statistically significant difference between the two groups in terms of implant failure ($p = 0.579$).

Table 1. Characteristics of patients and reconstructions

	Direct to Implant	Expander Implant	p
Age			
Mean ± SD (range)	46,97±11,5 (28-78)	46,96±8,12 (31-65)	0,998#
Median (IQR)	45 (40-55,5)	46 (41-52)	
Length of Hospitalisation			
Mean ± SD (range)	3±1,53 (2-8)	3,48±2,39 (2-12)	0,444*
Median (IQR)	2,5 (2-3)	3 (2-3)	
Tobacco Use, n (% of patients)	9 (26,5%)	9 (33,3%)	0,559¥
Comorbidity, n (% of patients)	11 (32,4%)	7 (25,9%)	0,585¥
BMI			
Mean ± SD (range)	23,73±3.6 (18,8-30,8)	26,76±5.1 (19,5-37,6)	**0,015***
Median (IQR)	23,5 (20,6-26,9)	26,6 (21,8-30,8)	
Mastectomy, n (% of breasts)			
Nipple Sparing	31 (91,2%)	18 (66,7%)	**0,017¥**
Skin Sparing	3 (8,8%)	9 (33,3%)	
Incision, n (% of breasts)			
Lateral	27 (79,4%)	20 (74,1%)	0,728¥
Inverted T	3 (8,8%)	1 (3,7%)	
Inframammary fold	2 (5,9%)	2 (7,4%)	
Elliptical	2 (5,9%)	3 (11,1%)	
Vertical	0 (0,0%)	1 (3,7%)	
Reconstruction, n (% of breasts)			
Bilateral	14 (42,4%)	6 (22,2%)	0,074¥
Unilateral	19 (57,6%)	21 (77,8%)	
Side			
Right	18 (52,9%)	11 (40,7%)	0,343¥
Left	16 (47,1%)	16 (59,3%)	
Axillary Curettage, n (% of breasts)	4 (11,8%)	17 (63,0%)	**<0,001¥**
Implant Volume			
Mean (Min-Max)	339,6 (155-475)	327 (70-460)	0,608#
Median (IQR)	340 (280-375)	350 (365-400)	
Neoadjuvant chemotherapy, n (% of patients)	7 (20,6%)	13 (48,1%)	**0,023¥**
Preoperative radiotherapy, n (% of patients)	1 (2,9%)	0 (0,0%)	1,000¥
Adjuvant chemotherapy, n (% of patients)	13 (39,4%)	15 (55,6%)	0,264¥
Postoperative radiotherapy, n (% of patients)	7 (21,2%)	18 (66,7%)	**0,001¥**
Complications, n (% of breasts)	11 (32,4%)	7 (25,9%)	0,585¥

*¥Ki Kare Test #Student t Test *Mann Whitney U Test*

Table 2. Summary of complications

Complications	Direct to Implant	Expander Implant
Minor		
Superficial Nipple Necrosis	2(5,88%)	1(3,70%)
Mastectomy Flap Necrosis (Superficial Thickness)	3(8,82%)	1(3,70%)
Major		
Infection	0 (0,0%)	1(3,70%)
Hematoma	1(2,94%)	1(3,70%)
Seroma	1(2,94%)	0 (0,0%)
Mastectomy Flap Necrosis (Full Thickness)	2(5,88%)	1(3,70%)
Capsular contracture	2(5,88%)	2 (7,41%)

The analysis conducted according to patient characteristics did not reveal any effect of smoking, comorbidities, BMI, type of mastectomy, type of incision used, axillary curettage, chemotherapy, and radiotherapy on the development of complications in both groups. In the DTI group, implant volumes of patients with complications were significantly higher compared to those without complications (p = 0.049). (Table 3) No significant factor was found in the logistic regression analysis of factors affecting complications (Table 4).

In the DTI group, a cut-off value above 360 for implant volume was obtained with 72.7% sensitivity and 65.2% specificity (positive predictive value: 50% negative predictive value: 83.3%). In the DTI group, when the implant volume was above 360, complication rate was fivefold higher (p = 0.038 OR 95% CI: 1.03–24.3).

Discussion

In the classic mastectomy technique, addressing the loss of skin caused after resection of the skin with tumoral tissue was a necessity in order to achieve a successful reconstructive result. In implant-based breast reconstruction, it is possible to overcome this problem only with EI reconstruction over two sessions. For this reason, many reconstructive surgeons are more familiar with two-stage EI reconstruction. The development of mastectomy techniques and the widespread use of nipple sparing, skin sparing mastectomy have made DTI reconstruction easier to perform. However, the opinion that ischemic complications are more frequent in DTI reconstruction (6,12–14) and the fact that reconstructive surgeons are more familiar with the EI reconstruction technique and tend to continue practicing the technique they are experienced in has limited the use of DTI reconstruction.

Table 3. Patient and Reconstruction Characteristics Associated with Complication						
	Direct to Implant			Expander Implant		
	Complicated (n, % of breasts)	Uncomplicated (n, % of breasts)	p¥	Complicated (n, % of breasts)	Uncomplicated (n, % of breasts)	p¥
Age						
Mean ± SD (range)	44,4±5,4 (29-50)	49,6±12,7 (28-78)	0,463#	45,8±7,3 (31-53)	47,3±8,5 (34-65)	0,684#
Length of Hospitalisation						
Mean ± SD (range)	3±1,1 (2-6)	3±1,7 (2-8)	0,434*	5±3,8 (2-12)	2,95±1,3 (2-7)	0,112*
BMI						
Mean ± SD (range)	24,3±4,1 (18,9-30,3)	23,4±3,4 (18,8-30,8)	0,632*	28,3±5,3 (20,7-34,5)	26,2±5,0 (19,5-37,6)	0,362#
Tobacco Use	4 (44,4%)	5 (55,6%)	0,425	3 (42,9%)	4 (57,1%)	0,653
Comorbidity	5 (45,5%)	6 (54,5%)	0,434	3 (42,9%)	4 (57,1%)	0,328
Mastectomy						
Nipple Sparing	11 (35,5%)	20(64,5%)		5 (27,8%)	13(72,2%)	
Skin Sparing	-	3(100%)		2 (22,2%)	7(77,8%)	
Incision						
Lateral	9 (33,3%)	18(66,7%)		5 (25%)	15(75,0%)	
Inframamary fold	1 (50,0%)	1(50%)		-	2(100%)	
Inverted T	1 (33,3%)	2(66,7%)	1,000	1 (100%)	-	0,176
Elliptical	-	2(100%)		-	3(100%)	
Vertical	-	-		1 (100%)	-	
Axillary Curettage	1 (25,0%)	3(75%)	1,000	3 (17,6%)	14 (82,4%)	
Implant Volume						
Mean ± SD (range)	375,4±66,3 (280-475)	322,3±72,6 (155-475)	**0,049#**	327,8±145,3 (70-460)	326,7±106,3 (80-460)	0,738*
Neoadjuvant chemotheraphy	2(28,6%)	5(71,4%)	1,000	3 (23,1%)	10(76,9%)	1,000
Preoperative radiotherapy	-	1(100%)	1,000	-	-	-
Adjuvant chemotherapy	6(46,1%)	7(53,9%)	0,458	3 (20,0%)	12(80,0%)	0,662
Postoperative radiotherapy	3(42,8%)	4(57,2%)	1,000	4 (22,2%)	14(77,8%)	0,653

*#Student t Test *Mann Whitney U Test*

Table 4. Odds ratios for complication, logistic regression analysis results						
	Direct to Implant			Expander Implant		
	p	OR	95% CI Min-Maks	p	OR	95% CI Min-Maks
Age	0,062	0,92	0,84-1,00	0,671	0,98	0,87-1,09
Length of Hospitalisation	1,000	1,00	0,62-1,61	0,094	1,41	0,94-2,11
Tobacco Use	0,370	2,06	0,42-9,97	0,537	1,75	0,30-10,34
Comorbidity	0,264	2,36	0,52-10,67	0,246	3,00	0,47-19,18
BMI	0,485	1,07	0,88-1,31	0,350	1,09	0,91-1,29
Mastectomy	0,999	0,00	0,00	0,757	0,74	0,11-4,87
Incision	0,811	1,25	0,20-7,75	0,853	0,83	0,12-5,72
Axillary Curettage	0,739	0,67	0,06-7,25	0,210	0,32	0,05-1,90
Implant Volume	0,060	1,01	1,00-1,02	0,982	1,00	0,99-1,01
Neoadjuvant chemotherapy	0,811	0,80	0,13-4,96	0,745	0,75	0,13-4,25
Adjuvant chemotherapy	0,278	2,25	0,52-9,73	0,436	0,50	0,09-2,86
Postoperative radiotherapy	0,722	1,35	0,26-7,07	0,537	0,57	0,10-3,38

OR: Odds ratio, CI: Confidence interval

Those who advocate the EI reconstruction technique suggest that the revision rates are low in this method, and the aesthetic outcome and patient satisfaction are better (15,16). Those who advocate the DTI reconstruction technique argue that the patient does not experience the psychological trauma of breast loss due to breast reconstruction in a single session. They suggest that sexual well-being is higher, overall cost decreases due to less visits and absence of a second surgery (7,8,17–19). The aim of the current study was to compare the DTI and EI reconstruction techniques in terms of complications and implant failure and to determine the factors that may affect the complications.

In their study, Srinivasa et al. (9) showed that the complication rates were higher in patients undergoing DTI reconstruction than those in patients undergoing EI reconstruction, but this difference was not statistically significant. Similarly, in the current study, although the complication rate was higher in the DTI group (11 [32.4%] patients) than that in the EI group (7 [25.9%] patients), no statistically significant difference was found between the two groups (p = 0.585). Srinivasa et al. (9) found that the rate of major complications was higher in the DTI reconstruction group compared to the EI reconstruction group. Unlike these results, the rate of major complications was similar in the DTI and EI groups in the current study (DTI 17.64% and EI 18.51%), and the rates of hematoma, seroma, infection, and capsular contracture were similar between the groups. It has been reported in the literature that the complication rate of breast reconstruction with implant varies between 0.2% and 52% (8,12,19,20). The complication rates observed in both groups in the current study are consistent with the literature.

As mentioned earlier, the view that a full-volume implant in DTI reconstruction will create pressure on the mastectomy flap and increase the risk of implant failure as a result of ischemia is one of the most important discussion topics related to this technique. In the literature, this rate has been reported as 0.4%–16% for DTI reconstructions (11,21). Azouz et al. (8) and Roostaeian et al. (22) found that the implant failure rates in DTI and EI reconstruction were similar. In the current study, implant failure was observed in only one patient (2.94%) from the DTI group and in two patients (7.41%) from the EI group. There was no significant difference between the two groups in terms of implant failure (p = 0.579). This may have been due to the small number of patients with ptotic and large breasts in DTI group and breast volume was within normal limits in the majority of patients in the DTI group.

In the current study, the DTI and EI groups differed in terms of BMI, mastectomy type, axillary curettage, neoadjuvant chemotherapy, and adjuvant radiotherapy characteristics. It has been reported that high BMI values increase the incidence of complications in patients undergoing breast reconstruction (23). Antony et al. (24) showed that every 5-unit increase in BMI values increases the occurrence of complications by 1.51 times. In the current study, mean BMI was significantly higher in the EI group (26.76 ± 5.1) than that in the DTI group (23.73 ± 3.6) (p = 0.015). Despite this finding, the incidence of complications was low in the EI group. High BMI did not have a significant effect on the occurrence of complications in either group.

In the current study, nipple sparing mastectomy rates were significantly higher in the DTI group compared to the EI group (p = 0.017). In a series of 297 breast reconstructions, Blok et al. (25) showed that nipple sparing mastectomy was a risk factor for implant loss. In this study, nipple sparing mastectomy was performed in all of the three patients who developed implant failure. When all patients who developed complications were considered (11 patients in the DTI group and seven in the EI group), nipple sparing mastectomy was performed in all patients who developed complications in the DTI group and five of the seven patients who developed complications in the EI group. Although nipple sparing mastectomy was performed in most of the patients who developed complications in both groups, no statistically significant effect of nipple sparing mastectomy on the development of complications was found.

Chemotherapy is not identified as a risk factor for breast reconstruction with an implant (26). While the rates of neoadjuvant chemotherapy were significantly higher in the EI group than those in the DTI group (p = 0.023), the rates of adjuvant chemotherapy were similar between the groups. Consistent with the literature, the results obtained in this study showed that neoadjuvant and adjuvant chemotherapy has no effect on the development of complications. It has been reported that radiotherapy increases the risk of complications and capsular contracture in patients undergoing breast reconstruction with an implant (27). Although higher rates of complication development after radiation therapy were observed in the DTI group (3 [37.5%] patients), the rates of capsular contracture development were similar between the groups (2 [5.55%] patients in the DTI group; 2 [7.41%] patients in the EI group) and no effect of radiotherapy on complication development was identified.

Another parameter in which EI and DTI reconstruction groups differed was axillary dissection. The frequency of axillary dissection was high in the EI group. Anthony et al. (24) showed that axillary dissection is an independent risk factor for breast reconstruction with an implant. In the current study, axillary dissection was not found to be a statistically significant risk factor in both groups. In contrast to the current study, Anthony et al. (24) performed EI reconstruction on all patients and ADM was used during reconstruction. We believe that non-vascularized ADM may increase the effect of axillary dissection on the development of complications. In the current study, no non-vascularized ADM-like foreign body was used during breast reconstruction.

Implant volumes of patients with complications in the DTI reconstruction group were significantly higher than those in patients without complications ($p = 0.049$). Salzberg et al. (19) stated that implants close to 650 cc can be used in DTI reconstructions performed using ADM in eligible patients with large and ptotic breasts. Another study conducted in our clinic on patients with large ptotic breasts requiring skin reduction showed that implants with a volume of ≤500 cc can be safely used in patients undergoing skin reduction in DTI reconstruction (28). In the current study, ROC analysis performed for the DTI group identified that implants of ≤360 cc and below can be safely used in the DTI group while the use of implants >360 cc increased the rate of complications increased by fivefold ($p = 0.038$ OR 95% CI: 1.03–24.3).

The major limitations of the study were that it was conducted in a single center and had small sample size. DTI reconstruction is a method that is technically more difficult and requires a longer learning curve compared to EI reconstruction. The fact that this may negatively affect the complication profile of patients operated on at an early stage in the DTI reconstruction group was the second major limitation. Another limitation was that patients in the EI reconstruction group were included in the study only with follow-up data after the first surgery.

Conclusion

The results of the current study show that DTI reconstruction has comparable complication rates with EI reconstruction. Implant failure rates are low in both techniques and both are reconstructively reliable techniques. The results also show that implant volume has an effect on the development of complications for DTI reconstruction; whereas, the other factors had no effect on the development of complications. DTI reconstruction is a reliable and effective method that can be considered in patients with normal breast volume, normal BMI, and when planned implant volume is low. Alternative reconstructive techniques such as two-stage EI reconstruction or skin reduction should be considered in patient groups outside this profile.

Declarations

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Conflicts of interest/Competing interests

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

Ethics approval

Ethical approval was given by the Acibadem Mehmet Ali Aydınlar University, School of Medicine Ethics Committee with the reference number, ATADEK-2023-05/167.

Availability of data and material

Available upon request.

Authors' contributions

AA conceived and designed the analysis, collected the data, wrote the paper, surgeon who performed the breast reconstructions; SY conceived and designed the analysis, participated in the design of the study; HK conceived and designed the analysis, a member of surgical team performed mastectomy; AEA conceived and designed the analysis, a member of surgical team performed mastectomy; CU conceived and designed the analysis, a member of surgical team performed mastectomy.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Surgery / Cerrahi

Effectiveness of Phenol Application in Pediatric Pilonidal Sinus

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ABSTRACT

Purpose: Phenol application is an increasingly popular method in the treatment of pediatric pilonidal sinus because of its ease of use. However, there has been insufficient research on standards for phenol application in children. This study aimed to determine standards for evaluating phenol applications to identify parameters that can be used in treatment planning.

Methods: Pediatric patients with pilonidal sinus who underwent surgical excision and/or phenol injection between January 2011 and January 2021 were evaluated retrospectively. Data related to the patients' age, sex, treatment method (phenol, surgery), number of phenol applications, preoperative complications and antibiotic use, postoperative complications, and treatment duration were analyzed.

Results: The study included 57 patients, 34 boys (59.6%) and 23 girls (40.3%), with a mean age of 15.15±1.62 years (range: 11-18). Number of phenol applications and postoperative complications were significantly higher in patients with prolonged preoperative antibiotic use (>two weeks) and preoperative complications (p=0.013), (p=0.024). Length of hospital stay, wound dressing duration, and time to return to daily routine were significantly shorter in the phenol application group (p<0.001). Treatment duration and frequency of postoperative complications did not differ among the treatment groups (p=0.523).

Conclusion: This study suggest that phenol application is not superior to surgical treatment in terms of postoperative complications or treatment duration. The potential negative impact of prolonged preoperative antibiotic use and preoperative complications on the treatment process should be considered when deciding to use phenol for the treatment of pilonidal sinus.

Keywords: Children; phenol application; pilonidal sinus; complications.

Pediatrik Pilonidal Sinüste Fenol Uygulamasının Etkinliği

ÖZET

Amaç: Çocuk hastalarda pilonidal sinüsün tedavi yöntemleri arasında uygulama kolaylığı sayesinde fenol uygulaması günümüzde giderek yaygınlaşmaktadır. Ancak, çocuklardaki fenol uygulamasının yönetim standartları konusunda yeterince çalışma bulunmamaktadır. Bu çalışma ile fenol uygulama sayıları ve tedavi yanıtlarının değerlendirilmesinde standartların belirlenmesi, tedavi tercihi aşamasında tedavi sonuçlarını ön görmede kullanılabilecek parameterelerin belirlenmesine katkı sağlanması amaçlandı.

Gereç ve Yöntem: Ocak 2011- Ocak 2021 yılları arasında pilonidal sinüs tanısı alan, cerrahi eksizyon veya fenol uygulaması yapılan çocuk hastalar çalışmaya dahil edildi. Hastaların yaş, cinsiyet, tedavi yöntemi (fenol, cerrahi), fenol uygulanma sayısı, preoperatif komplikasyon, preoperatif antibiyotik kullanımı, postoperatif komplikasyon ve tedavi süresi ile ilgili verileri incelendi.

Bulgular: Çalışmaya 57 hasta dahil edildi. Hastaların 34'ü erkek (%59.6), 23'ü kız (%40.3) idi. Yaşları 15.15±1.62 (min:11, max:18) idi. Preoperatif iki haftadan uzun süreli antibiyotik kullanım öyküsü olan ve preoperatif komplikasyonu olan hastalarda, fenol uygulama sayıları ve postoperatif komplikasyonların anlamlı şekilde daha fazla olduğu tespit edildi (p=0.013), (p=0.024). Yatış süresi, pansuman süresi ve günlük rutine dönme süresi değerlerinin fenol uygulaması grubunda anlamlı şekilde az olduğu tespit edildi (p<0.001). Ancak, tedavi süresi ve postoperatif komplikasyonlar açısından tedavi grupları arasından anlamlı farklılık tespit edilmedi (p=0.523).

Sonuç: Elde edilen bu sonuçlar, fenol uygulamasının postoperatif komplikasyonlar ve tedavi süresi açısından cerrahi tedaviye üstünlüğü olmadığını düşündürmektedir. Ayrıca pilonidal sinüste fenol uygulaması tedavi tercihi sürecinde, preoperatif uzun süreli antibiyotik kullanım öyküsü ve preoperatif komplikasyonların tedavi süreçleri üzerinde oluşturabileceği dezavantajların dikkate alınması gerektiği düşünülmektedir.

Anahtar Kelimler: Çocuklar; pilonidal sinüs; fenol uygulaması; komplikasyon.

Pilonidal sinus is an acquired disease caused by inflammation of hair follicles in the sacrococcygeal region (1). Risk factors include conditions such as hirsutism, obesity, local trauma, and poor hygiene (2). Minimally invasive treatment alternatives such as phenol application are increasingly used for the treatment of pilonidal sinus in the pediatric age group (3). Phenol application controls symptoms by eliminating the inflammatory processes within the pilonidal sinus (2). Open surgical procedures for pilonidal sinus are based on the principle of surgical eradication of the sinus orifice, where the inflammatory process is ongoing (4). The differences between minimally invasive and invasive methods of treating pilonidal sinus are reported to impact the treatment process and outcomes (4).

Phenol injection has become a popular treatment method because of its ease of application and is reported to have benefits such as less need for postoperative care, improved patient comfort, and good cosmetic results when compared to surgical procedures (5). However, repeated applications due to persistent discharge can extend the duration of treatment and reduce patient satisfaction (6). There is still controversy regarding issues such as recurrence rates which are minimal and invasive treatment methods used in pilonidal sinus (7). The existing literature on phenol application for pilonidal sinus offers no standard definition and approach to the management of complications such as infection, abscess, and recurrence (8.9). Moreover, there are insufficient data on the impact of preoperative parameters such as abscess, recurrent infection, antibiotic use, or prior surgical intervention on treatment response (10,11).

This study aimed to share our long-term results of phenol application and surgical treatment in pediatric patients with pilonidal sinus and to help identify parameters that can be used to predict treatment results when making treatment decisions.

MATERIALS AND METHODS

Patient Selection

This retrospective study included pediatric patients with pilonidal sinus who underwent surgical excision or phenol injection between January 2011 and January 2021. Patients with missing data were not included in the study. The study was approved by the local ethics committee of the university where the study was conducted (2023/295).

Study Design

The patients' records were reviewed to collect data regarding their age, sex, preoperative complications, prolonged preoperative antibiotic use (>two weeks before the first phenol application), treatment method, length of hospital stay, time to return to daily routine, duration of intravenous/oral antibiotic/analgesic use, follow-up time, and postoperative complications. Preoperative complication data were based on the period before the first phenol application in the phenol treatment group and the preoperative period in the surgical treatment group. The patients' time to return to daily routine was determined by contacting the patients by phone.

Preoperative complications such as infection of the sinus orifice and abscess were considered contraindications for phenol and surgical treatments. Surgical procedures were performed after controlling preoperative complications.

Duration of treatment was defined as the time to resolution of all complications, including recurrence. During the treatment planning phase, the patients and families were informed about the phenol application procedure and surgical treatment alternatives, and treatment was planned according to their preference. Those who opted for phenol application were informed that surgical treatment may be performed case of recurrence. Patients who did not respond to treatment with phenol application underwent surgical treatment. Patients who underwent surgical treatment after phenol application were not included in the surgical treatment group.

The patients were divided into two groups according to treatment method: phenol application and surgical excision. Phenol application was performed under local anesthesia or sedoanalgesia by curettage, cleaning the pilonidal sinus tract in the intergluteal area, then injecting liquid (80%) phenol (Phenol Liquid, Galenic Pharmaceuticals Inc., İzmir, Turkey) into each orifice to fill the entire cavity for two-three minutes, until a color change to matte white was observed in the orifice. Before the procedure, the skin around the pilonidal sinus was covered with antibiotic ointment (Furacin 0.2% ointment, Sanofi İlaç Sanayi, Istanbul). Patients in the phenol treatment group were scheduled for follow-up a month after phenol application. If complaints of discharge persisted at follow-up, phenol was applied again. Patients without active discharge were followed up. These patients were informed that their complaints could recur within 18 months and that phenol treatment could be continued for six applications.

Persistent discharge after six phenol applications was accepted as recurrence.

The relationship between preoperative and postoperative complications and their frequency in the treatment groups were analyzed. We also evaluated the relationship between the number of phenol applications required and the presence of preoperative complications and prolonged antibiotic use. Length of hospital stay, duration of intravenous/oral antibiotic and analgesic use, duration of wound dressing, time to return to daily routine, follow-up time, and total treatment time were also compared between the treatment groups.

Statistical Analysis

Mean and standard deviation values in each treatment group were determined as descriptive statistics. The relationship of preoperative complications and prolonged preoperative antibiotic use with postoperative complications in the treatment groups was examined by Spearman correlation test. Length of hospital stay, time to return to daily routine, duration of intravenous/oral antibiotic and analgesic use, follow-up time, and total treatment time were compared between the treatment groups using analysis of variance and chi-squared tests.

RESULTS

Seventy-five patients treated for pilonidal sinus between January 2011 and January 2021 were included in the analysis. Eighteen patients who were treated in the same period could not be included in the study because their data could not be reached. Thirty-four patients were male (59,6%) and 23 were female (40.3%). The mean age was 15.15±1.62 years (range: 11-18). Twenty-five patients (43.9%) underwent phenol application and 32 (56.1%) underwent surgical excision treatment. Phenol was applied a mean of 2.36±1.95 times (range: one-six) to the patients in the phenol treatment group. The interval between phenol reapplications in our study ranged from one to three months. Surgical techniques used in surgical treatment included simple excision with primary suturing in 13 patients and rhomboid flap transposition in 19 patients.

All of the patients included in the study had antibiotic use in their medical history when they first applied to the clinic. Twenty patients (35.1%) used antibiotics for more than two weeks preoperatively and 37 patients (64.9%) for less than two weeks due to signs of some clinical conditions. These clinical conditions were discharge from the sinus orifice alone, local infection wherewith skin hyperemia and increased skin temperature accompanying the discharge, abscess, and bleeding. Preoperative complications were seen in 21 patients. Preoperative complications included signs of local infection in 15 patients (26.3%), abscess in five patients (8.8%), and bleeding in one patient (1.8%). The other 36 patients who discharge from the sinus orifice alone (63.2%) had no preoperative complications. Four of the patients with preoperative abscess underwent incision and drainage, while one underwent conservative treatment with oral antibiotic therapy. Postoperative complications were seen in 17 patients. In terms of postoperative complications, eight patients (14%) had recurrence, three (5.3%) had abscess, three (5.3%) had hematoma, and three patients (5.3%) had wound dehiscence. No postoperative complications were observed in 40 patients. None of the phenol-treated patients developed pain or procedure-related dermatitis or cellulitis postoperatively, and none had any systemic complications associated with phenol. Mean follow-up times by treatment group were 42.28±23.44 months in the phenol group and 60.4±20.62 months in the surgery group. Treatment duration (including resolution of all complications and recurrence) in these groups was 15.88±21.7 weeks (range: 1-72) and 14.37±28.93 weeks (range: 2-96), respectively. Surgical treatment was applied to five of the patients who were treated with phenol because there was no response to treatment. These patients were not included in the surgical treatment group.

The number of phenol applications during treatment was significantly higher among patients with prolonged preoperative antibiotic use (p=0.013) and preoperative complications (p=0.023) (Table 1). In addition, prolonged preoperative antibiotic use and the presence of preoperative complications were significantly associated with the presence of postoperative complications (p=0.024 and p=0.047, respectively) (Table 2).

Table 1. Comparison of number of phenol applications according to duration of preoperative antibiotic use and preoperative complications

		n	Number of Phenol Applications		p
			Mean±SD	Range	
Preoperative Antibiotic Use	<2 weeks	37	0.62±0.72	0-4	*0.013
	>2 weeks	20	1.8±2.64	0-6	
Preoperative Complications	None	36	0.63±1.13	0-6	*0.023
	Infection	15	2±2.69	0-6	
	Abscess	5	5±0	0-5	
	Bleeding	1	2±0	2-2	

**Statistically significant (p < 0.05).*

Table 2. Comparison of postoperative complications according to duration of preoperative antibiotic use and preoperative complications

		Postoperative Complications					p
		Recurrence (n)	Abscess (n)	Hematoma (n)	Wound Dehiscence (n)	None (n)	
Preoperative Antibiotic Use	<2 weeks	1	0	0	0	36	*0.024
	>2 weeks	7	3	3	3	4	
Preoperative Complication	Yes	6	3	3	2	6	*0.047
	No	2	0	0	1	34	

Statistically significant (p < 0.05).

There was no significant difference between the treatment groups in terms of preoperative complications and postoperative complications (p=0.354). In addition, there was no significant difference in postoperative complications between patients who underwent phenol application, patients who underwent simple excision, and patients who underwent a rhomboid flap procedure (p=0.241). However, patients in the phenol application group had significantly shorter length of hospital stay, wound dressing duration, and time to return to daily routine when compared with the surgical treatment group (p<0.001 for all). However, treatment duration (including resolution of all complications and recurrence) did not differ significantly between the treatment groups (p=0.523) (Table 3).

Table 3. Comparison of length of hospital stay, wound dressing duration, time to return to daily routine, and treatment duration in the treatment groups

		Treatment		p
		Phenol (n=25)	Surgery (n=32)	
Length of Hospital Stay (days)	Mean±SD	1	2.68±0.85	*<0.001
	(min-max)	(1-1)	(2-5)	
Wound Dressing Duration (days)	Mean±SD	0	8.81±3.39	*<0.001
	(min-max)	(0-0)	(7-20)	
Return to Daily Routine (days)	Mean±SD	1	15.09±6.2	*<0.001
	(min-max)	(1-1)	(7-30)	
Treatment Duration (weeks)	Mean±SD	15.88±21.7	14.37±28.93	p=0.523
	(min-max)	(1-72)	(2-96)	

Statistically significant (p < 0.05).

DISCUSSION

Phenol application is a special issue in pediatric patients because it is a non-invasive treatment alternative. The results obtained in the study support the idea that phenol application is an effective treatment method in the pilonidal sinus in children. However, we think that long antibiotic use and preoperative complications are useful parameters to predict treatment outcomes.

Analysis of the long-term (10-year) outcomes of surgical excision for the treatment of pilonidal sinus indicates that reported recurrence rates vary widely, from 10% to 30% (9,10). In regards to phenol application, Hegge, et al (12) reported recurrence in 17.6% of phenol-treated patients during three-year follow-up. Consistent with the literature, recurrence rates in our study were 9.3% (three patients) in the surgical treatment group and 20% (five patients) in the phenol application group. In the literature, it has been reported that a fibrosis response in the pilonidal sinus tract can be achieved by applying phenol at concentrations varying from 25% to 80% (13). In our study, phenol application was curative in 80% of patients as a result of sclerosis of the fistula tract, while this rate was 90.7% in the surgical treatment group. However, when comparing these results, it is necessary to consider that phenol application is a noninvasive treatment alternative and its aim is to control symptoms.

In the treatment of pilonidal sinus, the crystallized form of phenol is reported to be safer in terms of potential complications related to contact with surrounding tissues. However, it is seen that liquid phenol is considered more effective in treatment (14). While treatment efficacy increases with higher concentrations of phenol (40%-100%), complications caused by contact with surrounding tissues may also increase (14). Local complications such as cellulite or skin and adipose tissue necrosis may occur at rates of 7-16% after phenol application (15). In addition, Bruce, et al (16) reported that phenol may cause systemic complications such as acute toxicity, muscle pain, convulsions, and coma as a result of skin absorption and inhalation. However, these systemic and local complications are associated with high concentration and inadequate skin contact precautions (17). In this study, 80% liquid phenol

was preferred both for treatment efficacy and ease of application. Liquid phenol was applied after protecting the area around the sinus orifice with ointment, and we observed no local (dermatitis, cellulitis) or systemic complications related to phenol. Therefore, we believe that phenol application can be done safely at appropriate concentrations and after taking contact precautions.

Doğru, et al (13) reported that an average of two to three phenol injections may be sufficient for pilonidal sinus, although in some cases a treatment response was obtained after nine applications. There is no consensus among previous studies in terms of numbers of phenol applications and what is considered recurrence, but the general approach seems to be based on whether a treatment response is achieved after six-eight phenol applications (18,19). In this study, we defined recurrence as a lack of treatment response after six phenol applications. Kayaalp, et al (9) also reported that in phenol treatment of pilonidal sinus, 80% of recurrences developed in the first year, and obtaining a complete treatment response may take 18 months. Considering these results, we believe that clinical parameters to predict treatment outcomes are needed because of the disadvantages associated with repeated phenol application for the treatment of pilonidal sinus.

Factors affecting treatment response in pilonidal sinus include sinus number and size, presence of complications, and persistence of symptoms for more than six months (20). In addition, chronic discharge and signs of local infection, which are indicators of chronic inflammatory processes in the pilonidal sinus, have been reported to affect treatment management (21). The intensity of inflammation in the pilonidal sinus also affects the treatment process. Doll, et al (22) reported in their study that pilonidal sinus usually exhibited acute episodes with periods of discharge lasting less than two weeks. The authors noted that chronic inflammation in the pilonidal sinus may be responsible for the formation of complex fistula tracts that impact treatment outcomes (22). This suggests that physical examination findings in the pilonidal sinus are not always directly proportional to the severity of disease. However, there is no information on the effect of prolonged preoperative antibiotic use, which may be another indicator of chronic inflammation in the pilonidal sinus, on the treatment process (18). Therefore, in this study we determined whether patients had local infection requiring follow-up with antibiotherapy for more than two weeks preoperatively and examined its effect on treatment results. We found that in patients with more than two weeks of preoperative antibiotic use, postoperative complications were significantly more frequent and the number of phenol applications needed was significantly higher. This strongly suggests that prolonged preoperative antibiotic use may contribute to longer phenol treatment, which is a factor to consider when selecting a treatment method for pilonidal sinus.

There is also no consensus in the literature on the effects of preoperative complications on treatment management and outcomes in pilonidal sinus (23). In pilonidal sinus, the acute abscess phase is considered a contraindication for noninvasive treatments (24). However, Nasr, et al (25) suggested that the presence of persistent symptoms that guide surgical excision may also be an indicator of multiple abscesses and complex fistula tract, which reduce the effectiveness of surgical treatment.

For all treatment groups in this study, the acute abscess phase was accepted as a contraindication for treatment, which was performed after signs of acute inflammation resolved. In this study, we found that preoperative complications consisting of local infection findings, acute abscess, and bleeding were significantly associated with postoperative complications. In addition, patients with preoperative complications received significantly more phenol applications. Therefore, we concluded that preoperative complications in pilonidal sinus may prolong phenol treatment and negatively affect the outcomes of surgical treatment.

The advantages of noninvasive phenol application for the treatment of pilonidal sinus in terms of patient comfort, labor loss, and cost can become disadvantages when repeated applications are needed (18). Kayaalp, et al (9) reported that it may take 18 months to achieve a complete treatment response with phenol application. Consistent with this, in the present study it was seen that treatment duration can extend up to 72 weeks because of repeated phenol applications. Moreover, there was no significant difference between the groups in terms of treatment duration, which included postoperative complications such as recurrence, abscess, and wound dehiscence. This suggests that although phenol application has the advantage of being a noninvasive method, treatment duration is an issue that should be considered. Ateş, et al (7) recognized phenol injection as a nonsurgical treatment method and reported that its main advantage over surgical treatment alternatives was the absence of surgery-related disadvantages. A quick return to daily routine has also been reported as one of the important advantages of phenol treatment, as phenol application is a simple outpatient procedure (19).Similarly, we observed in this study that mean values for length of hospital stay, wound dressing duration, and time to return to daily routine were significantly lower in the phenol application group compared to the surgical treatment group.

Nasr, et al (25) reported that the recovery period after surgical treatment could last between two weeks and six months and considered this to be one of the disadvantages of surgical treatment. The present study shows that treatment times can be as long as 72 weeks with phenol alone and 96 weeks with surgical treatment. In addition, there was no significant difference in the frequency of postoperative complications between the treatment groups over the mean follow-up period of 15.03±28.8 months. These results suggest that neither treatment option is superior in terms of the recovery process and development of complications in postoperative follow-up. However, when evaluating these results, it should be noted that the treatment goal in phenol application is symptom control, while that of surgical procedures is eradicating the sinus orifice, which is the source of inflammation (26). This difference is believed to influence the treatment process and results. We believe that questioning patients about their preoperative antibiotic use and complications during treatment planning and informing patients of the possible effects of these factors on treatment outcomes will increase their treatment adherence.

Limitations

Regarding the limitations of this study, the lack of standards for the number of phenol applications used in the treatment of pilonidal sinus, the duration of treatment, and the evaluation of treatment responses make it difficult to interpret the results of studies on this subject. Furthermore, differences in implementation and treatment goals between the minimally invasive methods and surgical procedures used in pilonidal sinus make it difficult to compare these treatment alternatives. In addition, due to the retrospective nature of our study, we could not evaluate the effects of variables such as perineal hygiene, hirsutism, and local trauma on treatment outcomes. The limited number of cases should also be considered when evaluating the results of this study. Therefore, prospective, multicenter studies with large patient samples are needed to establish standards for the phenol application treatment of pilonidal sinus in children.

CONCLUSION

In this study, we observed no significant difference in terms of postoperative complications between phenol application and surgery for the treatment of pediatric pilonidal sinus. Preoperative complications and prolonged antibiotic use were associated with the need for more phenol applications and the development of postoperative complications. These factors can lead to repeated phenol applications, which is disadvantageous in terms of treatment duration and subsequent patient satisfaction. These parameters should be taken into consideration during treatment planning for pilonidal sinus.

DECLARATIONS

Ethics Committee Approval

This study was approved by the Mersin University Non-interventional Clinical Research Ethics Committee (Date: 26.04.2023, Decision No: 295).

Conflict of Interest

None declared.

Financial Disclosure

The authors declared that this study has received no financial support

Authorship Contributions

Concept: Cİ, İK; Design: Cİ, HT; Data Collection: Cİ, İK; Analysis: Cİ, İK; Writing: Cİ, HT; Critical revision: AN.

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The Evaluation of YouTube™ Videos' Quality About Pediatric Urological Diseases

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ABSTRACT

Purpose: To evaluate the quality and reliability of YouTube™ videos on pediatric urological diseases (PUD).

Methods: This study was performed between 1 August - 7 August 2023. Turkish YouTubeTM videos related to 'paediatric urology', 'circumcision', 'undescended testis', 'phimosis', 'hypospadias', 'vesicoureteral reflux', 'nocturnal enuresis' and 'testicular torsion' were evaluated. The videos were divided into professional (doctor, nurse, hospital, etc.) and non-professional (patient, patient relatives, news, etc.) according to the uploading source. Video characteristics (number of views, video length, likes, dislikes and comments) were compared between the groups. Video quality was assessed with DISCERN and Global Quality Score (GQS).

Results: A total of 498 videos, 312 professional videos and 186 non-professional videos, were included in the study. The number of views and likes were statistically significantly higher in the professional video group than in the non-professional video group (p=0.001 for both parameters). Mean DISCERN score and GQS score were significantly higher in the professional group than in the non-professional group (p=0.001, and p=0.001; respectively).

Conclusion: Professional videos about PUD had significantly higher quality and reliability according to DISCERN score and GQS. Moreover, YouTube™ videos uploaded by professional health care providers had significantly higher 'view' number, and 'like' number.

Keywords: DISCERN score, GQS score, Pediatric urological diseases, YouTube™

Pediatrik Ürolojik Hastalıklar İle İlgili YouTube™ Videolarının Kalitesinin Değerlendirilmesi

ÖZET

Amaç: Pediatrik ürolojik hastalıklar (PÜH) ile ilgili YouTube™ videolarının kalitesini ve güvenilirliğini değerlendirmek.

Yöntemler: Bu çalışma 1 Ağustos - 7 Ağustos 2023 tarihleri arasında gerçekleştirilmiştir. 'Pediatrik üroloji', 'sünnet', 'inmemiş testis', 'fimozis', 'hipospadias', 'vezikoüreteral reflü', 'enürezis nokturna' ve 'testiküler torsiyon' ile ilgili Türkçe YouTubeTM videoları değerlendirildi. Videolar yükleme kaynağına göre profesyonel (doktor, hemşire, hastane vb.) ve profesyonel olmayan (hasta, hasta yakınları, haberler vb.) olarak ayrılmıştır. Video özellikleri (görüntüleme sayısı, video uzunluğu, beğenme, beğenmeme ve yorumlar) gruplar arasında karşılaştırılmıştır. Video kalitesi DISCERN ve Global Kalite Puanı (GQS) ile değerlendirilmiştir.

Bulgular: Çalışmaya 312 profesyonel video ve 186 profesyonel olmayan video olmak üzere toplam 498 video dahil edilmiştir. Görüntüleme ve beğeni sayısı profesyonel video grubunda profesyonel olmayan video grubuna göre istatistiksel olarak anlamlı derecede yüksekti (her iki parametre için p=0.001). Ortalama DISCERN puanı ve GQS puanı profesyonel grupta profesyonel olmayan gruba göre anlamlı derecede daha yüksekti (sırasıyla p=0.001 ve p=0.001).

Sonuç: PÜH hakkındaki profesyonel videolar DISCERN skoru ve GQS'e göre anlamlı derecede daha yüksek kalite ve güvenilirliğe sahiptir. Ayrıca, profesyonel sağlık hizmeti sağlayıcıları tarafından yüklenen YouTube™ videolarının 'görüntülenme' sayısı ve 'beğenme' sayısı önemli ölçüde daha yüksektir.

Anahtar Kelimeler: DISCERN skoru, GQS skoru, Pediatrik ürolojik hastalıklar, YouTube™

Pediatric urological diseases (PUD) are diagnosed with increased frequency due to easier access to the health system, increased awareness of families about pediatric diseases and advanced diagnostic methods of PUD. Miller and colleagues investigated the demographic burden of PUD, and authors concluded that prevalence of PUD including hypospadias, undescended testis, and vesicoureteral reflux was significantly increased in last 50 years (1). On the other hand, many PUD require surgical intervention and long-term follow-up, and can place stress and anxiety on both the patient and their parents. Therefore, numerous parents aim to obtain more information about PUD from other professional health centers, similar case' experience, and social media applications (2).

Social media application turned into indispensable information sources for patients and patient' relatives in last 20 years due to their free use, and easy access (3). Moreover, different and unlimited resources makes social media applications more attractive. Additionally, study by Freeman et al., found that public interest was significantly higher for visual contents than only verbal and only written sources (4). Some authors previously focused on the importance of YouTube™ videos for patients and patients' relatives while getting information about symptoms, diagnosis, and treatment about diseases. Kumar et al. analyzed YouTube™ video about hypertension, but author concluded that many videos had misleading information (5). In another study which investigating quality of YouTube™ videos about uterine leiomyoma found that YouTube™ videos about uterine leiomyoma had poor quality (6).

Although, many studies evaluated quality and reliability of YouTube™ videos in many disorders, to our knowledge no study analyzed YouTube™ video quality about PUD. In present study, we purposed to determine the quality and reliability of YouTube™ videos about PUD.

Materials and Methods

This study was conducted between 1 August and 7 August 2023. The terms 'pediatric urology', 'circumcision', 'undescended testis', 'phimosis', 'hypospadias', 'vesicoureteral reflux', 'nocturnal enuresis' and 'testicular torsion' were searched separately on YouTube™. Only Turkish-language videos were evaluated and the videos were analyzed in order of relevance. Two urologists experienced in pediatric urology watched the videos. Reposted videos, videos in other languages, silent videos, advertisement videos, and videos related to adult diseases were not included in the study. Videos with a video duration between 1-30 minutes were evaluated. Since no patient data were used in the study, ethics committee approval was not required.

Videos were divided into two groups according to the upload source. Videos prepared by doctors or other healthcare professionals and hospital resources were included in the professional videos group. Non-professional videos were defined as videos prepared by patients, patients' relatives or news videos. Video characteristics (number of views, video length, likes, dislikes, and comments) were noted. The target audiences of the videos were divided into two groups as patients and healthcare professionals. The evaluation forms related to video quality were filled in by two urologists without each other's knowledge. Average scores were recorded for videos with different values.

Modified DISCERN Score, and Global Quality Score (GQS)

The modified DISCERN scale is used to assess the reliability of videos (7). DISCERN is a short questionnaire with 5 questions that indicate the quality of a written or visual source about a medical condition. Each question is answered yes (1 point) and no (0 points). These questions are:

1. Is the video clear, concise, and understandable?
2. Are valid sources cited? (from valid studies, physiatrists or rheumatologists)
3. Is the information provided balanced and unbiased?
4. Are additional sources of information listed for patient reference?
5. Does the video address areas of controversy/uncertainty?

GQS is another scale for evaluating the flow, quality and usefulness of videos (8). With this scale developed by Bernard et al. the quality of videos is rated between 1-5.

1. Poor quality, poor flow of the site, most information missing, not at all useful for patients
2. Generally poor quality and poor flow, some information listed but many important topics missing, of very limited use to patients

3. Moderate quality, suboptimal flow, some important information is adequately discussed but others poorly discussed, somewhat useful for patients

4. Good quality and generally good flow, most of the relevant information is listed, but some topics not covered, useful for patients

5. Excellent quality and excellent flow, very useful for patients

Statistically Analysis

All analyses were performed with Statistical Package for the Social Sciences version 27 (SPSS IBM Corp., Armonk, NY, USA). The normality of the distribution of variables was checked by Kolmogorov Smirnov test. Normally distributed data were compared with Independent Student's t-test, and non-normally distributed data were compared with Mann Whitney u test. Categorical variables were compared using the χ^2 test. Data were analyzed at 95% confidence level and a P value less than 0.05 was considered statistically significant.

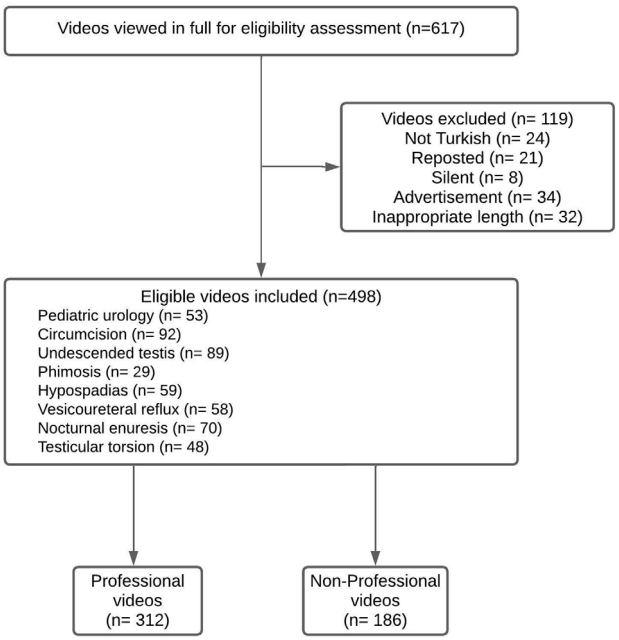

Figure 1. *Flowchart of the evaluated videos*

Results

The videos included in the study are shown as a flowchart in Figure 1. The number of videos evaluated was 617 and 119 videos did not meet the inclusion criteria. A total of 498 videos, 312 professional videos and 186 nonprofessional videos, were included in the study. The 3 most common topics were circumcision (n = 92), undescended testis (n = 89), and nocturnal enuresis (n = 70).

Comparison of video characteristics between groups is shown in Table 1. The number of views, and likes were statistically significantly higher in the professional video group than in the nonprofessional video group (p=0.001 for both parameters). There was no statistical difference between the groups in terms of video length, number of dislikes, comments, and duration on YouTube™ (p=0.621, p=0.620, p=0.119, and p=0.455; respectively). While 74.4% of professional videos were directed towards patients, this rate was 88.7% in nonprofessional videos (p=0.001).

The mean DISCERN score was 3.6±1.1 in the professional group and 2.5±1.0 in the nonprofessional group (p=0.001). Similarly, the GQS score was significantly higher in the professional video group than in the nonprofessional video group (3.4±1.1 vs 2.4±1.0, p=0.001) (Figure 2).

Table 1. Comparison of video features by categories

	Professional	Non-professional	*p* value
Number of videos	312	186	
Video parameters*			
Number of views	3362 (1969 - 4528)	2243 (1157 - 3078)	***0.001***
Video length (min)	7 (3 - 10)	7 (4 - 10)	0.621
Likes	100 (66 - 142)	53 (25 - 75)	***0.001***
Dislike	10 (4 - 15)	9 (4 - 14)	0.620
Comment	18 (8 - 31)	18 (9 - 24)	0.119
Duration on YouTube™ (days)	310 (102 - 510)	280 (99 - 422)	0.455
Target audience, n (%)			
Doctors or health workers	80 (25.6%)	21 (11.3%)	***0.001***
Patients	232 (74.4%)	165 (88.7%)	

**: median (interquartile range)*

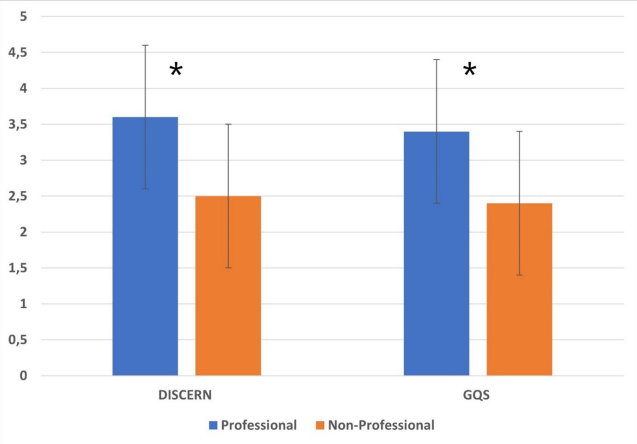

Figure 2. *Comparison of DISCERN and GQS scores between groups*

Discussion

Access to social media applications quickly and easily without paying has changed the patients' behavior during getting information about their diseases. Social media statistics revealed that YouTube™ is most preferred social media application and more than 95% of social media user watch YouTube™ videos (9). Thus, we purposed to define accuracy and quality of YouTube™ videos about PUD. In this study, we found that videos about PUD which shared by professional health care workers had significantly higher accuracy and quality in comparison of non-professional videos, according to DISCERN score and GQS. Moreover, our findings determined that YouTube™ videos uploaded by professional health care providers had significantly higher 'view' number, and 'like' number.

To objective analyze of visual contents' quality and reliability, DISCERN score and GQS were developed, and external validation of two scoring system was done by numerous studies. To evaluate the quality of YouTube™ videos about COVID-19 and pregnancy, Yuksel and Cakmak used DISCERN score, and authors concluded that YouTube™ videos about COVID-19 and pregnancy had poor quality and reliability (10). Furthermore, Ferhatoglu and colleagues analyzed the YouTube™ videos about obesity surgery by using DISCERN score, and authors stated that YouTube™ videos about obesity surgery which shared by professional health care providers had significantly better DISCERN score (11). In another study, Kılınc and Sayar defined the quality of YouTube™ videos about dental practice, and findings revealed that professional YouTube™ videos about dental surgery significantly better GQS in comparison of non-professional videos (12). In accordance with literature, our finding demonstrated that YouTube™ videos about PUD which uploaded by professional health care providers had significantly higher accuracy and quality. We believe that encouraging professional healthcare professionals to share on the YouTube™ channel will enable the public to access more accurate information.

Number of 'view' and 'like' are important for videos in YouTube™ platform to get more interaction. Sevgili and Baytaoglu compared the 'like' number of professional YouTube™ videos and non-professional YouTube™ videos, and they did not find significant difference between groups in regards of 'like' number (13). In contrast, Kanber and Koseoglu which evaluated YouTube™ videos about pediatric cardiac surgery anesthesia demonstrated that professional YouTube™ had significantly higher like rate (14). However, 'view' number was not significantly different between professional YouTube™ videos and non-professional YouTube™ videos in Kanber and Koseoglu study. Conversely, Cetin et al. which analyzed the YouTube™ videos about coronary artery bypass grafting, showed that professional YouTube™ videos significantly higher 'view' number (15). In present study, we found that professional YouTube™ videos about PUD had a significantly higher 'like' number and 'view' number.

Present study has some limitations. First of all, we only focused on YouTube™ videos in Turkish language. We believe that analyzing YouTube™ videos in more than one language could be confusing, and we also believe that reporting outcomes could be difficult and incomprehensible. Additionally, we selected eight term to search videos in YouTube™, but we know that some uploaders shared YouTube™ videos about PUD without using these eight words. Thirdly, we did not scan the videos of common diseases in adults, such as urinary tract infection, stone disease etc. In last, since YouTube™ content is constantly updated, the data of our study covers only the scheduled time period.

In conclusion, our study showed that the YouTube™ videos about PUD are easily accessible and useful sources for public. Additionally, present study outcomes determined that professional videos about PUD had significantly higher quality and reliability according to DISCERN score and GQS. Moreover, YouTube™ videos uploaded by professional health care providers had significantly higher 'view' number, and 'like' number.

Abbreviation

PUD: Pediatric urological diseases

GQS: Global Quality Score

Declarations

Funding

There is no funding in this study.

Conflicts of interest/Competing interests

There is no conflicts of interesst in this study for all authors.

Ethics approval

Not required.

Availability of data and material

Appropriate.

Authors' contributions

Hakan Cakir: Substantial contributions to the conception or design of the work, analysis, interpretation of data for the work, drafting the work or revising it critically for important intellectual content.

Ufuk Caglar: Final approval of the version to be published, 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.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Cardiology / Kardiyoloji

The Role of Mitral Annular Calcification in Predicting One-Month Mortality in Patients with STEMI Undergoing Primary Percutaneous Coronary Intervention

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ABSTRACT

Purpose: Numerous cardiovascular disorders have been related to mitral annular calcification (MAC). This study looked at the effects of mitral annular calcification on one-month mortality in ST-segment elevation myocardial infarction (STEMI) patients.

Methods: This single-center, retrospective observational study was carried out between 2017 and 2021. The study included 1541 patients who presented to the Dr. Siyami Ersek Hospital emergency department with a diagnosis of STEMI and underwent primary percutaneous intervention. The patients' clinical and demographic characteristics were investigated. Images taken during percutaneous intervention using angiography were used to assess the presence of MAC in patients. According to death, the patients were split into two groups, and a statistical analysis was done.

Results: The median age of 1541 STEMI patients included in the study was 59 years (51, 68) and 78% were male. While MAC was present in 134 patients (8.7%) in the whole group, the frequency of MAC was significantly higher in the deceased compared to the survivors (19% vs. 7.8%, p<0.001). The presence of MAC (OR = 2.84, 95% CI 1.68-4.63, p<0.001) was associated with death. In multivariable analysis hypertension (OR = 1.6, 95% CI 1.02-2.54, p = 0.043), platelet count (OR = 1, 95% CI 1.00-1.01, p = 0.02), LVEF (OR = 0.98, 95% CI 0.96-1.00, p = 0.024) and MAC (OR = 2.68, 95% CI 1.55- 4.50, p<0.001) were found to be independent predictors of death.

Conclusion: In STEMI patients, increased one-month mortality is strongly correlated with the presence of MAC during fluoroscopic primary percutaneous intervention.

Keywords: Mortality, Mitral valve, ST Elevation Myocardial Infarction

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Primer Perkütan Koroner Girişim Yapilan STEMI Hastalarinda Mitral Anüler Kalsifikasyonun Bir Aylik Mortaliteyi Öngörmedeki Yeri

ÖZET

Amaç: Mitral anüler kalsifikasyonun (MAK) çeşitli kardiyovasküler hastalıklarla ilişkilendirilen bir tablodur. Bu çalışmada STEMI hastalarında mitral anüler kalsifikasyonun bir aylık mortalitedeki etkisi araştırmayı amaçladık.

Yöntem: 2017-2021 yılları arasında yapılan tek merkezli gözlemsel retrospektif bir çalışmadır. Dr.Siyami Ersek Hastanesi acil servisine başvuran STEMI tanısı konarak primer perkütan girişim uygulanan 1541 hasta çalışmaya dahil edildi. Hastaların demografik, klinik özellikleri incelenmiştir. Hastalarda MAK varlığı perkütan girişim sırasındaki anjiyografi görüntüleri üzeriden değerlendirildi. Hastalar ölüme göre ikiye ayrılarak istatistiksel incelemesi yapılmıştır.

Bulgular: Çalışmaya dahil edilen 1541 STEMI hastasının median yaşı 59 yıl (51, 68) ve %78 erkekti. Tüm grupta 134 hastada (%8.7) MAK varken, ölenlerde, sağ kalanlara göre MAK sıklığı belirgin daha fazlaydı (%19 vs %7.8, p<0.001). MAK (OR=2.84, 95% CI 1.68-4.63, p<0.001) varlığı ölüm ile ilişkili bulundu. Multivariable analizde hipertansiyon (OR=1.6, 95% CI 1.02-2.54, p=0.043), platelet sayısı (OR=1, 95% CI 1.00-1.01, p=0.02), LVEF (OR=0.98, 95% CI 0.96-1.00, p=0.024) ve MAK (OR=2.68, 95% CI 1.55- 4.50, p<0.001) ölüm için bağımsız prediktörler olarak bulundu.

Sonuç: Floroskopik olarak primer perkütan girişim sırasında MAK görülmesi STEMI hastalarında bir aylık artmış mortalite ile yakından ilişkilidir.

Anahtar Kelimeler: Mitral kapak, ST Elevasyonlu Miyokard Infarktüsü, mortalite

Although STEMI mortality has decreased recently due to advances in technology and the widespread use of interventional therapies, STEMI still accounts for the majority of in-hospital and global mortality in patients with cardiovascular disease (1).

Chronic degenerative development in the fibrous basis of the mitral valve is known as mitral annular calcification (MAC) (2). Until recently, the optimum technique for MAC diagnosis was thought to be echocardiography (3). Recently, the idea that computed tomography is a more accurate diagnostic method has emerged, since it is difficult to differentiate calcification and tight collagen deposition which gives intense echogenicity with echocardiography (4, 5). MAC can be seen and diagnosed during coronary angiography (6). MAC is connected to cardiovascular conditions and events such coronary artery disease (CAD), atherosclerosis of the carotid and aortic arteries, stroke, atrial fibrillation and heart failure. It has also been linked to mortality in the Framingham Heart Study (7). However, no study has examined the relationship between MAC and mortality in STEMI patients who underwent primary percutaneous intervention, therefore we planned to look into it in our study.

MATERIAL AND METHODS

Our research is a retrospective observational single-center study. The study comprised 1541 STEMI patients who underwent primary percutaneous intervention and were admitted to the emergency service of the Dr. Siyami Ersek Hospital between 2017 and 2021. Their median age was 59 years (51, 68), and 78% of them were men. Primary percutaneous intervention images, one-month follow-up and patient data of the patients were accessed from the hospital electronic database.

Patient population and data collection

Patients who applied to our hospital between 2017 and 2021 and met the criteria for STEMI according to the universal myocardial infarction (MI) guideline were included (8). The clinical and angiographic demographic data of the patients were recorded by scanning them retrospectively from the files. Each patient's TIMI (Thrombolysis in Myocardial Infarction) score was calculated. TIMI ≤ 2 was defined as no reflow if the patient did not have residual stenosis, spasm, distal embolization, or dissection. More than 50% stenosis in at least one major artery other than the culprit lesion was defined as multivessel disease (MVD). Peripheral blood samples of the patients were taken from the antecubital vein and the results of the blood immediately sent to the laboratory were recorded (Hdl, WBC, Hgb, Platelet, Troponin, Total Cholesterol, Creatinine, Triglyceride). Angiographic diagnosis of MAC was made with the joint decision of the two researchers, by retrospectively viewing cineangiographic images.

Statistical method

The patients were divided into two groups based on death before the patients' demographic and clinical characteristics were examined. Continuous variables were represented by medians and quartiles as opposed to categorical variables, which were represented by numbers and percentages. The Mann-Whitney U test was used to assess differences between deceased and surviving groups. To determine how categorical variables vary between groups, the chi-square test was used. A univariate logistic regression analysis was then used to calculate each variable's impact on the risk of mortality. Odds ratios and 95% confidence intervals were used to present the results. In the univariate analysis, $p < 0.05$ was considered significant. The multivariate logistic regression analysis was then performed on the variables with a p-value of 0.05 or above in the univariate analysis. For this analysis, a significance level of $p < 0.05$ was accepted. The statistical analysis was completed using R 4.01 (R software, Vienna, Austria).

RESULTS

The median age of 1541 STEMI patients enrolled in the study was 59 years (51, 68) and 78% were male. During the 1-month follow-up, 113 patients (7.3%) died. Table-1 shows whether the variables between the deceased and surviving groups are different. While MAC was present in 134 patients (8.7%) in the whole group, the frequency of MAC was significantly higher in the deceased compared to the survivors (19 % vs. 7.8 %, $p<0.001$). Differences for other variables can be seen in Table-1.

Table-1: Baseline clinical characteristics by death status

Variable	All (n = 1541)	Alive (n = 1428)	Death (n = 113)	p value
Age, years	59 (51, 68)	58 (51, 68)	67 (56, 75)	<0.001
Sex, male	1.206 (78%)	1.116 (78%)	90 (80%)	0.711
HT, yes %	743 (48%)	668 (47%)	75 (66%)	<0.001
Family history, yes %	402 (27%)	381 (27%)	21 (19%)	0.069
DM, yes %	440 (29%)	396 (28%)	44 (39%)	0.012
Previous MI, yes %	324 (21%)	287 (20%)	37 (33%)	0.002
Previous Revascularization, yes %	299 (19%)	266 (19%)	33 (29%)	0.007
Hyperlipidemia, yes %	102 (6.6%)	96 (6.7%)	6 (5.3%)	0.562
Smoking, yes %	837 (54%)	787 (55%)	50 (44%)	0.027
MI pattern, Anterior MI	627 (41%)	582 (41%)	45 (40%)	0.846
KILLIP, class II-IV	160 (11%)	140 (10.0%)	20 (18%)	0.007
Systolic BP, mmHg	132 (112, 152)	132 (112, 152)	130 (110, 150)	0.776
Diastolic BP, mmHg	76 (68, 90)	76 (68, 90)	72 (60, 90)	0.378
Heartrate, beat/min	81 (68, 95)	81 (68, 95)	84 (75, 100)	0.002
LVEF, %	48 (40, 55)	48 (40, 55)	43 (30, 50)	<0.001
Antiplatelet, yes %	314 (20%)	285 (20%)	29 (26%)	0.149
ACE, yes %	257 (17%)	234 (17%)	23 (21%)	0.297
BB, yes %	183 (12%)	167 (12%)	16 (15%)	0.461
Statin, yes %	178 (12%)	164 (11%)	14 (12%)	0.772
HDL, mg/dl	34 (29, 40)	34 (29, 41)	34 (28, 39)	0.574
WBC	11.7 (9.4, 14.4)	11.7 (9.4, 14.3)	11.4 (9.0, 15.7)	0.124
Hgb, gr/L	13.80 (12.40, 15.00)	13.80 (12.47, 15.00)	13.60 (11.00, 14.50)	<0.001
Plt	232 (194, 277)	231 (194, 275)	241 (194, 314)	0.002
Troponin	27 (8, 50)	27 (8, 50)	29 (6, 54)	0.08
Total Cholesterol	175 (149, 207)	177 (150, 207)	166 (146, 197)	0.039
Creatinine, mg/dl	0.83 (0.74, 1.04)	0.83 (0.74, 1.03)	0.93 (0.76, 1.14)	0.04
Tg	132 (96, 181)	133 (96, 183)	124 (89, 158)	0.015
TIMI, 0-2	458 (30%)	419 (29%)	39 (35%)	0.248
MVD, yes %	682 (44%)	617 (43%)	65 (58%)	0.004
MAC, yes %	134 (8.7%)	112 (7.8%)	22 (19%)	<0.001

ACE: Angiotensin converting Enzyme, BB: Beta Blocker, BP: Blood pressure, DM: Diabetes Mellitus, HDL: High-density lipoprotein, Hgb: Hemoglobin, HT: Hypertension, LVEF: Left ventricle ejection fraction, MAC: Mitral Annular Calcification, MI: Myocardial Infarction, MVD: Multivessel coronary artery disease, Plt: Platelet, Tg: Triglyceride, TIMI: Thrombolysis In Myocardial Infarction, WBC: White blood cell

In univariate analysis, advanced age (OR = 1.03, 95 % CI 1.02-1.05, p<0.001), hypertension (OR = 2.25, 95 % CI 1.51-3.39, p<0.001), diabetes mellitus (OR = 1.66, 95 % CI 1.11-2.46, p = 0.012), previous history of MI (OR = 1.94, 95 % CI 1.27-2.91, p = 0.002), previous coronary revascularization (OR = 1.8, 95 % CI 1.16-2.74, p = 0.007), smoking (OR = 0.65, 95 % CI 0.44-0.95, p = 0.027), heart rate (OR = 1.01, 95 % CI 1.00-1.02, p = 0.002), left ventricular ejection fraction (LVEF) (OR = 0.96, 95 % CI 0.95-0.98, p<0.001), hemoglobin (OR = 0.85, 95 % CI 0.78-0.93, p<0.001), platelet count (OR = 1, 95 % CI 1.00-1.01, p = 0.002), creatinine (OR = 1.18, 95 % CI 0.99-1.37, p = 0.04), MVD (OR = 1.78, 95 % CI 1.21-2.63, p = 0.004), and MAC (OR = 2.84, 95 % CI 1.68-4.63, p<0.001) was found to be associated with death. These variables, which were associated with death in the univariate analysis, were included in the multivariable analysis. In multivariable analysis, hypertension (OR = 1.6, 95 % CI 1.02-2.54, p = 0.043), platelet count (OR = 1, 95 % CI 1.00-1.01, p = 0.02), LVEF (OR = 0.98, 95 % CI 0.96- 1.00, p = 0.024) and MAC (OR = 2.68, 95 % CI 1.55- 4.50, p<0.001) were found to be independent predictors of death. The significance levels of the variables in explaining the variance in death according to the partial X2 values are shown in figure-1. Accordingly, MAC was the variable that explained the variance in death the most. While the multivariable model was R2 = 0.085 and AUC = 0.701 without including MAC, it was observed that there was a significant improvement in model performance when MAC was included (R2 = 0.103, AUC = 0.718). A significant difference was observed between the AUC values of the two models with the Delong test (p = 0.01) (figure-2).

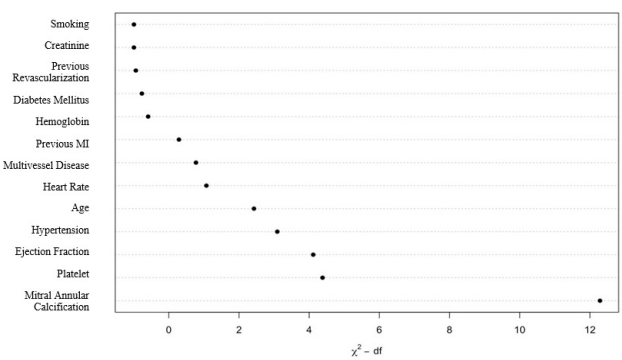

Figure1. *The significance levels of the variables in explaining the variance in death according to the Partial X2 values*

Table-2: Univariate and multivariable logistic regression analysis for the determination of mortality-related factors

Variable	Univariable OR	95% CI	p value	Multivariable OR	95% CI	p value
Age, years	1.03	1.02-1.05	<0.001	1.02	1.00- 1.04	0.064
Sex, male	0.91	0.56-1.44	0.711			
HT, yes %	2.25	1.51-3.39	<0.001	1.6	1.02- 2.54	0.043
Family history, yes %	0.63	0.38-1.02	0.069			
DM, yes %	1.66	1.11-2.46	0.012	0.9	0.57- 1.39	0.629
Previous MI, yes %	1.94	1.27-2.91	0.002	1.75	0.62- 4.37	0.256
Previous Revascularization, yes %	1.8	1.16-2.74	0.007	0.88	0.34- 2.52	0.805
Hyperlipidemia, yes %	0.78	0.30-1.68	0.562			
Smoking, yes %	0.65	0.44-0.95	0.027	1.02	0.65- 1.60	0.942
MI pattern, Anterior MI	0.96	0.65-1.42	0.846			
KILLIP, class II-IV	2.03	1.19-3.34	0.007			
Systolic BP, mmHg	1	0.99-1.01	0.776			
Diastolic BP, mmHg	0.99	0.98-1.01	0.378			
Heartrate, beat/min	1.01	1.00-1.02	0.002	1.01	1.00- 1.02	0.15
LVEF, %	0.96	0.95-0.98	<0.001	0.98	0.96- 1.00	0.024
Antiplatelet, yes %	1.38	0.88-2.13	0.149			
ACE, yes %	1.29	0.78-2.06	0.297			
BB, yes %	1.23	0.68-2.09	0.461			
Statin, yes %	1.09	0.58-1.89	0.772			
HDL, mg/dl	0.99	0.97-1.01	0.574			
WBC	1.02	0.99-1.05	0.124			
Hgb, gr/L	0.85	0.78-0.93	<0.001	0.97	0.87- 1.07	0.522
Plt	1	1.00-1.01	0.002	1	1.00- 1.01	0.02
Troponin	1	1.00-1.00	0.08			
Total Cholesterol	1	0.99-1.00	0.039			
Creatinine, mg/dl	1.18	0.99-1.37	0.04	0.99	0.79- 1.19	0.941
Tg	1	0.99-1.00	0.015			
TIMI, 0-2	1.27	0.84-1.89	0.248			
MVD, yes %	1.78	1.21-2.63	0.004	1.33	0.87- 2.03	0.183
MAC, yes %	2.84	1.68-4.63	<0.001	2.68	1.55- 4.50	<0.001

ACE: Angiotensin converting Enzyme, BP: Blood pressure, DM: Diabetes Mellitus, Hdl: High-density lipoprotein, Hgb: Hemoglobin, HT: Hypertension, MAC: Mitral Annular Calcification, MI: Myocardial Infarction, MVD: Multivessel coronary artery disease, OR: Odds Ratio, Plt: Platelet, Tg: Triglyceride, TIMI: Thrombolysis In Myocardial Infarction, WBC: White blood cell

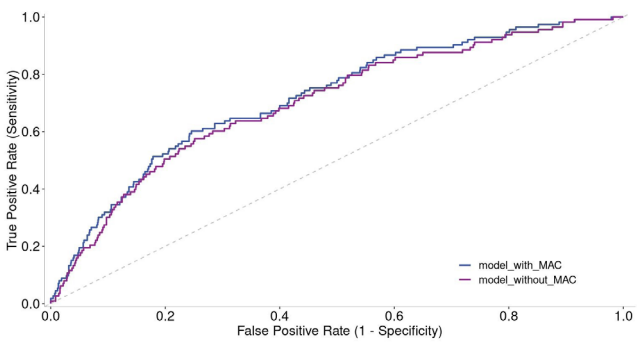

Figure 2. *AUC values of two models*

DISCUSSION

According to the results of our single-center retrospective observational study, MAC was an accurate predictor of mortality in STEMI patients. Advanced age, diabetes mellitus, hypertension, a history of MI, previous coronary revascularization, smoking, heart rate, left ventricular ejection fraction (LVEF), hemoglobin, platelet count, creatinine, and MVD were also related to mortality.

The presence of fluoroscopically detectable MAC in STEMI patients who are undergoing primary intervention affects 1-month mortality. It has been demonstrated that MAC is linked to numerous cardiovascular atherosclerotic disorders (7). It has also been shown to be associated with the prevalence of atherosclerosis in general and cardiovascular mortality in general (9-12). However, no study has examined the connection between MAC and STEMI mortality. To the greatest degree of our knowledge, the current research is the first to address the connection between MAC and mortality in the literature.

The findings of our study are consistent with the previous literature, except for the relationship between MAC and 1-month mortality (13-17). Ali M et al (13) found age, KILLIP II-IV and hypertension as mortality-related factors similar to our study results, but differently, no correlation between heart rate and mortality. Morrow et al (14) also presented KILLIP II-IV and heart rate, which we found related to increased mortality in addition to age, hypertension, and DM, as factors that increase mortality. McNamara et al (15), in their study examining the factors affecting in-hospital mortality after acute MI, found age, hypertension, and presence of heart failure at hospital admission to be related to increased mortality, which is consistent with our study. According to Paul GK et al. (17), STEMI patients' mortality increased with a higher platelet count. In the current study, we also discovered that higher platelet levels were linked to death. Other mortality-related indicators in this study other than MAC are consistent with the state of literature.

The leading diagnostic methods in the diagnosis of MAC are echocardiography and cardiac computed tomography (3-5). However, considering the success of fluoroscopy in demonstrating dense calcific structures, detection of MAC during coronary angiography is quite practical in clinical practice because it does not require additional examination. Due to the nature of the disease in STEMI patients, primary percutaneous intervention is often conducted before echocardiography can be performed. Our study showed that fluoroscopic diagnosis of MAC can provide information about mortality while the patient is still in the catheter room.

Limitations of the Study

The results should always be regarded as suspect in terms of bias because it was a retrospective study conducted at a single center. Prospective randomized studies on the subject should be designed. Since there are no defined criteria for fluoroscopic diagnosis of MAC, the diagnosis was made within the scope of expert opinion.

CONCLUSION

The presence of MAC during fluoroscopic primary percutaneous intervention is closely associated with an increased 1-month mortality in STEMI patients.

DECLARATIONS

Conflict of Interest

The authors state that they do not have any competing interests.

Funding

There is no source of funding.

Ethics Approval

This retrospective study was approved by the Institutional Review Board. This study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

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Flow Cytometric Analysis of Lymphocyte Subsets of Covid-19 Patients from A Single Centre in Turkey

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ABSTRACT

Purpose: Lymphocyte counts have been shown to negatively correlate with the severity in Covid-19. The aim of this study is to analyse the distribution of lymphocyte subsets in response to SARS-CoV-2 infection and its relation to the severity of the disease.

Methods: Blood samples were obtained from 67 consecutive patients between April 2020 and July 2020. Data on other laboratory parameters, and clinical course were collected retrospectively from patient files and patients were defined to have as severe or non-severe (mild/moderate) disease. Leukocyte subsets to be studied were identified by using flow cytometric analysis (Beckman Coulter Navios Ex V2.0). Patients were allocated into 3 groups based on the day of blood sample collection: Days 0-7, 8-14 and >14 as Group I, Group II and Group III, respectively. In 10 of 67 patients an additional analysis was done 7-10 days after the initial sampling.

Results: A total of 67 patients (30 female, 37 male) with a median age of 57 were evaluated. Lower total lymphocyte, CD3 positive, CD4 positive and B-cell counts were identified in severe infection compared to non-severe infection group which were also correlated with high serum CRP, D-dimer and ferritin levels. NK and monocyte counts were not different between the two groups. Activation markers CD38 and HLA-DR on CD4 and CD8 positive lymphocytes also were not different in either group.

Conclusion: CD3 and CD4 lymphopenia were lower in accordance with previous studies and were associated with severe disease. The expectancy of high activation markers was not met. Future studies with detailed subgroup analyses at different time-points will shed more light on our general knowledge of the immune response to COVID-19.

Keywords: Flow Cytometry, COVID-19, Immune Profile, Lymphocyte Subsets, Monocytes

Türkiye'deki Tek Bir Merkezden Covid-19 Hastalarinin Lenfosit Alt Kümelerinin Akim Sitometrik Analizi

ÖZET

Amaç: Lenfosit sayılarının Covid-19'de hastalık şiddeti ve farklı gidişatla negative yönde ilişkisi olduğu gösterilmiştir. Bu tek merkezli çalışmanın amacı, SARS-CoV-2 enfeksiyonuna yanıt olarak lenfosit alt gruplarının dağılımını analiz etmek ve hastalığın şiddeti, seyri ve prognozuyla ilişkisini incelemektir.

Yöntemler: Nisan 2020 ile Temmuz 2020 arasında ardışık olarak 67 hastadan kan örnekleri alındı. Diğer laboratuvar parametreleri ve klinik seyirle ilgili veriler, hastaların dosyalarından geriye dönük olarak toplandı ve hastalık, ciddi veya ciddi olmayan (hafif / orta) hastalık olarak tanımlandı. İncelenecek lökosit alt grupları akım sitometri analizi (Beckman Coulter Navios Ex V2.0) kullanılarak belirlendi. Hastalar, akım sitometri analizi için kan örneği alınma gününe göre üç gruba ayrıldı: 0-7.gün, 8-14.gün ve >14.gün için sırasıyla Grup I, Grup II ve Grup III. 67 hastanın 10'unda, başlangıç örneğinden 7-10 gün sonra ek bir akım sitometri analizi yapıldı.

Bulgular: Ortanca yaşı 57 olan 67 hasta (30 kadın, 37 erkek) incelendi. Ciddi hastalık grubunda, ciddi olmayan hastalık grubuna göre daha düşük toplam lenfosit, CD3 pozitif, CD4 pozitif ve B-hücre sayıları belirlendi; aynı zamanda yüksek serum CRP, D-dimer ve ferritin seviyeleri ile korelasyon gösterdi. NK ve monosit sayıları ise iki grup arasında farklı değildi. CD4 ve CD8 pozitif lenfositlerdeki aktivasyon belirteçleri CD38 ve HLA-DR, her iki grupta da farklı değildi.

Sonuç: CD3 ve CD4 lenfopenisi, önceki çalışmalarla uyumluydu ve ciddi hastalıkla ilişkilendirildi. Yüksek aktivasyon belirteçlerinin beklentisi karşılanmadı. Gelecekte, farklı zaman noktalarında detaylı alt grup analizleri COVID-19'a bağışıklık tepkisi hakkındaki genel bilgimizi daha da aydınlatacaktır.

Anahtar Kelimeler: Akım Sitometri, COVID-19, İmmun Profil, Lenfosit Alt Grupları, Monositler

Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) has resulted in one of the greatest pandemics in the history changing life on earth in almost every aspect. Extensive and devoted research has shed some light into the biology and pathogenesis of the disease and potential immune response mechanisms against the virus, yet there is still much to learn. Hyper-inflammation complicated by endotheliitis and thrombosis seems to be the major pathology underlying the organ damage which mainly involves the lungs and leads to death of most of the infected patients with SARS-CoV-2. Both, the direct viral cytotoxicity and the immune response of the host against the replicating virus have been reported to contribute to the resulting organ damage.

Lymphocyte counts have been shown to negatively correlate with the severity and different outcomes of the disease in several studies and meta-analyses (1-4). The aim of this single centre study is to analyse the distribution of lymphocyte subsets in response to SARS-CoV-2 infection and its relation to the severity, course and prognosis of the disease.

MATERIALS and METHODS

Patients

Blood samples were obtained from 67 consecutive patients who were either admitted to the COVID-19 Outpatient Clinics or were followed in the COVID-19 wards at Cerrahpasa Medical Faculty, Istanbul University-Cerrahpasa between April 2020 and July 2020 and who accepted to enter the study by signing the written informed consent. The study received approval from the ethical committee of Cerrahpasa Medical Faculty (03.06.2020 - 67534) and Ministry of Health of Türkiye.

Definitions

Data on other laboratory parameters, and clinical course were collected retrospectively from patient files. Patients with the following criteria were defined to have severe/critical COVID-19: (1) breathing rate ≥30 times/min; (2) oxygen saturation (SpO_2) ≤93% at rest; and (3) ratio of partial pressure of arterial oxygen (PaO_2) to fraction of inspired oxygen (FiO_2) ≤300 mmHg according to Fifth Revised Trial Version of the Novel Coronavirus Pneumonia Diagnosis and Treatment Guidance criteria (4,10,11,23). Furthermore, patients who had progressive disease, were transferred to intensive care unit (ICU) and/or died from COVID-19 were also classified as severe/critical. All other patients were defined as non-severe (mild/moderate) (1). Computerised Tomography (CT) images were evaluated by the radiology department according to RSNA evaluation criteria as described elsewhere (16). All patients were treated and followed according to the National COVID-19 Guidelines released and regularly updated by the Turkish Ministry of Health (24).

Day 0 was accepted as the first day of symptoms in symptomatic patients and the day of first nasopharyngeal SARS-CoV-2 polymerase chain reaction (PCR) positivity in patients with no symptoms. Patients were allocated into 3 groups based on the day of blood sample collection for the flow cytometric analysis: Days 0-7, Days 8-14 and Days >14 as Group I, Group II and Group III, respectively. In 10 available of 67 patients an additional flow cytometric analysis was done 7-10 days after the initial sampling to study the evolution in the of lymphocyte subsets during the course of the disease.

Flow- cytometric Analysis

Leukocyte subsets to be studied were identified by using flow cytometric analysis. The evaluation panel consisted of CD19 (+) B-cells, CD3(-)16(+) (NK cells), CD3(-)19(-)14(+) (monocytes), CD3(+)4(+)8(-) T-Helper cells CD3(+)4(-)8(+) cytotoxic T-cells and CD38 and/or HLA-DR expression on T-helper and cytotoxic T cells as activation markers. Flow cytometric analysis was done with Beckman Coulter Navios Ex V2.0 10 Colours/3 lasers machine with the following monoclonal antibodies (Beckman Coulter): CD14 FITC (fluorescein isothiocyanate), CD4 PE (phycoerythrin), CD45 ECD (phycoerythrin-Texas Red conjugate), HLA-DR PC5 (phycoerythrin-cyanine5 conjugate), CD19 APC (allophycocyanin), CD38 AF700 (APC-Alexa Fluor 700), CD8 AF750 (APC-Alexa Fluor 750), CD16 KrO (Krome Orange). Ten thousand events were acquired per sample. Results were evaluated using Kaluza C analysis software (2017), calculated as percentages and given as absolute numbers based on total leukocyte counts.

Leucocyte subset patterns of patients with COVİD-19 and their relevance to clinical severity (severe vs. non-severe), survival and the need for intensive care was evaluated.

Statistical Analysis

Categorical data were described as percentages and continuous data as median with interquartile range (IQR). Parametric and nonparametric comparative tests for continuous data was used to compare variables between groups, where appropriate. All statistical analyses were performed using SPSS (Statistical Package for the Social Sciences) version 23.0 software (SPSS, Inc.). Two-sided

P values of less than .05 were considered statistically significant.

RESULTS

Characteristics of the 67 COVID-19 patients according to their clinical severity were given in Table 1. Age distribution was significantly different between severe and non-severe groups, severe patients being significantly older than the non-severe ones. Furthermore, a significant male predominance was observed in the severe group. By definition, ICU stay and deaths were only present in the severe group. PCR positivity rates and CT findings were similar in both groups. Although the percentage of hypertension and diabetes mellitus patients were higher in the severe group, this was statistically insignificant. Tocilizumab use was solely confined to severe patients. Similarly, favipiravir use was higher in this group; whereas there were no differences regarding the use of hydroxychloroquine, azithromycin and oseltamivir.

Table 1: Characteristics of the Study Group

	Total (n, %)	Severe (n, %)	Non-severe (n, %)	p-value
	67 (100)	**36 (54)**	**31(46)**	
Age [years, median (range)]	57 (24–93)	64(35-93)	53 (24-81)	**0.0200***
Gender				
· Male [n, (%)]	37 (55)	25 (69)	12 (39)	**0.012****
· Female [n, (%)]	30 (45)	11 (31)	19 (61)	**0.012****
Co-morbidities				
· Hypertension [n, (%)]	23 (34)	13 (36)	10(32)	0.740**
· Diabetes mellitus [n, (%)]	21 (31)	14 (39)	7 (22)	0.151**
· Coronary artery disease [n, (%)]	10 (15)	8 (22)	2 (6)	0.070**
· Congestive heart failure [n, (%)]	1 (1)	1(3)	0(0)	0.537**
· Dementia [n, (%)]	1 (1)	1 (3)	0(0)	0.537**
· Cerebrovascular event [n, (%)]	1 (1)	1(3)	0(0)	0.537**
· COPD/Asthma (n, %)	11 (16)	8 (22)	3 (10)	0.147**
· Chronic renal failure [n, (%)]	8 (12)	6 (16)	2 (6)	0.183**
· Rheumatoid disease [n, (%)]	2 (3)	2 (6)	0(0)	0.285**
· Cancer [n, (%)]	4 (6)	3 (8)	1(3)	0.366**
CT positive [n, (%)]	53 (79)	29 (80)	24 (78)	0.771**
CT non-diagnostic [n, (%)]	10 (15)	5 (14)	5 (16)	0.771**
CT negative [n, (%)]	4 (6)	2 (6)	2 (6)	0.771**
PCR positive [n, (%)]	62 (92)	33 (92)	29 (93)	0.572**
PCR negative [n, (%)]	5 (8)	3 (8)	2 (7)	0.572**
Therapy				
· Hydroxychloroquine [n, (%)]	63 (94)	35 (97)	28 (90)	0.252**
· Favipiravir [n, (%)]	46 (68)	36(100)	10 (32)	**0.000****
· Azithromycin [n, (%)]	50 (74)	27 (75)	23 (74)	0.940**
· Oseltamivir [n, (%)]	31 (46)	18 (50)	13 (42)	0.509**
· Tocilizumab [n, (%)]	16 (23)	16 (44)	0 (0)	**0.000****
· Other antibiotics [n, (%)]	29 (43)	26 (72)	3 (10)	**0.000****
Patients requiring ICU [n, (%)]	5 (7)	5 (14)	0 (0)	**0.039****
Deaths [n, (%)]	4 (6)	4 (11)	0 (0)	0.077**

**Mann-Whitney; **Chi-square / Fisher; COPD, Chronic obstructive pulmonary disease; CT, Computerised tomography; ICU, Intensive care unit; PCR, Polymerase chain reaction*

Flow cytometric results and other relevant laboratory tests taken on the day of flow-cytometric analysis are listed in Tables 2 and 3. Table 4 depicts the flow cytometry results of leucocyte subsets obtained at 2 different time points 7-10 days apart from 10 patients during the course of the disease.

CRP, ferritin and D-dimer levels were all higher and total lymphocyte, as well as CD3+CD4+ lymphocyte counts were lower in the severe group; no significant differences were observed for monocytes, NK cells (represented as CD16+ positive cells), B lymphocytes, CD3+CD8+ cells and activated lymphocytes (described as HLA-DR+38+CD4+ and HLA-DR+38+CD8+ cells). CD4/8 ratio was found to be decreased in the severe group in accordance with lowered CD4+ and unchanged CD8+ cell counts. Neutrophil / lymphocyte ratio (NLR) was elevated and lymphocyte / CRP ratio (L/CRP) was lowered in the severe group, accordingly.

According to their initial blood sampling time points for flow cytometric analysis patients had been assigned into 3 groups: Groups I, II, III (see Methods Section for details). Intergroup comparison revealed a slight decrease in the total lymphocyte counts of patients who were in the first few days of the disease. However, none of the parameters tested (including CRP, D-dimer, ferritin and total neutrophil and lymphocyte counts) showed a significant difference between groups.

10 patients with results at two time intervals were also compared, only CRP levels showed a tendency to fall while median ferritin, D-dimer and complete blood count parameters remained unchanged.

Table 2: Laboratory Tests and Leucocyte subset distribution at the Day of Flow Cytometric Analysis

	Total (n=67)*	Severe (n=36)*	Non-severe (n=31)*	P-value**
CRP (mg/L)	18.4(4.6-68.7)	44(15-108)	7(3-18)	**0.000**
Ferritin (ng/mL)	313(152-590)	469(167-670)	190(128-331)	**0.025**
D-Dimer (mg/L)	0.68(0.37-1.43)	0.86(0.48-1.75)	0,55(0.3-0.9)	**0.013**
Haemoglobin (g/dL)	12.1(10.6-12.9)	11.7 (9.7-12.8)	12.1 (11.2-13)	0.220
Platelets (x10^3/µL)	243(185-296)	246 (160-282)	237 (185-326)	0.950
Leucocytes (/µL)	6000(4800-7500)	5900(5100-8400)	6100(4300-7200)	0.225
Neutrophils (/µL)	3700(2400-5000)	4000(2900-6300)	3200(1900-4400)	**0.013**
Monocytes (/µL)	500(400-700)	545(300-775)	500(400-800)	0.695
Lymphocytes (/µL)	1600(1000-2100)	1100(750-1700)	1900(1350-2100)	**0.002**
Neutrophil/ Lymphocyte	2.4(1.4-3.9)	3.8(2.3-5)	1.7(1-2.3)	**0.000**
CD3+ (/µL)	1350(690-1800)	832(476-1445)	1486(1218-1908)	**0.004**
CD16+ (/µL)	187(94-270)	176(67-277)	171(94-268)	0.782
CD19+ (/µL)	135(80-260)	96(36-218)	214(124-312)	**0.001**
CD14+ (/µL)	550(275-775)	596((269-840)	459(309-712)	0.308
CD3+ 4+ 8- (/µL)	770(360-1080)	440(254-786)	917(774-1190)	**0.000**
CD3+ 4- 8+ (/µL)	420(230-590)	360(179-584)	457(312-608)	0.094
CD3+ 4+ 8+(/µL)	21(8-36)	19(6-28)	20(10-37)	0.227
CD3+ 4- 8-(/µL)	56(25-99)	50(23-97)	60(33-109)	0.300
CD4+ / CD 8+	1.8(1.2-2.3)	1,68(1,19-2,1)	1,95(1,5-2,9)	**0.018**
CD3+ 16+ (/µL)	10.5(5-34.5)	11(7-34)	7(3-43)	0.314
CD14+ 16+ (/µL)	50(23-85)	54(20-186)	58(29-85)	0.758
CD3+ 4+ 38+(/µL)	84(40-174)	51(33-116)	127(58-220)	**0.016**
CD3+ 4+ DR+(/µL)	101(40-206)	95(28-192)	102(36-273)	0.414
CD3+ 4+ 38+ DR+ (/µL)	21(11-36)	19(11-34)	21(12-43)	0.611
CD3+ 8+ 38+ (/µL)	30(12-68)	29(12-65)	31(17-85)	0.252
CD3+ 8+ DR+ (/µL)	91(37-231)	88(42-201)	133(35-319)	0.606
CD3+ 8+ 38+ DR+ (/µL)	19(9-34)	20(10-42)	17(7-29)	0.489
Lymphocyte/CRP	87.8(19-489)	24(6-134)	249(73-767)	**0.000**

**Values are given in median, (IQR25-75); **Mann-Whitney; CRP, C-reactive protein*

Table 3: Laboratory Results and Leucocyte Subsets Grouped According to the Day of Initial Sampling

	DAY 0 -7*	DAY 7-14*	DAY > 14*	P-value**
Number of Patients (n)	15	16	12	-
CRP (mg/L)	27(6-95)	19.3(5-65)	11.8(2.5-19)	0.061
Ferritin (ng/mL)	253(129-664)	313(118-516)	368(154-585)	0.789
D-Dimer (mg/L)	0.65(0.4-1.5)	0.72(0.36-1.3)	0.9(0.36-1.68)	0.837
Haemoglobin (g/dL)	11.7(10.1-12.7)	12.2(10.8-13.1)	12.4(11.2-13.1)	0.595
Platelets (x10^3/µL)	220 (167-258)	256(187-326)	296(206-427)	0.064
Leucocytes (/µL)	6000(4100-7800)	6000(5200-7100)	6700(4500-8000)	0.723
Neutrophils (/µL)	3800(2000-5200)	3550(3050-4400)	4000(1800-5100)	0.991
Monocytes (/µL)	500(300-600)	600(400-830)	600(500-900)	0.052
Lymphocytes (/µL)	1210(780-1900)	1900(1000-2300)	1700(1300-2200)	0.110
Neutrophil/ Lymphocyte	2.6(1.1-5.2)	2.3(1.5-3.4)	2.2(1.4-3.9)	0.609
CD3+ (/µL)	1200(500-1600)	1420(820-1860)	1400(1120-1900)	0.369
CD16+ (/µL)	188(48-258)	212(72-291)	153(99-272)	0.819
CD19+ (/µL)	106(64-210)	113(79-281)	251(102-300)	0.142
CD14+ (/µL)	522(312-716)	459(243-673)	774(329-1088)	0.448
CD3+ 4+ 8- (/µL)	772(324-950)	768(357-1190)	902(587-1210)	0.254
CD3+ 4- 8+ (/µL)	386(205-585)	467(306-702)	492(312-608)	0.752
CD3+ 4+ 8+(/µL)	23(7-40)	13(8-26)	23(10-47)	0.247
CD3+ 4- 8-(/µL)	53(25-97)	53(21-174)	78(32-107)	0.898
CD4+ / CD 8+	1.86(1.19-2.4)	1.76(1.19-2.2)	2.25(1.28-2.61)	0.428
CD3+ 16+ (/µL)	8.6(0-60)	12(6-33)	9(5-33)	0.634
CD14+ 16+ (/µL)	48(19-73)	68(31-85)	48(23-151)	0.710
CD3+ 4+ 38+ (/µL)	47(35-154)	99(33-156)	122(62-315)	0.154
CD3+ 4+ DR+ (/µL)	126(46-286)	68(33-192)	104(29-142)	0.331
CD3+ 4+ 38+ DR+ (/µL)	20(12-32)	15(10-28)	31(11-74)	0.416
CD3+ 8+ 38+ (/µL)	29(10-69)	28(16-64)	31(12-73)	0.970
CD3+ 8+ DR+ (/µL)	133(30-342)	91(47-231)	60(37-169)	0.588
CD3+ 8+ 38+ DR+ (/µL)	17(7-34)	18(10-29)	22(11-44)	0.967
Lymphocyte/CRP	34(7-298)	95(24-456)	152(47-850)	**0.045**

**Values are given in median, (IQR25-75); **Kruskal-Wallis; CRP, C-reactive protein*

Table 4: Comparison of the leukocyte subset samples taken at 2 different time points (10 patients)

	1 st*	2 nd*	p-value**
CRP (mg/L)	153(86-188)	14(8.5-27)	**0.005**
Ferritin (ng/mL)	589(477-814)	446(409-753)	0.074
D-Dimer (mg/L)	0.65(046-1.43)	0.78(0.46-1.16)	0.374
Haemoglobin (g/dL)	11.7(10.6-13.1)	11.6(10.2-15.1)	0.646
Platelets (x10^3/µL)	220(160-266)	378(262-471)	0.139
Leucocytes (/µL)	8400(4200-11500)	6300(5000-9000)	0.646
Neutrophils (/µL)	6600(2900-9000)	4300(2900-8100)	0.878
Monocytes (/µL)	540(200-560)	700(500-800)	0.284
Lymphocytes (/µL)	1000(490-1700)	1200(1100-1700)	0.766
CD3+ (/µL)	697(487-1216)	1070(705-1480)	0.878
CD16+ (/µL)	142(40-199)	88(27-270)	0.241
CD19+ (/µL)	76(11-99)	75(29-117)	0.241
CD14+ (/µL)	402(267-747)	705(580-1020)	0.285
CD3+ 4+ 8- (/µL)	264(81-855)	575(295-615)	0.721
CD3+ 4- 8+ (/µL)	340(210-511)	496(296-730)	0.878
CD3+ 4+ 8+(/µL)	23(8-59)	19(18-62)	0.678
CD3+ 4- 8-(/µL)	42(23-99)	54(27-94)	0.959
CD4+ / CD 8+	1.2(0.64-2.56)	0.84(0.41-2.5)	0.444
CD3+ 16+ (/µL)	34(4-201)	9(4.5-75)	0.740
CD14+ 16+ (/µL)	23(8-47)	126(58-315)	0.139
CD3+ 4+ 38+(/µL)	42(12-47)	55(31-87)	0.203
CD3+ 4+ DR+(/µL)	92(47-370)	135(87-265)	0.575
CD3+ 4+ 38+ DR+ (/µL)	17(8-28)	25(24-49)	0.139
CD3+ 8+ 38+ (/µL)	33(9-81)	10(9-302)	0.721
CD3+ 8+ DR+ (/µL)	231(133-391)	254(85-521)	0.508
CD3+ 8+ 38+ DR+ (/µL)	33(4-81)	10(9-260)	0.646

**Values are given in median, (IQR25-75); ** Wilcoxon; CRP, C-reactive protein*

10 patients with results at two time intervals were also compared, only CRP levels showed a tendency to fall while median ferritin, D-dimer and complete blood count parameters remained unchanged.

Five patients were admitted to ICU and four of them died, all were in the severe group, ICU group shared same flow characteristics as in the severe group.

Sixteen patients received tocilizumab, all in the severe group. None of the parameters differed from the rest of the severe patients group(n=20), a temporal change was available only in 3 patients (before and after tocilizumab) but no conclusions could be drawn.

DISCUSSION

Immune response, innate and adaptive immunity play great role in the pathogenesis of SARS-CoV-2 infection. (2) It has been postulated that the aberrant immune response against the virus and defective repair mechanisms of the body are responsible for the organ damage, morbidity and mortality rather than the cytotoxicity caused by the virus. (2) It is, therefore, vital to gain insight into the exact mechanisms of disease and immunity against the virus in order to better understand how and when to best intervene. Flow cytometry is a fast and easy tool for pursuing immune cells and their maturation, differentiation during viral infections, yet the enormous spectrum of different cell lines makes the interpretation rather difficult. Phenotypical identification of different cell lines may not directly reflect their functional status. Also their circulating numbers in the peripheral blood may not always represent their true quantity in the body. Since a scantiness of T cells in the peripheral blood, for example, might be due to the relocation of these cells at injury sites (residing T cells at tissues) (17).

Our data were in line with the previous publications indicating that patients with severe infection were significantly older compared to patients with non-severe infection (2,7-9). The proportion of men in the severe group (69%) were significantly different from the non-severe group. Although hypertension, diabetes mellitus and chronic renal disease are insistently pronounced in other studies, no significance between different types of co-morbidities and clinical severity was observed in our study with the only exception of cardiovascular disease. Other than possible alterations in the immune system for the worse, age and comorbidities might also contribute to the shortcomings of the body by diminished residual organ capacities (17).

$CD4^+$ or $CD8^+$ T cell counts were independently linked to key patient outcomes including mortality, ICU admission, viral clearance, and recovery across many studies (4,6-11,). Lymphopenia and low CD3+ counts were signs of severe presentation in several datasets (1,2,4,10) as in this study.

Information regarding $CD4^+$ and $CD8^+$ T cells on the other hand is contradictory as either one or both were found decreased or unchanged in the literature (2,3,7-9, ,13). In many studies the $CD4^+/CD8^+$ ratio was reported to be unchanged since both the $CD4^+$ and $CD8^+$ cells were decreased (3). Lymphopenia obviously results from a decrease in both $CD4^+$ and $CD8^+$ T cells, although some studies suggested that the decline was more pronounced for $CD8^+$ T cells. It remains to be determined how lymphopenia might relate to $CD4^+$ T cell activation and/or dysfunction (2,11,17).

Not many reports can be found on activation markers, but deep immune-profiling and studies on immune signature in COVID-19 cases with different scenarios are expected to provide new insight into the immunity against the virus (8,15). In some of these studies, there were changes in $CD38^+DR^+CD4^+$ and $CD38^+DR^+CD8^+$ T cells (8,15). Other studies demonstrated that $CD8^+$ T cell activation was more salient than $CD4^+$ T cell activation but our study in line with other studies could not demonstrate an increase in the activated T cell fractions (2,17). In different studies other markers of activation including CD25 and Ki-67 have been studied at different time intervals with similar outcomes. These data should cautiously be interpreted since not all patients with COVID-19 might have this T cell activation phenotype; in fact, current data point out to potentially diverse patterns of $CD8^+$ T cell responses in patients with COVID-19 (11,17). Clonal expansion of $CD8^+$ T cells in peripheral blood has been associated with milder disease or better recovery rates; however, it is not clear whether this $CD8^+$ T cell clonal expansion was the cause or the consequence of the disease recovery (17).

In contrast to our results Chen et al. (7) could demonstrate the restoration of the distribution of $CD3^+$ T cells, $CD4^+$ T cells, $CD8^+$ T cells, and B cells following the recovery of patients. Our cohort, however, included a small group of patients and therefore was devoid of the power of showing significant difference in lymphocyte subset patterns over the course of the disease. This holds true for the 10 patients who gave 2 blood samples 7-10 days apart. Seven of those 10 were in the severe group and had delayed viral clearance and immune reconstitution. Studies on homogenous patient populations with multiple flow-cytometric analyses at previously specified time-points would help clarifying this issue.

We did not find a difference in the NK cell fractions over the course of the disease. Patients at different intervals of disease had similar NK cell populations. Some studies reported lower NK cell numbers with delayed NK cell improvement whereas others found normal levels (2, 7, 13). Interesting data on NK immune-phenotypes in COVID-19 have been retrieved from studies which also take KIR expression profiles into account striving more for functional abilities rather than sole phenotypical classification (14).

B lymphocyte profiling in comprehensive studies revealed elevated plasmablast levels and their relationship with antibody production after COVID-19 infection as well as other viral infections and vaccinations (8,20). CD19 counts alone were less remarkable, as they were unchanged in most (2,13) and but decreased in some studies (7,8). In our study, we found a significant decrease in $CD19^+$ cells in the severe group. We also noticed that $CD19^+$ cells were lower in patients within the first 14 days of infection when compared to levels after 14 days. However, this difference was not statistically significant.

In critical patients with COVID-19, decline in the number and HLA-DR expression of monocytes might potentially lead to decreased antigen presentation and thus immunosuppression, while increased number of $CD16^+$ pro-inflammatory monocytes might mediate hyper-inflammation. Studies reveal that the extent of $HLA\text{-}DR^+$ monocytes might help identifying the risk for developing critical/severe COVID-19 (22). $CD16^+$ monocytes were within normal limits in our study, mostly in line with the literature. There are, however, other studies, which have reported lower levels (2). Not only quantitative alterations in immune profile but also atypical monocytes with bizarre side scatter characteristics and mean fluorescent intensity patterns for common antigens like CD14 have been observed (19). Clinical significance of these findings and their relevance to COVID-19 has not yet been clarified.

The main significant change that could be observed between groups and time intervals was with CRP and ferritin to some extent, which are well established surrogate markers of inflammation. Just as in other clinical studies on COVID-19 they were correlated with severity of cases (1,2,4,10,13). Some previously defined ratios such as neutrophil-lymphocyte ratio (NLR) and lymphocyte-CRP ratio (LCR) were also lower and higher in our study in severe cases, respectively (2), but their clinical significance and true contribution needs further exploration and validation in clinical decision making algorithms.

Big part of the studies looking at immune profiling come from China and this study is one of the few reports from Türkiye and middle-eastern territory. There is a great polymorphism in inflammatory responses between different populations and it is important to reveal differences between them. Another study from Türkiye found reduced naive T cell/$CD4^+$ effector-memory T cell ratio, an indicator of the differentiation from naive T cells to memory cells and lower peripheral $CD4^+CD8^+$ double-positive T cells in severe disease (18). Conversely, double positive and double negative $CD3^+$ cells were similar between groups and no temporal changes were observed in our study; but we could not determine a baseline reference value for these subpopulations, therefore, we could not comment on a possible reduction.

Other than the universal finding of lymphopenia and low counts of $CD3^+$ cells and their correlation (causality yet to be shown!) to disease severity, the remainder of lymphocyte subsets have varying results among the vast majority of the studies. With the lack of proper and validated cut-off values, well-established subgroups of different cell lines and their interactions and their ever-changing numbers/proportions during reactive conditions, it is hard to draw exact conclusions just based on lymphocyte subsets. Small numbers and heterogeneous patient populations with highly variable study designs make this area more prone to speculation.

A recent study also reporting the subset of helper and cytotoxic T cells found, that not only $CD3^+$ and $CD4^+$ helper cells but also B cells, NK cells and also all subsets except EMRA $CD4^+$ and $CD8^+$ plus terminal effector $CD8^+$ cells, were all lower in COVID patients compared to healthy subjects and lower in the severe group to non-severe cases (25).

There were several limitations to this study that might cause some potential bias. First, it was a single-centre, small-sample study of patients admitted to the hospital. Second, patients with ICU admission and patients with residual lung damage were underrepresented. Second blood samples for flow-cytometric analysis were not necessarily obtained after recovery but after Day 14 according to the previously specified plan. Thus, second samples possibly did not always reflect a recovery phase. Another hurdle to overcome was the difficulty in determining the D0 of the disease since not all patients were symptomatic. Moreover, the use of chloroquine and azithromycin at the onset of symptoms may have affected the counts of some patients. Antigen presenting cells like dendritic cells and other representatives of innate immune system were not included in the panel, NK cells and monocytes were underrepresented as they were solely identified based on CD14 and CD16 positivity, respectively. Of note, HLA-DR and CD38 expression on lymphocytes might show inter-observer variability.

Deeper and more comprehensive immune profiling in larger cohort of patients reflecting different clinical scenarios and at different and well-planned time points will shed more light in the understanding of COVID-19 and the hyper-inflammatory states we see with viral infections. Also, the changes in the immune profile after immunomodulatory drugs and vaccination will inform us more about the complex structure of the immune response.

CONCLUSION

Total lymphocyte counts, CD4 counts and to some extent CD8 and CD19 counts correlate with COVID-19 infection as shown by previous studies. Associations between severity and lymphocyte activation markers, NK cells and monocytes could not be shown. A more comprehensive immune profiling with more frequent measurements will aid more in the understanding of the immunological process, the prognosis and outcomes of COVID-19.

Declarations

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Conflicts of interest/Competing interests
The authors have no affiliation with any organization with a direct or indirect financial interest in the subject matter discussed in the manuscript

Ethics approval
Animal subjects were not part of this study. This was an all human subject study, they all have been asked for and given a written and signed informed consent (which was approved by the local ethical comitee. The study received approval from the ethical committee of Cerrahpasa Medical Faculty (03.06.2020 - 67534) and Ministry of Health of Türkiye

Availability of data and material
All additional data can be demanded from corresponding author.

Authors' contributions

All authors have participated in additional conception and design, or analysis and interpretation of the data, AKE contributed to data collection, TE and MCA planned the design, purpose of the study and wrote the article.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Obstetrics and Gynaecology / Kadın Hastalıkları ve Doğum

Optimal Timing of Cesarean Delivery in Pregnant Women with Previous Cesarean Delivery

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ABSTRACT

Objectives: In this study, we aimed to determine the optimal fetal and maternal timing of Cesarean delivery in pregnant women with previous cesarean delivery.

Material/Method: In the one-year study period, a total of 150 pregnant women with a singleton pregnancy and gestational age between 37-40 weeks were included in the study. The data of pregnant women and newborns were prospectively examined. Pregnant women were divided into three groups according to their gestational age: those within 37 weeks, those within 38 weeks, and those within 39 weeks. The initiation of active labor and the previous cesarean section in pregnant women with 37 and 38 weeks of gestation included in the study are indications for cesarean section. Those with a gestational age of 39 weeks are those who were given the day of planned cesarean section. In this group, the incision is a previous cesarean section. Gravida, parity, age information, additional diseases, and number of cesarean deliveries of pregnant women were recorded. Fetal and birth complications experienced during birth were recorded. One-minute and 5-minute Apgar scores, birth weights, gender, and need for intensive care of newborns were recorded.

Results: Apgar scores at 1 minute and 5 minutes were significantly lower at 37 weeks compared to other weeks ($p < 0.001$). Need for intensive care ranged from 45.5-68.2% between 37+0 and 37+6 weeks, 22.7-40.9% between 38+0 and 38+6 weeks, and 0-4.5% after 39 weeks. In the evaluation of the groups, it was observed that the median age value of the pregnants was significantly higher in the group with 38 weeks of gestation than in the groups with 37 and 39 weeks of gestation ($p < 0.001$).

Conclusıon: It was determined that the most appropriate gestational week for delivery time in pregnant women with cesarean history was 39 weeks and later.

Keywords: Pregnancy; cesarean section; cesarean delivery; term birth

Daha Önce Sezaryenle Doğum Yapmış Gebelerde Sezaryen Doğumun Optimal Zamanlaması

ÖZET

Amaç: Bu çalışmada, daha önce sezaryen ile doğum yapmış gebelerde sezaryen doğumun optimal fetal ve maternal zamanlamasını belirlemeyi amaçladık.

Materyal/Yöntem: Bir yıllık çalışma süresinde tekil gebeliği olan ve gebelik yaşı 37-40 hafta arasında olan toplam 150 gebe çalışmaya dahil edildi. Gebe ve yenidoğan verileri prospektif olarak incelendi. Gebeler gebelik yaşlarına göre 37 hafta, 38 hafta ve 39 hafta olmak üzere üç gruba ayrıldı. Çalışmaya dahil edilen 37 ve 38 haftalık gebelerde aktif doğum eyleminin başlaması ve daha önce sezaryen olması sezaryen endikasyonudur. 39 hafta gebelik yaşı olanlar ise planlı sezeryan ameliyat günü verilenlerdir. Bu gurup içinde enkiasyon daha önce gecirilmiş sezeryan ameliyatıdır. Gebelerin gravida, parite, yaş bilgileri, ek hastalıkları ve sezaryen doğum sayıları kaydedildi. Doğum sırasında yaşanan fetal ve doğum komplikasyonları kaydedildi. Yenidoğanların 1. dakika ve 5. dakika apgar skorları, doğum ağırlıkları, cinsiyetleri ve yoğun bakım ihtiyaçları kaydedildi.

Bulgular: 1. dakika ve 5. dakika apgar skorları 37. haftada diğer haftalara göre anlamlı derecede düşüktü ($p < 0,001$). Yoğun bakım ihtiyacı 37+0 ile 37+6 haftalar arasında % 45,5-68,2, 38+0 ile 38+6 haftalar arasında %22,7-40,9 ve 39 hafta sonra %0-4,5 arasında değişmektedir. Grupların değerlendirilmesinde, gebelerin medyan yaş değerinin gebelik haftası 38 haftalık olan grupta, gebelik haftası 37 ve 39 haftalık gruplara göre anlamlı olarak daha yüksek olduğunu görüldü ($p < 0.001$).

Sonuç: Sezaryen öyküsü olan gebelerde doğum süresi için en uygun gebelik haftasının 39 hafta ve sonrası olduğu belirlendi.

Anahtar Kelimeler: Gebelik; sezaryen; sezaryen doğum; vadeli doğum

For singleton fetuses in humans, the fetal developmental period is generally calculated according to the mother's last menstrual period. This period is the time from the mother's last menstrual period until the end of the 37 weeks of pregnancy. A "term baby" refers to a baby that has completed 37 weeks of pregnancy (1). In recent times, considering the problems experienced by term babies after birth, the definition of term baby has become controversial. Therefore, babies born between the first day of the 37th week and last day of the 38th week were called "early term" (1). Today, it has been asserted that the time until fetal maturation to be considered completed. should be 38 weeks and 2 days from ovulation (2). In general, babies born before the 37th week are referred to as "premature babies"(3). About one out of five babies born without complications are early term babies (2). Morbidity and mortality rates vary after birth depending on the gestational age in early term babies (4). The reason for the majority of cesarean deliveries in our country and our hospital is the presence of a previous cesarean operation. In such cases, our patients are scheduled for elective cesarean delivery. In these deliveries, considering the morbidity and mortality of the newborn, it is important to plan the time of delivery. There is no consensus on the subject. In our study, we aimed to determine the optimal delivery time for planned cesarean deliveries in pregnant women.

MATERIAL AND METHOD

In the one-year study period, a total of 150 pregnant women with a singleton pregnancy and gestational age varying between 37-40 weeks were included in the study.

Pregnant women at 37, 38 and 39 weeks were selected by stratified sampling method according to their gestational weeks.

While the groups were randomized, pregnant women with a gestational age of 40 weeks and above were not included in the grouping due to the low number of pregnant women. Those with a gestational age below 37 weeks were not included due to problems that may be related to prematurity. All pregnant women were screened for congenital anomalies between 20 and 22 weeks with detailed ultrasonography. Those with congenital anamoly were not included in the study. All pregnant women were treated by the same anesthesia team using the same methods. Pregnant women who had a previous cesarean section and planned a cesarean section for the next delivery were included in our study. The initiation of active labor and the previous cesarean section in pregnant women with 37 and 38 weeks of gestation included in the study are indications for cesarean section. Those with a gestational age of 39 weeks are those who were given the day of planned cesarean section. In this group, the incision is a previous cesarean section. Sample selection was completed when 50 pregnant women were reached for each of the three trimesters groups who met the inclusion criteria among the pregnant women who applied to our clinic between 1/1/2020 and 1/1/2021. Data of the pregnant women and newborns were prospectively examined. Pregnant women were divided into three groups according to their gestational age: those within 37 weeks, those within 38 weeks, and those within 39 weeks. Pregnant women with fetal anomaly, gestational age under 37 weeks, and women who required emergency cesarean operation were excluded from the study. Gravida, parity, age information, additional diseases, and number of cesarean deliveries of pregnant women were recorded. Fetal and birth complications experienced during birth were recorded. One-minute (APGAR1) and 5-minute (APGAR5) Apgar scores, birth weights, gender, and need for intensive care of newborns were recorded. In addition, the indications for neonatal intensive care unit (NICU) admission in infants admitted to neonatal intensive care were also recorded. Date of last menstrual period was taken into consideration when calculating gestational age. For pregnant women who did not know the date of their last menstrual period, the date was determined according to ultrasound findings of the first fifteen weeks of pregnancy. For pregnant women who did not know the date of their last menstrual period and who did not have ultrasounds of their first trimester, calculation was based on biparietal diameter (BPD) in ultrasound taken at admission. Naegele formula was used for calculations when determining gestational week according to last menstrual period. Cesarean indication was defined as *previous cesarean section* in those who previously underwent cesarean section, and as *repeat cesarean section* in those who underwent more than two previous cesarean sections. This study was approved as a prospective study by the Human Research Ethics Committee of Zonguldak Bülent Ecevit University. Protocol number: 2019-77-08/05. All participants were informed about the scope of the study and written consent was obtained from all participants. The study was conducted in accordance to the principles of the Declaration of Helsinki.

Statistical Analysis

Analysis of the data was conducted using the SPSS 22.0 (IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp) package program. Normality distribution

of the data was evaluated using the Shapiro-Wilk test and graphically assessed. It was determined that the data was not normally distributed. Numerical data was expressed as median (minimum-maximum) and categorical data was expressed as number and percentage. In the comparison of the three groups, the Kruskal-Wallis test was tested using Monte Carlo simulation results. Independent two groups comparisons of the statistically significant parameters were applied Dun's test. Pearson chi-square test was tested using Monte Carlo simulation results to compare categorical data. ROC analysis was applied to determine the cutoff for the most ideal gestational week for delivery. Logistic regression analysis was used to assess the value of gestational week in predicting the need for NICU. The level of $p<0.05$ was considered statistically significant.

RESULTS

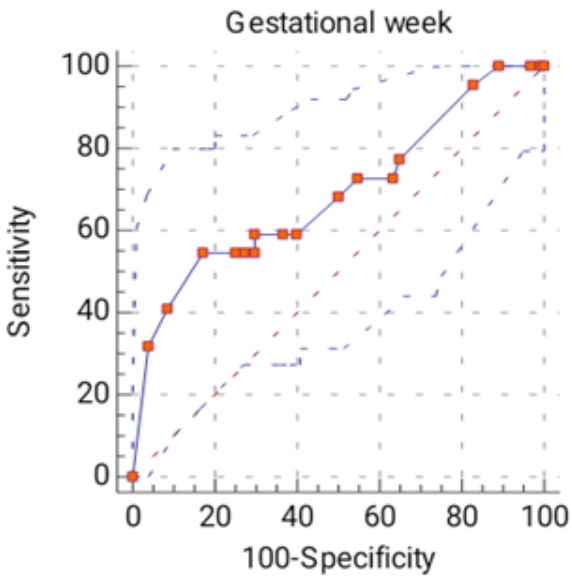
A total of 150 patients were included in the study. The 37-, 38-, and 39-week groups each consisted of 50 patients. Median patient age was 29 (24-39), gravida 2 (2-4), parity 1 (1-3), newborn weight 3207.5 (2700-4300) grams, gestational week 38.3 (36.6-39.4), 1-min Apgar 8 (5-10), and 5-min Apgar 9 (6-10). In terms of comorbidities, in the 37-week group, 6 (12%) patients had anemia, 1 (2%) diabetes mellitus (DM), and 3 (6%) hypertension (HT); in the 38-week group 3 (6%) patients had anemia, 1 (2%) DM, and 1 (2%) asthma; in the 39-week group, 2 (4%) patients had DM. According to complications during labor, only one patient in the 39-week group experienced bowel injury. In terms of postpartum complications, only one patient in the 38-week group developed postpartum hemorrhage. In one patient in the 38-week group, the previous cesarean section had been recorded as vertical incision. One patient in the 39-week group had a history of myomectomy.

In the 37-week group, Respiratory Distress Syndrome (RDS) was observed in 2 (4%) babies and transient tachypnea of the newborn (TTN) in 9 (18%) babies; in the 38-week group, RDS was observed in 1 (2%) baby and TTN in 4 (8%) babies; and in the 39-week group, TTN was observed in 5 (10%) babies. No anomalies were observed in any of the babies. Mortality was not observed in any of the mothers and babies in the three groups.

In the 37-week group, 4 (8%) babies stayed in the newborn unit for 3 days, 7 (14%) for 4 days, and 1 (2%) baby stayed for 5 days; in the 38-week group, 1 (2%) babies stayed for 2 days and 4 (8%) babies stayed for 3 days; and in the 39-week group, 5 (10%) babies stayed for 3 days.

Analysis of the groups revealed that median age was significantly higher in the 38-week group compared to the 37- and 39-week group ($p<0.001$). The 1-min and 5-min Apgar scores were significantly lower in the 37-week group compared to the other groups ($p<0.001$). There was a significant difference between all of the groups according to birth weeks and newborn weight ($p<0.001$). There was no significant difference between the groups according to the rest of the parameters ($p>0.05$). The rate of babies born at 39 weeks among those in need of NICU is 22.7%. The sensitivity rate for detecting the cut-off point for NICU need at week 39 is 4.5%. The distribution of the demographic data of the groups is presented in Table 1.

Our optimal cut-off value for the gestational week according to the need for intensive care was 37.3%, our sensitivity rate was 54.5%, our specificity rate was 82.8%, our ppv rate was 35.3%, and our npv rate was 91.4%, which was statistically significant (AUC: 0.690 (SE.:0.069); CI=0.609-0.763; p=0.006) (Table 2, Graph 1).



Graph 1. *Sensitivity and specificity comparison of gestational age*

According to logistic regression analysis of the 37-week, 38-week, and 39-week groups, it was observed that gestational week was a significant predictor of the development of NICU risk ($p<0.001$). The risk of NICU need decreased by 68.4% at 38 weeks, and decreased by 88.9% at 39 weeks compared to 37 weeks ($p<0.001$; OR=0.316 [95% CI: 0.165-0.604] and $p<0.001$; OR=0.111 [95% CI: 0.044-0.280] respectively) (Table 3).

Table 1. Distribution of demographic data of the groups

	37 Weeks (n=50) median (min-max)	38 Weeks (n=50) median (min-max)	39 Weeks (n=50) median (min-max)	p	Pairwise comparisons of gestational weeks (37-38)	(37-39)	(38-39)
Age	28 (24-36)	30 (24-39)	28 (24-36)	**<0.001** [k]	0.067	0.423	**0.001**
Gravida	2 (2-3)	2 (2-4)	2 (2-3)	0.910 [k]	ns.	ns.	ns.
Parity	1 (1-2)	1 (1-3)	1 (1-2)	0.910 [k]	ns.	ns.	ns.
Newborn weight	3089.5 (2700-3780)	3199 (2740-3865)	3468 (2980-4300)	**<0.001** [k]	0.028	**<0.001**	**<0.001**
Gestational week	37.3 (37.0-37.7)	38.4 (38.0-38.9)	39.0 (39.0-39.6)	**<0.001** [k]	**<0.001**	**<0.001**	**<0.001**
APGAR							
1	7 (5-9)	8 (6-10)	8 (6-9)	**<0.001** [k]	**<0.001**	**0.001**	0.470
5	9 (6-10)	9 (7-10)	9 (7-10)	**<0.001** [k]	**<0.001**	**0.007**	0.546
	n (%)	n (%)	n (%)				
Smoking							
Absent	39 (78)	40 (80)	45 (90)	0.246 [c]	ns.	ns.	ns.
Present	11 (22)	10 (20)	5 (10)		ns.	ns.	ns.
Indication							
Previous C/S	33 (66)	33 (66)	34 (68)	0.999 [c]	ns.	ns.	ns.
Repeat C/S	17 (34)	17 (34)	16 (32)		ns.	ns.	ns.
Need for NICU							
Absent	38 (76)	45 (90)	45 (90)	0930 [c]	ns.	ns.	ns.
Present	12 (24)	5 (10)	5 (10)		ns.	ns.	ns.
Gender							
Female	24 (48)	24 (48)	23 (46)	0.999 [c]	ns.	ns.	ns.
Male	26 (52)	26 (52)	27 (54)		ns.	ns.	ns.

[k] Kruskal Wallis H Test (Monte Carlo); Post Hoc Test: Dunn's Test, [c] Pearson Chi Square Test (Monte Carlo) NICU: Neonatal Intensive Care Unit.

Table 2. ROC Analysis for determining the optimal delivery time

	Neonatal Intensive Care Unit		AUC (SE)	p
	Absent	Present		
Gestational week			0.690 (0.069)	0.006
>37.3 (37w+2d)	106 (91.4) [npv] (82.8) [sp]	10 (8.6) (45.5)		
≤37.3 (37w+2d)	22 (64.7) (17.2)	12 (35.3) [ppv] (54.5) [ss]		

Roc (Receiver Operating Curve) Analysis (Honley&Mc Nell - Youden index J), AUC: Area under the ROC curve, SE: Standard Error, [ss] Sensitivity, [sp] Specificity, [ppv] Positive predictive value, [npv] Negative predictive value

Table 3. Logistic regression analysis of gestational week in predicting NICU need

	B (SE)	p	Odds ratio	95% C.I.for Odds ratio	
				Lower	Upper
37 vs 38 weeks	-2.197 (0.471)	<0.001	0.111	0.044	0.280
37 vs 39 weeks	-1.153 (0.331)	<0.001	0.316	0.165	0.604

Logistic Regression (Method = Enter), C.I.: Confidence interval B: regression coefficients SE: Standard error, Dependent variable: NICU need.

DISCUSSION

According to our clinical experiences, planned cesarean deliveries in women who have previously underwent cesarean section are generally performed in the 39th gestational week. However, there is no definite consensus regarding the timing of planned cesarean sections in pregnant women with a history of previous cesarean section. In general, the reason for planning delivery at 39 weeks is to reduce newborn morbidity and mortality. According to 2013 data, the mortality rates of newborns born in weeks 37 and 38 were significantly higher compared to newborns born in weeks 39 and 40 (5).

In our study, APGAR1 and APGAR5 scores of the newborns were significantly lower in the 37-week group compared to the other two groups. In addition, it was observed that 39 weeks and later was the most optimal time in order to reduce the need for NICU.

One study on pregnant women who gave birth between 32 and 39 gestational weeks reported that advancing delivery by one week reduced neonatal morbidity by 23% (6). In our study, we observed that the need for neonatal intensive care decreased from 37 weeks to 39 weeks. However, a percentage value was not obtained.

One large-scale Swedish study observed that mortality rates of young adults were significantly higher when they were born in weeks 37 and 38 compared to those born in gestational weeks 39 and 40. The most significant causes of mortality in these young adults were heart diseases and diabetes. Although they could not state that early term birth directly impacted heart disease and diabetes in adulthood, they emphasized that it may have a negative effect (7).

One study conducted in the United Kingdom reported that school performance of children born between gestational weeks 37-39 was significantly lower than those born between weeks 39-41. They emphasized that the effect of delivery between 37-39 weeks of gestation on children's school performance is minimal, but that the effect is significant and real (8).

One Australian study observed that early term babies exhibited more behavioral disorders in adulthood compared to babies born at 39 weeks of gestation and later. They indicated that early term birth may be associated with mental problems (9).

The aforementioned three studies investigated early term babies in their adulthood period. We did not evaluate adulthood of the babies born in our study, which was a limitation.

Another study more similar to the focus of our study emphasized that waiting for the 39th week of gestation was not optimal for reducing neonatal morbidity and mortality in pregnant women with repeat cesarean sections. They concluded that waiting for the 39th week for optimal cesarean timing would increase maternal and fetal mortality and morbidity by inducing potential emergency delivery with the start of labor. The same study indicated that the optimal delivery time for women with repeat cesarean deliveries should be within 37 weeks of gestation (10). The results of our study do not support this finding. In our study, fetal morbidity decreased as the gestational age approached 39 weeks. There was no significant difference in terms of maternal morbidity and mortality.

Spong et al. emphasized the importance of previous uterine operations and uterine incisions performed in previous cesarean sections in optimally planned cesarean deliveries. They drew attention to the finding that those who underwent cesarean section with vertical uterine incision had higher risk of uterine rupture and that the optimal cesarean delivery time should be 37 weeks in those who previously underwent cesarean section in such a manner. In addition, they emphasized that optimal cesarean delivery time should be between 37-38 weeks in women who previously underwent non-cesarean uterine operations (11). Among the patients of our study, only one of the pregnant women had previously undergone a myomectomy operation. Her cesarean section was performed at 39 weeks of gestation without complications. In the same manner, only one of our patients had previously underwent cesarean operation with classical incision. That patient's cesarean section was performed at 39 weeks of gestation and no fetal or maternal complications developed.

In diabetic women, complications associated with maternal diabetes may develop during pregnancy and birth. Delivery time in diabetic pregnancies is controversial. In diabetic women, pharmacologic management of diabetes during pregnancy is important. In these cases, delivery time may vary depending on whether or not the pregnant woman's diabetes is kept under control. Catalano et al. indicated that when planning optimal cesarean delivery time, macrosomia and sudden infant death syndrome associated with diabetes may be encountered due to advanced gestational week, and they emphasized that this condition may complicate pregnancy.

They recommended that cesarean delivery should be planned close to 39 weeks in pregnant women with diabetes kept under control with pharmacologic agents (12). In our study, we did not observe a significant difference between the three groups according to labor complications in diabetic patients.

In pregnant women with history of intrauterine fetal death in the third trimester, the presence of negative obstetric history causes the clinician concern when planning cesarean delivery time. A study on this topic demonstrated that planning delivery before the 39th week of gestation without a medical necessity did not prevent a potential recurrent intrauterine fetal death (13).

It has been indicated that in the presence of fetal anomaly, moving the delivery time to an earlier date did not provide any benefit. It was emphasized that delivery could be performed in the early term if there is risk of fetal or maternal complications (14).

Intrauterine growth retardation (IUGR) is a condition characterized by impaired placentation and sudden fetal death and delivery timing is important. In case of IUGR, if Doppler parameters are normal, with close follow-up, optimal delivery time is recommended between 38-39 weeks of gestation (15).

According to the American College of Obstetricians and Gynecologists (ACOG), various parameters are factors when planning delivery time, and the situation is rather complex. They recommended that risks, application sites, and maternal and fetal benefits should be considered when planning delivery. Based on this information, they suggested that delivery should not be before 39 weeks of gestation. However, in their research, ACOG mentioned that when referring to delivery before 39 weeks, this was in regard to general labor timing and not planning of optimal cesarean timing (16).

Study Limitations

Since the research was conducted in a single center, the long-term extension of the study to reach a sufficient number of participants can be counted among the limitations of this study.

CONCLUSION

In pregnant women with a history of previous cesarean section, it is recommended that optimal time of cesarean delivery is 39 weeks of gestation in order to reduce the need for postnatal intensive care.

DECLARATIONS

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Conflict of Interest

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Ethics Committee Approval

The study was approved by the Zonguldak Bülent Ecevit University Human Research Ethics Committee (08.05.2019, 2019-77-08/05).

Informed Consent

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

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Orthopaedics / Ortopedi

Analyzing Turkey's Impact on Orthopedic Literature: A Bibliometric Study

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ABSTRACT

Purpose: Bibliometric analyzes are an important tool for evaluating the progress of scientific research, determining research strategies, and using resources effectively. In our study, bibliometric analysis of publications related to orthopedics in Turkey was made.

Methods: In the field of orthopedics, publications between 1980 and 2022 in SCIE journals were scanned. During this screening only articles as document type were included in the study. The distribution of articles by years, the most frequently published topics, the authors who contributed the most, the journals in which they were published, the educational institutions to which the articles belonged, the status of Open Access and citations of the articles were noted.

Results: Between 1980-2022, 274.902 articles were reached. USA takes the first place in the articles published in the world literature. Türkiye is in the 14th place. When we look at the number of contributions to the articles, Murat Bozkurt takes the first place. Looking at the institutions of the authors, the most publications were produced in Hacettepe University. The citation rate per article was found to be 10.56.

Conclusion: In our study, Turkey has entered a rising trend in terms of contributing to science by writing articles in the field of orthopedics. Improvements to be made in health policies in Turkey, increasing the budgets allocated to scientific research and attempts to increase the quality of health institutions will cause Turkey's rapid rise in the scientific arena.

Keywords: Bibliometric, article, citation, Turkey

Türkiye'nin Ortopedi Literatürüne Katkısının İncelenmesi: Bibliyometrik Analiz

ÖZET

Giriş: Bibliyometrik analizler, bilimsel araştırmaların ilerleyişini değerlendirmek, araştırma stratejilerini belirlemek ve kaynakları etkin kullanmak için önemli bir araçtır. Çalışmamızda Türkiye'de ortopedi ile ilgili yayınların bibliyometrik analizi yapılmıştır.

Materyal ve Metod: Ortopedi alanında SCIE dergilerde 1980 ile 2022 yılları arasındaki yayınlar tarandı. Bu tarama sırasında sadece doküman türü olarak araştırma makaleleri çalışmaya dahil edilmiştir. Makalelerin yıllara göre dağılımı, en sık yayınlanan konuları, en çok katkıda bulunan yazarları, hangi dergilerde yayınlandığı, makalelerin ait olduğu eğitim kurumları, açık erişim durumu ve makalelerin atıfları değerlendirildi.

Sonuçlar: 1980-2022 yılları arasında 274.902 makaleye ulaşılmıştır. Dünya literatüründe yayınlanan makalelerde ilk sırayı ABD almaktadır. Türkiye 14. sırada. Yazılara katkı sayısına baktığımızda ilk sırayı Murat Bozkurt alıyor. Yazarların kurumlarına bakıldığında en çok yayın Hacettepe Üniversitesi'nde yapılmıştır. Makale başına atıf oranı ise 10.56 olarak bulundu.

Tartışma: Çalışmamızda Türkiye ortopedi alanında makaleler yazarak bilime katkı sağlama açısından yükselen bir trend içerisine girmiştir. Türkiye'de sağlık politikalarında yapılacak iyileştirmeler, bilimsel araştırmalara ayrılan bütçelerin artırılması ve sağlık kurumlarının kalitesinin yükseltilmesine yönelik girişimler, Türkiye'nin bilimsel arenada hızla yükselmesine neden olacaktır.

Anahtar Kelimeler: Bibliyometrik, makale, atıf, Türkiye

The bibliometric study studies bibliographic data using numerical and statistical analysis of published scientific articles, books, and other publications. This type of study is used to measure research trends in a particular discipline, the quality and impact of published articles, the publication performance of authors and institutions, and other bibliographic characteristics. Bibliometric analysis can include many different data items. Still, data such as publication type, publication year, number of authors, number of citations, journal name, publisher, citations, and collaborations between authors are usually examined. These analyses show the progress of research on a particular topic, the exploration of new areas, and potential opportunities for future research. While bibliometric studies help advance research and make new discoveries in the academic world, they can also increase competition between researchers and institutions.

Bibliometric studies can also measure a country's contribution to the world literature in any branch area. The number of bibliometric studies from Turkey is very limited in the literature. In our study, it is planned to investigate the contribution of orthopedic publications in Turkey to the world literature and to discuss them in the light of the literature.

Material and Methods

Ethics committee approval is not required as no human or animal research exists. The study is a bibliometric analysis research; participant informed consent is not required. The Clarivate Web of Science database searched publications between 1980 and 2022 in SCIE journals in orthopedics. The search process was made on 20.05.2023. During this screening, publications such as letters to the editor, reviews, and book chapters were excluded from the study and only articles as document type were included. Only English was chosen as the language. Each country's publications per million (PmP) values were found as previously described in the literature (1). Population data is taken from https://datatopics.worldbank.org/.

While the number of articles belonging to Turkey was found, only the articles sent from Turkey were included; publications made jointly with different centers or countries abroad were not considered. In addition, the distribution of articles by years, the most frequently published topics, the authors who contributed the most, the journals in which they were published, the educational institutions to which the articles belong, the status of Open Access, and the citations of the articles were noted. The citation data received by the articles are based on the data up to 20.05.2023 when the search process was made.

Results

Between 1980-2022; 274,902 articles were reached all over the world. Distribution of these articles by country, PmP data are given in Table-1 (data for the first 20 countries are given). The distribution of articles by year in Turkey is given in Figure-1. Considering the distribution of the articles in Turkey, 387 articles are related to the ankle, 365 shoulder, and 345 intervertebral disc . Regarding the number of contributions to the articles, Murat Bozkurt contributed 87, Izge Gunal 82, and Abdulhamit Mısır 65 articles. Considering the authors' institutions, most authors are from Hacettepe University, 9eylül University is the 2nd, and Gazi University is the 3rd (table-2). Looking at the journals in which articles are published in Turkey, Acta Orthopaedıca Et Traumatologıca Turcıca Ranks First, Journal Of Back And Musculoskeletal Rehabılıtatıon comes in second place, and Archıves Of Orthopaedıc And Trauma Surgery ranks third. (Table-3). The open-access status of the articles is given in Table-4. 5826 articles have been cited 61,529 times (57.605 without self-citations). The citation rate per article is 10.56. The top 10 most cited articles are given in Table-5, and the comparison of cited publications is given in figure-1.

Table-1. Article distribution by country

Countries/Regions	Record Count	Population (million)	PmP
USA	114688	331,9	345
ENGLAND	20855	55,9	373
JAPAN	18687	125,7	148
PEOPLES R CHINA	15527	1412	10
GERMANY	14264	83,2	171
CANADA	12863	38,2	336
AUSTRALIA	8994	25,6	351
SOUTH KOREA	8812	51,7	170
FRANCE	8592	67,7	126
NETHERLANDS	7948	17,5	454
SWITZERLAND	7527	8,7	865
SWEDEN	7368	10,4	708
ITALY	6618	59,1	111
TURKEY	6514	84,7	76
SPAIN	4172	47,4	88
DENMARK	3851	5,8	663
BRAZIL	3778	214,3	17
INDIA	3692	1408	2
BELGIUM	3436	11,5	298
AUSTRIA	3341	8,9	375
WORLD	274.902	7888	34

Table-2. Distribution of articles by institutions

Affiliations	Record Count	% of 5.826
ISTANBUL UNIVERSITY	508	8.720
HACETTEPE UNIVERSITY	474	8.136
DOKUZ EYLUL UNIVERSITY	282	4.840
GAZI UNIVERSITY	250	4.291
ANKARA UNIVERSITY	246	4.222
UNIVERSITY OF HEALTH SCIENCES TURKEY	243	4.171
ANKARA NUMUNE TRAINING RESEARCH HOSPITAL	222	3.811
BASKENT UNIVERSITY	215	3.690
MARMARA UNIVERSITY	205	3.519
BALTALIMANI BONE DISEASES TRAINING RESEARCH HOSPITAL	194	3.330
Showing 10 out of 1.467 entries		
7 record(s) (0.120%) do not contain data in the field being analyzed		

Table-3. Distribution of articles by journals in which they were published

Publication Titles	Record Count	% of 5.826
ACTA ORTHOPAEDICA ET TRAUMATOLOGICA TURCICA	829	14.229
JOURNAL OF BACK AND MUSCULOSKELETAL REHABILITATION	382	6.557
ARCHIVES OF ORTHOPAEDIC AND TRAUMA SURGERY	296	5.081
EKLEM HASTALIKLARI VE CERRAHISI JOINT DISEASES AND RELATED SURGERY	266	4.566
KNEE SURGERY SPORTS TRAUMATOLOGY ARTHROSCOPY	252	4.325
JOINT DISEASES AND RELATED SURGERY	236	4.051
INJURY INTERNATIONAL JOURNAL OF THE CARE OF THE INJURED	172	2.952
ACTA ORTHOPAEDICA BELGICA	169	2.901
SPINE	165	2.832
JOURNAL OF PEDIATRIC ORTHOPAEDICS PART B	159	2.729
Showing 10 out of 93 entries		

Table-4. Distribution of articles by Levels of Open Access

Open Access	Record Count	% of 5.826
All Open Access	1981	34.003
Gold	1445	24.803
Gold-Hybrid	17	0.292
Free to Read	153	2.626
Green Published	1103	18.932
Green Accepted	3	0.051
Green Submitted	353	6.059
3.845 record(s) (65.997%) do not contain data in the field being analyzed		

Table-5.The most cited publications in Turkey

	Before 2020	2020	2021	2022	2023	Average per Year	Total
Article-1 (2)	156	27	34	19	3	11.95	239
Article-2 (3)	150	15	18	23	6	11.16	212
Article-3 (4)	171	12	11	10	4	9.04	208
Article-4 (5)	159	41	43	43	7	29	203
Article-5 (6)	150	13	12	5	0	9	180
Article-6 (7)	109	21	20	14	1	10.31	165
Article-7 (8)	7	26	62	61	6	27	162
Article-8 (9)	101	20	23	10	6	14.55	160
Article-9 (10)	131	5	7	10	1	7.7	154
Article-10 (11)	135	5	11	3	1	7	154

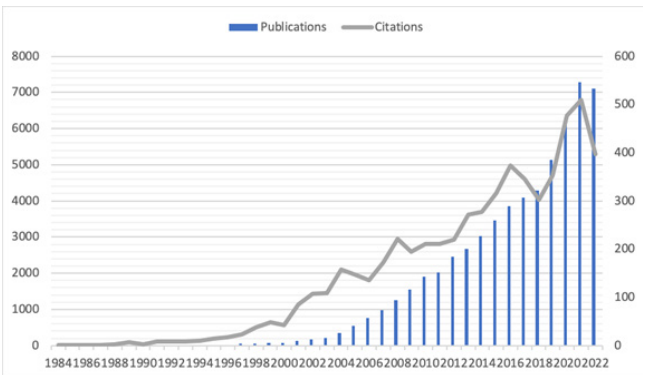

Figure-1. *Distribution of publication and citation by years*

Discussion

Bibliometric studies of the country where the study was conducted; It provides important data in researching its contribution to the world literature in any branch area. When we look at the top 20 countries with the highest number of publications in the world, we see that Turkey ranks 14th in the field of orthopedics. If we make a comparison according to PMP data, we see that Turkey has regressed from 14th to 17th among 20 countries. When we look at the publications made in our country over the years, while 234 publications were made between 1984-2000, 302 publications were made in the first 3 years (2000-2001-2002), which increased gradually. According to the World Bank data, while the population of Turkey was 64 million in 2000, it was recorded as 85 million in 2022. Here, we see a serious increase in publications per capita. We think there are many reasons for the rapid increase in the number of publications in Turkey since 2000. The widespread use of the internet due to the advancement of technology, the increase in the number of educational institutions in Turkey and Turkey's competitive attitude toward contributing to science are some of the biggest reasons for this increase. Switzerland, Sweden and Denmark constitute the first 3 countries in PMP data. Some common features of these 3 countries are their high educational standards, the wealth of research and development program funds, and the high cooperation between scientists and research institutions.

When we look at the subject distribution of the articles written in Turkey, ankle, shooulder and intervertebral disc constitute the first 3 rows. However, in the last 5 years, there has been a significant increase in the number of studies in the field of Total arthroplasty. Due to the prolongation of the average life expectancy in the world, the increase in the elderly population and the increase in socio-cultural activities in these individuals, studies have focused on joint arthrosis, which reduces the activities of daily living. When the articles written during the research period are examined, total arthroplasty is the first in the world, the intervertebral disc is the second, and the Anterior Cruciate Ligament is the third. In parallel with our explanation above, health issues related to total arthroplasty and intervertebral disc are some of the most common medical conditions we encounter worldwide due to prolonging life expectancy.

Let's look at the top 5 institutions that have written the most articles in our country's orthopaedics field. These are Istanbul University, Hacettepe University, 9 Eylül University, Gazi University and Ankara University. These 5 institutions constitute approximately 30% of the publications made by Turkey. Located in Turkey's 3 most crowded cities, these universities are some of the oldest universities in Turkey. We think that the presence of qualified academic staff, research-oriented working principles and the existence of sufficient resources-infrastructure are some of the most important factors in contributing to science. When looking at individual publication production, the first 3 researchers are Murat Bozkurt, İzge Günal and Abdulhamit Bozkurt.

In the academic community, success criteria may differ according to disciplines. There are metrics such as the impact factor of the journal, the h index that measures the impact of a researcher's publications, and the number of citations. The number of citations of the published article by other researchers is an important criterion that shows the impact and importance of the article. Citation count is a measure of how influential an article is in the scientific community. If we look at the citation numbers of the studies in Turkey, an increase has been observed in the number of citations in parallel with the number of publications since the early 2000s. However, there has been a decrease in the total number of citations of publications in our country between 2016 and 2018. Despite the regular increase in the number of publications in our country, there may be some reasons for the decrease in the number of citations in the years we mentioned. There is intense competition and publication pressure in the field of medicine and orthopedics. High publication pressure may encourage researchers to publish their results quickly or to publish frequently. This may sometimes lead to reduced research quality or insufficient evaluation of studies. In addition, the fact that scientific literature is freely accessible to readers also affects the citation rate of a publication.

The publication patterns of the articles are a factor that directly affects the reach of the readers. The term Open Access means that scientific literature is freely available to everyone. Open-access publications refer to journals in which articles are published online for free and that anyone can read. In this model, there is no charge for accessing articles, and they are usually published under Creative Commons licenses. In addition, Green publish refers to uploading an author's sample or pre-publish version (preprint or postprint) of articles published in academic journals to an open-access repository (for example, an institutional repository or interdisciplinary repository). This way, articles are published in the journal and available in open-access archives. In this model, the full text of

the article is generally not freely available in the journal but is available in the open-access archive. Green Publish allows articles to be shared and discussed earlier, but full-text access depends on the journal. On the other hand, open access targets full-text access and ensures that articles are freely available from publication. When we look at the publications published in the field of orthopedics in our country, the rate of all open Access is 34%. In the same time period, the world average is 25%, and the USA average is 19%.

There are some limitations of our study. There are some common points of bibliometric studies using web of science database. It is not possible to evaluate the publications before 1980. In addition, cross-examination with support from Pubmed, Scopus and other search engines will increase the reliability of the data. It is not appropriate to evaluate a country's contribution to science only through studies published in a single index. If you give an example for Turkey, articles published in TRdizin-indexed journals are not included in our study. The reason for this is that we think that making comparisons with the world literature will not give accurate results. The impact factor of journals is a separate study. There is no direct relationship between the impact factor and the journal's quality (12).

Conclusion

As a result, this analysis mentioned how the studies in the field of orthopedics in Turkey took place in the world literature. The increase in the number of publications and total citations started in the early 2000s; The improvement of health policies will be accelerated with the addition of additional institutions that will provide financial support to institutions such as TOTBID and Tübitak. Thus, our country's contribution to world science will increase.

Declarations

Funding
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Conflicts of Interest/Competing Interests
The authors declare that they have no competing interests.

Ethics Approval
Ethics committee approval is not required for this study.

Availability of Data and Materials
The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Authors' Contributions
All authors contributed to this work in accordance with the ICMJE authorship criteria. Conceptualization: AK. Data collection: İU. Data analysis: İU. Draft: AK. Review and editing: İU. All authors read and approved the final manuscript.

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Do K-wire Configurations and Numbers Have Effects on Gartland Type 3 Pediatric Supracondylar Humeral Fractures?

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ABSTRACT

Aim: The purpose of this study was to compare pin configuration effects on early secondary displacement in the surgical treatment of pediatric supracondylar humeral fractures (SCHF).

Methods: The study consisted of 100 (68M, 32F) children who underwent surgery between 2010 and 2013 for Gartland Type 3 (SCHF). The patients were divided into five groups according to the top configurations. The average age at the time of injury was 7.34 (between 2 and 14 years). Bauman angle (BA), Humerocapital angle (HCA), Anterior humeral line (AHL), flexion range, extension range, and Carrying angle (CA) were compared at preoperative, postoperative 1st-day, postoperative last control, and non-operated side.

Results: There was no statistical difference between all five subgroups in terms of BA, AHL, HCA, and CA were the same on postoperative 1st-day and postoperative last control. Also, there was no statistically significant difference was observed between age, sex, and type of fracture. Five of the cases have pin site infection and in three patients occurred ulnar nerve injury due to initial trauma.

Conclusion: After a good and gentle reduction and early treatment of pediatric SCHF, all pin configurations maintain alignment. All pin configurations can be used for stabilization.

Keywords: Pediatric, Supracondylar Humerus Facture, Closed Fracture Reduction, Kirschner Wire

Malik ÇELİK

Alkan BAYRAK

K-teli Konfigürasyonları ve Sayılarının Gartland Tip 3 Pediatrik Suprakondiler Humerus Kırıkları Üzerinde Etkisi Var Mı?

ÖZET

Amaç: Bu çalışmanın amacı, pediatrik suprakondiler humerus kırıklarının (SKHK) cerrahi tedavisinde, K-teli konfigürasyonunun redüksiyon kaybı üzerindeki etkilerini değerlendirmekti.

Yöntem: Çalışma, 2010-2013 yılları arasında Gartland Tip 3 (SCHF) için ameliyat edilen 100 (68/E, 32/K) çocuktan oluşturuldu. Hastalar K-teli konfigürasyonuna göre beş gruba ayrıldı (1 lateral-1 medial; 2 lateral- 1 medial; 2 medial- 1 lateral; 2 lateral; 3 lateral K teli). Yaralanma anındaki ortalama yaş 7.34 yıldır (2-14 yıl). Bauman açısı (BA), Humerokapital açı (HCA), Anterior humerus hattı (AHL), fleksiyon aralığı, ekstansiyon aralığı ve Taşıma açısı (CA) preoperatif, postoperatif 1.gün, postoperatif son kontrol ve opere olmayan taraf ölçülerek karşılaştırıldı. Ortalama takip süresi 24,96 ± 11,06 aydır (12-54 ay).

Bulgular: Postoperatif 1. gün ve postoperatif son kontrolde BA, AHL, HCA ve CA açısından beş alt grup arasında istatistiksel olarak fark yoktu. Ayrıca yaş, cinsiyet ve kırık tipi arasında istatistiksel olarak anlamlı bir fark gözlenmedi. Olguların beşinde pin dibi enfeksiyonu ve üç hastada ilk travmaya bağlı ulnar sinir yaralanması meydana geldi. İyatrojenik sinir yaralanması gözlenmedi.

Sonuç: Pediatrik SKHK' nın iyi ve nazik bir şekilde redüksüyonu sonrasında farklı pin konfigürasyonları arasında fark saptanmamıştır. Tespit için tüm pin konfigürasyonları kullanılabilir.

Anahtar Kelimeler: Pediatrik, Suprakondiler Humerus Kırığı, Kapalı Kırık Redüksiyonu, Kirschner Teli

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Pediatric supracondylar humerus fractures (SCHF), one of the most common fracture types in children, are mainly associated with extension type 2 and generally require surgical stabilization (1,2). Due to limited remodeling, anatomic reduction and alignment reconstruction are essential to restore normal elbow function and prevent future complications (3,4). Plaster immobilization, axial traction using tape or trans olecranon pin, external fixation, percutaneous pinning, and open reduction and pinning are the usual techniques applied for SCHF treatment (5,6). Closed reduction with pin stabilization which was first introduced by Swenson in 1948, is the most popular technique for displaced Garthland Type 2 and 3 SCHF (3,4,7). Displaced fractures can occur in early complications such as nerve (6-12%), vessel injury (3.7-7%), and compartment syndrome (8,9). Acceptable criteria of closed reduction are defined as restoration of the humeral capitellar angle greater than 90 on the AP view, intact medial and lateral columns on oblique views, and bisection of the anterior humeral line through the middle third of the capitellum on the lateral view. If close reduction can't acceptable open reduction with medial, lateral, posterior, anterior, posteromedial, and both medial and lateral approaches can be preferred (4,10).

Configurations of the K-Wires (KW) in the fixation of SCHF remain controversial. A medial KW is commonly preferred in the literature for strong stability, but unfortunately, it may increase the risk of iatrogenic nerve injury which was reported to be seen up to 15% (1,11,12). Lee et al. found that the crossed configuration provided better stability (13). Zionts et al. showed that optimal stability was provided by the crossed KW configuration in their experiments on adult human cadavers (14). Sankar et al. showed that there was no reduction loss in the cross KW configuration compared to the two lateral KW configurations, which is more commonly associated with the reduction loss (15). Also, one needs to keep in mind the other parameters that may affect the reduction loss in the short or long term such as a KW diameter, and multiple drilling which may result in osteonecrosis, instability, and pin loosening (11,16,17).

Pediatric SCHF preferred to be treated as soon as possible. This retrospective study aimed to evaluate KW number and configuration (crossed 1 lateral 1 medial, crossed 2 lateral 1 medial, crossed 1 lateral 2 medial, 2 lateral divergent, and 3 lateral divergent) effects on early stability. We hypothesize that more pins will provide more stability for pediatric SCHF.

Materials and Methods

After the approval of the local ethics committee (Approval ID: 2014/18/05), medical records of patients who underwent surgery between 2010 and 2013 for Gartland type 3 fractures were retrospectively screened. Informed consent was obtained by all patients.

Patients with pathological fractures, conservative follow-up, less than the 1-year follow-up, and patients with incomplete postoperative follow-up were excluded from this study. The current study consisted of, one hundred patients (68 males and 32 females) who underwent surgery for Gartland type 3 supracondylar humerus fracture. 98% of the fractures are extension and 2% are flexion-type fractures. Of 73% of the patients' left humerus and 27% of the patient's right humerus were affected. While 53% of the fractures occurred with a simple fall at home, 47% were outside. The distribution of demographic features and injury characteristics of the patients were presented in Table 1. In the present study, the patients were divided into 5 groups according to their configurations of the K-wires in fixation; Group 1 (crossed 1 lateral 1 medial), Group 2 (crossed 2 lateral 1 medial), Group 3 (crossed 1 lateral 2 medial), Group 4 (2 lateral divergent), and Group 5 (3 lateral divergent). Closed reduction and percutaneous pinning were initially preferred in all patients.

All patients were initially evaluated at the emergency room and peripheral neurovascular examination was reported. The SCHF was classified according to Gartland classification (3). A long arm plaster was used to immobilize the elbow in 1100-1200 of elbow flexion in a comfortable position. No closed reduction was attempted in the emergency department. The decision of the timing for the surgery was based on the patient's condition and operating room availability. Open fractures with associated vascular injury were immediately accepted to the operating room. In all the follow-up controls, the range of motion on the operated and non-operated sides was evaluated respectively and only the final control measurements were statistically analyzed and presented in this manuscript.

Table 1. The distribution of demographic characteristics, clinical and radiological outcomes of the patients

		n	%
Gender	Male	68	68
	Female	32	32
Group	2L+1M	51	51
	1M+1L	29	29
	2L	7	7
	3L	7	7
	2M+1L	6	6
Injured Side	Right	27	27
	Left	73	73
Trauma mechanism	Fall at home	53	53
	Fall at outdoor	47	47
Fracture type	Flexion	2	2
	Extansion	98	98
		Min / Max (Median)	Mean±SD
Age (years)		2-14 (7)	7,34±3,11
Time to operation (hours)		2-228 (16)	24,29±41,92
Hospitalization (days)		1-13 (2)	2,39±1,73
Operation time (minutes)		25-165 (50)	57,01±25,51
KW extraction time (days)		7-57 (30)	30,63±7,46
Follow-up duration (months)		12-54 (17,5)	24,96±11,06
		Min / Max (Median)	Mean±SD
Carrying angle (º)	Uninjured side	3,0 / 18,0 (10,0)	8,89±2,91
	Operated side*	3,0 / 20,0 (8,5)	9,06±3,45
Flexion angle (º)	Uninjured side	130,0 / 155,0 (140,0)	140,59±5,65
	Operated side*	110,0 / 150,0 (137,0)	136,34±7,88
Extension angle (º)	Uninjured side	170,0 / 195,0 (185,0)	183,75±4,64
	Operated side*	150,0 / 195,0 (180,5)	181,35±6,73

*M: medial entry, L: lateral entry, KW: K-wire * postop last control*

Surgical Technique

Under general anesthesia, a non-inflated high-arm tourniquet was placed on the arm in case when an open reduction and fixation was necessary. Intravenous cefazolin was administered to the patients based on their weight. The upper limb was prepared and dressed. Closed reduction was applied via manual traction. Then varus-valgus position checked by the surgeon by palpating the epicondyles and discussed with the preoperative images. While gradually flexing the elbow in extension-type fractures (hyperextension can be used in some flexion-type fractures), the surgeon pressed the olecranon to push the distal fragment in the sagittal plane to anteriorly for reduction. In the pronation process, we check fluoroscopy images on the coronal and sagittal planes. The reduction was considered acceptable when the anterior humeral line (AHL) bisected the middle third of the capitellum as observed on the lateral view and the humeral capitellar angle (HCA) was normal (range, 90–260) on the AP fluoroscopy view (Figure 3).

Under fluoroscopy guidance, the first KW was applied on the lateral epicondyle to the medially. For cross-wiring medial epicondyle was centered and KW applied medial to lateral. KWs were used for the fixation in different configurations such as 2 medial+1 lateral, 2 lateral+1 medial, 2 lateral, 3 lateral, or 1 medial+1 lateral. To prevent iatrogenic ulnar nerve injury, medial mini-incision was used for the application of medial KW. Lateral KWs were preferred at divergent orientations. The surgeons who managed the operation used an adequate number of pins to fix the fracture with sufficient stability for all patients. After the reduction, the first KW was applied lateral side, the surgeons decided on the other KWs in the intraoperative period according to the flexion-extension fluoroscopy images. As indicated in figures 1-2 below, crossed 1L-1M KW and crossed 2L-1M KW were used in most of the patients. The pin number and orientation were entirely determined during surgery according to the configuration to achieve fixation stability. In the fractures where the arm is edematous and the medial epicondyle cannot be palpated, the use of a lateral pin is preferred to avoid the risk of ulnar nerve injury. The pin diameter was determined according to the age of the patient and the cortical thickness of the humerus seen on the lateral radiograph. All patients were evaluated clinically and radiologically at 2nd-, 4th- and 6th weeks, 3rd- and 6th months, and annually in the postoperative period (Figure 1 and Figure 2). The elbow was immobilized with a long arm plaster for 4 to 6 weeks. Plaster and pins were removed in the outpatient clinic after callus formation seemed (between the 4th and 6th week). The patients were asked to start passive range of motion exercises after the pin and plaster were removed.

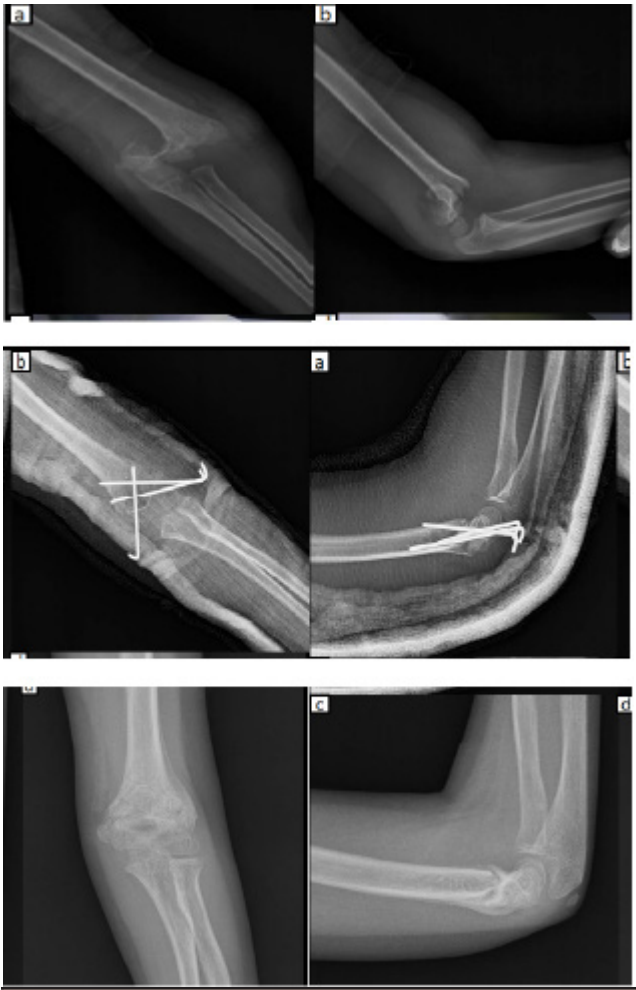

Fig. 1 *6-year-old female patient diagnosed with Gartland Type 3 supracondylar humerus fracture (SCHF). A : Pre-operative anteroposterior (AP) and lateral (L) view. B: Early postoperative control X-rays AP and L view. C: Postoperative last control (13th month) X-rays AP view and L view.*

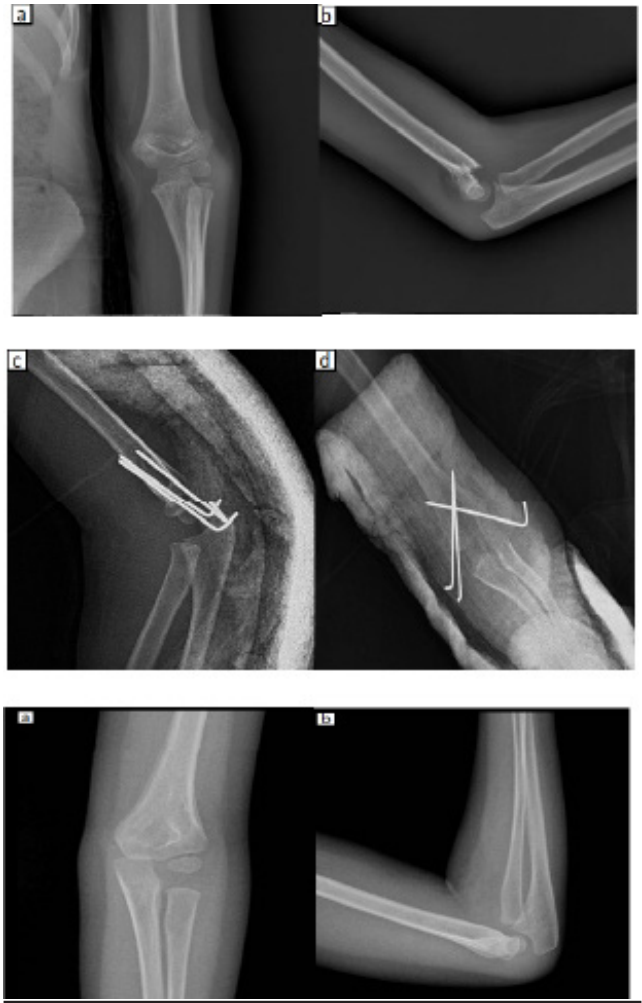

Fig. 2 *5-year-old female patient diagnosed with Gartland Type 3 SCHF. A: Pre-operative AP view and L view. B: After closed reduction SCHF fixated by 2 Medial and 1 Lateral crossed KW, early postoperative control X-rays AP view and L view. C: Postoperative last control (15 months) X-rays AP view L view. The valgus deformity was observed during the follow-up period.*

Statistical Results

Statistical analysis was performed with NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA). Many Whitney U test was used for descriptive statistical methods evaluation (average, standard deviation, median, frequency, ratio, minimum, maximum) and not normally distributed data comparison. Kruskal Wallis test was used for not normally distributed three and upper groups quantitative data comparison. Mann-Whitney U test was used for the definition of the different groups. Friedman test was used for the comparison of intragroup not normally distributed parameters and the Wilcoxon Signed Ranks test and Marginal Homogeneity test were used for the evaluation of binary comparison. The Fisher-Freeman-Halton test was used for qualitative data comparison. P values were considered statistically significant when $p<0.01$ and $p<0.05$.

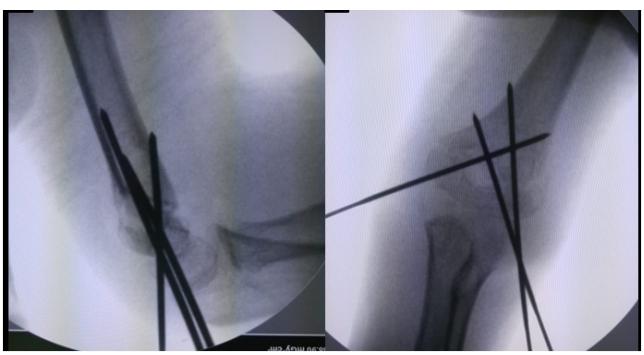

Fig. 3 *6-year-old female patient diagnosed with Gartland Type 3 supracondylar humerus fracture (SCHF). After closed reduction, SCHF was fixated by 2 Lateral and 1 Medial crossed K-wire(KW) intraoperative fluoroscopy images AP and Lateral view.*

Results

The mean values for carrying angle (CA), mean flexion, and extension range on the operated side were; $9,06^0 \pm 3,45^0$, $136,34^0 \pm 7,88^0$, $181,35^0 \pm 6,73^0$, on the uninjured side were; $8,89^0 \pm 2,91^0$ $140,59^0 \pm 5,65^0$, $183,75^0 \pm 4,64^0$ respectively. No statistically significant difference was observed between subgroups in terms of age, sex, CA, and flexion-extension range in the comparison with the uninjured side ($p<0.05$. Baumann angle (BA) showed a statistical difference inside each group only on the first postoperative day ($p=0.015$). However, BA did not noticeably differ between different groups on the preoperative, postoperative final control, and uninjured side ($p<0.05$). Also, HCA and AHL did not differ significantly between the groups on the preoperative, the first postoperative day, postoperative final control, and uninjured side ($p<0.05$). Significant differences were observed between preoperative measurements and postoperative first day, postoperative final control, and uninjured side measurements in the 2L + 1M group for BA ($p=0.004$), and in the 2L, 1L+1M, and 2L + 1M groups for HCA ($p=0.001$, $p=0.001$, and $p=0.034$; respectively) (Table 2). Also, in posthoc binary analyses of BA, HCA, and AHL, statistical variations were found between preoperative values, postoperative values, and uninjured side ($p<0.05$ and $p=0.001$) (Table 3). Since, after reduction, the angular measurements changed, preoperative and postoperative measurements showed crucial differences. Within all groups, postoperative BA values show no statistical difference in postoperative 1st-day and last control. In addition, the mean HCA averaged 8,9±2,9 (range 3 to 18) on the uninjured side and 9,06±3,45 (range 3 to 20) on the injured side ($p<0.05$). Injury-related complications were seen in three patients, including ulnar nerve damage. Pin tract infection occurred in five patients. In one case within the 2M+1L group, one pin had to be removed on the medial side on the 7th day due to a pin tract infection. All complications were resolved in the postoperative 8th weeks. Overall after the treatment process, all of the patients had successful healing, secondary displacement, and non-union were not reported.

Discussion

One of the most important findings of this study is that different KW configurations do not affect secondary displacement in the early postoperative period. Pediatric SCHF is the most common fracture that requires surgery in childhood. Although closed reduction and pin fixation are generally accepted techniques in the field, in some cases closed reduction may not be applied to some fracture types. In such cases, an attempt to manipulate the fracture makes the close reduction even more difficult. Consequently, when the manipulation fails, an open reduction must be used. However, this results in a trade-off between easy reduction, the direct appearance of the fracture site, early rehabilitation, and cosmetic dissatisfaction. Naturally, closed reduction and percutaneous pinning methods are generally desired treatment models for displaced SCHF (18,19). But it is controversial, how many K-wires are needed for stable fixation. The most common type is the percutaneous cross KW fixation (20). The goal of the present study was to evaluate the effect of KW number and configuration on early reduction loss. The number of KW and configurations were discussed in the literature (21,22). Especially lateral entered KW and cross-entered KW are compared. In the present study, 5 different pin configurations were compared. We would like to emphasize that this is the first study in the literature that compares 5 different ways.

Although previous studies agreed that crossed KW is the most stable pin configuration, iatrogenic ulnar nerve injury incidence is still highly observed in these groups (23,24). In some cases, medial mini-incision is used to prevent iatrogenic ulnar nerve injury (25). Inspired by the outcome of these studies, in this work, we used medial mini-incision with crossed KW for preventing iatrogenic ulnar nerve palsy. Since the medial KW entry may cause iatrogenic ulnar nerve palsy, lateral entry is accepted by many surgeons (19). However, even though laterally entered two pins showed statistically good results for preventing iatrogenic ulnar nerve injury, they caused a higher secondary loss of reduction. It is reported in the previous studies that laterally entered KW is less stable for rotational forces compared to crossed KW configuration and also causes early reduction loss (16,26,27). As commonly known, cast immobilization provides more stability, but it does not protect patients from rotational forces (28). Naturally, the dilemma between stability and iatrogenic nerve palsy requires new KW configurations. Therefore, some surgeons performed three lateral entered pins to prevent secondary reduction loss (24,29). Here, 5 different pin configuration subgroups were evaluated: 2L+1M, 1M+1L, 2L, 3L, and 2M+1L subgroups were compared for early reduction loss. All subgroups were equal, and there was no reduction loss between groups. Also, no statistical difference was found between all subgroups in terms of complications and secondary reduction loss in the present study. AHL, CA, flexion, and extension range were also compared in the current study. Many studies usually compare BA for remodeling which in some studies has variations (22,30). For early results, all radiological parameters were evaluated in the postoperative first day, postoperative last control, and non-operated side for reduction loss for limiting the variations. Although the number of patients in some subgroups is very low, all KW configurations provide enough stability and there was no statistical difference according to our findings.

Table 2. Comparison of Bauman's angle, humerocapital angle and anterior humeral line between groups

		Groups					
		2L+1M (n=51)	1M+1L (n=29)	2L (n=7)	3L (n=7)	2M+1L (n=6)	
Bauman angle		**Mean±SD**	**Mean±SD**	**Mean±SD**	**Mean±SD**	**Mean±SD**	**[a]p**
		Min-Max (Median)	**Min-Max (Median)**	**Min-Max (Median)**	**Min-Max (Median)**	**Min-Max (Median)**	
Preoperative		11,68±14,86	17,18±17,11	11,02±10,95	13,91±23,40	9,34±23,75	0.608
		-10/41,59 (14)	-12,3/ 54 (17,1)	-10/21,76 (11)	-10/46 (24)	-10/52 (4,1)	
Postoperative 1st day		20,81±7,24	19,82±5,19	18,06±4,79	10,33±12,76	7,81±14,71	0.055
		9,5/38 (20)	10/30,9 (19,7)	11,5/27,3 (17)	-18,2/18 (13,7)	-12/21,3 (14,8)	
Postoperative last control		20,17±6,59	19,76±4,85	16,70±5,05	19,34±5,89	20,35±5,55	0.534
		8/37 (19)	11,6/29,2 (19)	11/27 (16)	11,7/ 30,5 (19)	12,2/ 27 (21,6)	
Uninjured side		21,21±10,75	19,40±8,49	16,71±6,05	23,75±5,99	19,72±2,36	0.286
		-10/43 (18,2)	-10/39 (18,2)	10,7/28 (14,1)	16 / 31,70 (22)	16,3/ 22,2 (20)	
Alteration (postop 1st day – postop last control)		-0,16±4,78	0,05±3,81	1,35±2,37	-9,0±17,83	-12,53±18,42	0.074
		-12,45/20 (0,5)	-8,16/9,7 (-0,3)	-2/5,21 (0,5)	-11,45 (-3,3)	-19,10 (-3,3)	
[c]p		**0,004****	**0,001****	**0,016***	**0,019***	**0,012***	
Humerocapital angle		**Ort±SD**	**Ort±SD**	**Ort±SD**	**Ort±SD**	**Ort±SD**	**[a]p**
		Min-Max (Median)	**Min-Max (Median)**	**Min-Max (Median)**	**Min-Max (Median)**	**Min-Max (Median)**	
Preoperative		-4,79±28,23	0,77±30,29	0,38±38,38	5,71±29,54	7,84±24,15	0715
		-50 / 56 (-10)	-47,4/85 (-10)	-50/51,6 (-10)	-28/48 (-10)	-12,7/54 (3,3)	
Postoperative 1st day		40,35±8,44	41,02±5,71	44,89±3,60	45,51±7,90	41,08±5,54	0.188
		23,75/58 (40)	33/54,2 (40,8)	39,76/49 (45)	34/55 (47)	34/50,4 (39,6)	
Postoperative last control		42,40±7,62	43,02±4,74	44,78±6,13	48,86±7,70	41,62±6,21	0.160
		26,2/60 (40,8)	35/56 (42,6)	34,6/52 (45,4)	36,4/ 57,2 (53)	35,3/51,4 (40)	
Uninjured side		44,65±7,70	43,78±6,62	47,68±6,63	49,34±8,05	40,83±5,24	0.144
		29,8/60 (42,6)	33/59,3 (42,9)	35,40/56 (49)	34,9/59 (48,5)	37,3/ 51 (39,3)	
[c]p		**0,001****	**0,001****	**0,034***	**0,016 ***	**0,012 ***	
Anterior humeral line		**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**[b]p**
Preop	1/3 Anterior	10 (19,6)	5 (17,2)	2 (28,6)	1 (14,3)	0 (0)	0.179
	1/3 Medial	3 (5,9)	0 (0)	1 (14,3)	2 (28,6)	0 (0)	
	1/3 Posterior	38 (74,5)	24 (82,8)	4 (57,1)	4 (57,1)	6 (100)	
Postop 1st day	1/3 Anterior	11 (21,6)	4 (13,8)	2 (28,6)	2 (28,6)	0 (0)	0.633
	1/3 Medial	29 (56,9)	14 (48,3)	3 (42,9)	4 (57,1)	3 (50,0)	
	1/3 Posterior	11 (21,6)	11 (37,9)	2 (28,6)	1 (14,3)	3 (50,0)	
Postop last control	1/3 Anterior	3 (5,9)	0 (0)	0 (0)	1 (14,3)	0 (0)	0.505
	1/3 Medial	39 (76,5)	22 (75,9)	5 (71,4)	6 (85,7)	4 (66,7)	
	1/3 Posterior	9 (17,6)	7 (24,1)	2 (28,6)	0 (0)	2 (33,3)	
Uninjured side	1/3 Anterior	0 (0)	1 (3,4)	0 (0)	0 (0)	0 (0)	0.823
	1/3 Medial	33 (64,7)	19 (65,5)	5 (71,4)	4 (57,1)	5 (83,3)	
	1/3 Posterior	18 (35,3)	9 (31,0)	2 (28,6)	3 (42,9)	1 (16,7)	

*[a]Kruskal Wallis Test, [b]Fisher Freeman Halton Test, [c]Friedman Test, *p<0,05*

Table 3. Post-hoc analysis and comparison of Bauman's angle, humerocapital angle and anterior humeral line between preop, postop 1st day, postop last control and uninjured side

	Groups				
	2L+1M (n=51)	1M+1L (n=29)	2L (n=7)	3L (n=7)	2M+1L (n=6)
Bauman angle	[d]p	[d]p	[d]p	[d]p	[d]p
Preop – postop 1st day	0.001**	0.011*	0.023*	0.028*	0.001**
Preop - postop last control	0.001**	0.011*	0.026*	0.018*	0.001**
Preop – uninjured side	0.001**	0.011*	0.026*	0.021*	0.001**
Postop 1st day - postop last control	0.827	0.955	0.116	0.091	0.116
Postop1st day - uninjured side	0.337	0.936	0.612	0.735	0.075
Postop last conrol - uninjured side	0.198	0.882	0.735	0.612	0.463
Humerocapital angle	[d]p	[d]p	[d]p	[d]p	[d]p
Preop – postop 1st day	0.001**	0.001**	0.028*	0.028*	0.026*
Preop - postop last control	0.001**	0.001**	0.018*	0.028*	0.016*
Preop – uninjured side	0.001**	0.001**	0.028*	0.028*	0.026*
Postop 1st day - postop last control	0.213	0.234	1.000	0.398	0.458
Postop1st day - uninjured side	0.251	0.086	0.553	0.310	0.753
Postop last conrol - uninjured side	0.178	0.210	0.398	0.612	0.753
Anterior humeral line	[e]p	[e]p	[e]p	[e]p	[e]p
Preop – postop 1st day	0.001**	0.019*	0.023*	0.016*	0.013*
Preop - postop last control	0.001**	0.019*	0.031*	0.018*	0.015*
Preop – uninjured side	0.001**	0.019*	0.023*	0.016*	0.013*
Postop 1st day - postop last control	0.083	1.000	0.157	1.000	0.317
Postop1st day - uninjured side	0.110	0.525	0.664	1.000	0.317
Postop last conrol - uninjured side	0.089	0.763	1.000	1.000	0.317

*[d]Wilcoxon Signed Ranks Test, [e]Marginal Homogeneity Test, **p<0.01, *p<0.05*

As recommended acute treatment of SCHF prevents complications such as compartment syndrome, infection, nerve injuries, etc. In the current study, all patients without any comorbidities were treated in 6-8 hours. In some patients with acute upper respiratory tract infection or brain injury, surgery could be performed when anesthesia was available.

Common nerve injury in postoperative period rates have been reported as 2%-5% in closed reduction and 3%-13% in open reduction (29). Ulnar nerve injury was seen in three patients due to primary injury. Whereas pin site infection occurs in rates of 2.4-6.4%, deep infection and osteomyelitis are rarely observed (29). Pin site infection occurred in five patients. In one case we removed one medial KW on the first week in the 2M+1L group. The other KWs maintained the alignment. Other complications such as compartment syndrome, deep infection, and secondary displacement were not observed in our study. We found that all five subgroups have enough stability and avoid reduction losses, one should note that there were small populations in subgroups, no randomization, and the follow-up periods were relatively short which all might be argued as the weakness of this study.

Our study has several limitations that need to be underlined. A small number of patients, the single-center design, and the retrospective nature of this study should be acknowledged.

Conclusion

Different KW configurations do not affect on secondary displacement in the early postoperative period. Surgeons could prefer fewer K-wires such as 2 cross KW or 2 lateral KW for SCHF fixation. Also, all KW configurations maintained the correct alignment after an anatomic reduction in both open and closed reduction. Early treatment, slight traction, and adequate operation technique provide good functional and radiological outcomes independent from the KW configuration.

Ethical Consideration

The study was approved by Bakirkoy Dr.Sadi Konuk Research and Training Hospital, Clinical Research Ethics Committee, Approval ID: 2014/268 (29.12.2014).

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Psychiatry / Psikiyatri

Covid-19 Phobia Among Pandemic Hospital Staff: A Cross-Sectional Design

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ABSTRACT

Purpose: To determine factors related to Covid-19 phobia in pandemic hospital staff during the pandemic.

Methods: 361 staff were assessed between 2020-07-14 and 2020-10-15. A form consisting of 28 queries and the Covid-19 Phobia-Scale (C19P-S) were administered to determine sociodemographic; working and living conditions.

Results: Participants' mean age was 39.82±7.37, 69.8% were female, 14.4% were physicians, 41.6% were nurses, 8% were other health care staff, and 36% were other personnel. The C19P-S scores were higher among women, those whose monthly income is lower than their expense, those who live ≥4 people in household, those who have a chronic illness, those on whose working conditions pandemic has a large and extreme impact, the Y State Hospital staff, those who house in another place other than their home for quarantine, and in those who have patients with Covid-19 among family, relatives or neighbours.

Conclusion: Re-planning the intense and high-risk working order, providing suitable conditions, and making plans for employees with limited work experience in outbreaks, and addressing the impact of the pandemic on the family and social lives of PH staff can reduce the negative psychological effects of the pandemic.

Keywords: Pandemics, medical staff, Covid-19, phobia

Pandemi Hastanesinde Çalışanlarda Covid-19 Fobisi: Kesitsel Çalışma

ÖZET

Amaç: Bu araştırmanın amacı pandemi hastanesinde çalışanlarda pandemi sürecinde Covid-19 fobisine ilişkin faktörleri belirlemektir.

Yöntem: Araştırma, 14.07.2020 ile 15.10.2020 tarihleri arasında 361 sağlık çalışanı ile gerçekleştirildi. Veriler, sosyodemografik özellikleri, çalışma ve yaşam koşullarını belirlemek için 28 soruluk bir form ve Covid-19 Fobi Ölçeği (C19P-S) ile toplandı.

Bulgular: Katılımcıların yaş ortalaması 39.82±7.37 olup, %69.8'i kadın, %14.4'ü doktor, %41.6'sı hemşire, %8'i diğer sağlık personeli ve %36'sı diğer personeldir. C19P-S puanları kadınlarda, aylık geliri giderinden düşük olanlarda, hanede ≥4 kişiden fazla yaşayanlarda, kronik hastalığı olanlarda, pandeminin çalışma koşulları üzerinde büyük ve aşırı etkisi olanlarda, Y Devlet Hastanesi personelinde, karantina için evi dışında başka bir yerde ikamet edenler ile aile, akraba veya komşuları arasında Covid-19 hastası bulunanlarda daha yüksek bulunmuştur.

Sonuç: Yoğun ve yüksek riskli çalışma düzeninin yeniden planlanması, uygun koşulların sağlanması, salgınlarda iş deneyimi az olan çalışanlar için planlama yapılması ve salgının pandemi hastanesi personelinin aile ve sosyal yaşamları üzerindeki etkisinin ele alınması olumsuz psikolojik etkileri azaltabilir.

Anahtar kelimeler: Pandemik, sağlık çalışanları, Covid-19, fobi

Coronavirus Disease (Covid-19) is a virus infection identified for the first time on 2020-01-13 because of research on a group of patients who developed respiratory symptoms such as fever, cough, and shortness of breath in Wuhan Province in December 2019 (1,2). People aged≥60, those with chronic illness, and healthcare workers are the individuals most affected by the disease (3,4).

Epidemic diseases, which are among the crises impacting health institutions and employees, create the risk and fear of contamination that may impair the physical and mental well-being of staff. One of six healthcare professionals serving patients during epidemics manifests signs of severe stress during or after the epidemic (5,6). Besides burnout syndrome, adjustment disorder, trauma-related stress disorder (7,8,9), it's necessary to determine the fear of Covid-19 transmission and related risk factors, which can reach the level of coronaphobia (C19P) (10). Likewise, it was challenging for hospital staff to cope with C19P as they cannot avoid the coronavirus, which is common in society and work environments.

The studies investigated C19P among healthcare professionals. First, Coronavirus Anxiety Scale-Healthcare version (CAS-HC) was administered to 231 healthcare professionals in Mexico (11). Those working in emergency rooms, triage, and ICUs exhibited high CAS-HC scores. Over 1/3 of the participants scored in the clinical range on this measure. Second, 736 nurses working in Covid-19 designated hospitals and public health units were investigated in Philippines (12). C19P is found to be prevalent among frontline Filipino nurses (54.76%); 37.04% in hospital nurses and 70.91% in public health nurses. Additionally, nurses' gender, marital status, job status and personal resilience were identified as predictors of Covid-19 anxiety. Third, Enea et al. (2021) reported that, obsession with Covid-19 and C19P mediated the relationship of death anxiety with burnout in ICU specialists facing the Covid-19 outbreak. Most of their participants reported higher levels of death anxiety compared with the general population and nurses reported higher levels of death anxiety than physicians (13). Asghar et al. (2021) reported that, depersonalization, emotional exhaustion, and low personal accomplishment were associated significantly with a history of Covid-19 infection and Covid-19 postings (14).

On this basis, we investigated the relationship between C19P and the living and working conditions of PH staff during the epidemic. We hypothesized that H1: There is a significant correlation between C19P and age; H2: Females show higher C19P-scores compared to males; H3: C19P-scoresare higher in participants living in crowded house, compared to others; H4: C19P-scores are higher in participants having children with whom they live in the same house compared to others; H5: Participants having chronic illness show higher C19P-scores; H6: C19P-scores are higher in participants behaving sensitively for not to infect people, especially the household.

Material and Methods

Participants and Procedure

A total of 361-volunteers working in University of Health Science (UHS) X Training and Research Hospital (TRH), Y-State Hospital (SH), and Y1, Y2, Y3 and Y4-SH were included in the study (Table-1). First, the online questionnaire link was sent to the hospital administrators. Then, the link was shared within hospital staff via mobile phone communication application. The data were collected between 2020-06-14 and 2020-10-15. Inclusion criteria were working in any department of the PH and volunteering to participate in research. To reach the whole population, two reminders were made, and the participation was tried to be increased. Written informed consent was obtained.

Measures

We developed *The Information Form*, consisting of 28 questions to determine the sociodemographic characteristics, working conditions, some issues related to Covid-19.

Covid-19 Phobia Scale (C19P-S) is a 20-item, 5-likert-type, developed to measure the phobia that can occur because of coronavirus. Items are rated as "1-Strongly disagree; 5-Strongly agree". Items 1,5,9,13,17,20 measure Psychological Sub-Scale; 2,6,10,14,18 measure Somatic Sub-Scale; 3,7,11,15,19 measure Social Sub-Scale; 4,8,12,16 measure Economic Sub-Scale. The total score ranges from 20 to 100. Higher scores indicate a higher C19P in the sub-scales and a higher level of general C19P. Cronbach-alpha coefficient of the C19P-S was 0.925 and subscale reliabilities ranged 0.851-0.903 (15). Cronbach-alpha coefficient our study was 0.941 and subscale reliabilities ranged 0.763-0.858.

Data Analysis

The data were analysed with the SPSS 15.0. Descriptive data was expressed as frequency, percentage, and as mean, median. Data were analysed using t-test and one-way ANOVA (Kruskal-Wallis and Mann-Whitney U test when the variables were not normally distributed),

post hoc Tukey HSD test and logistic regression analyses (Backward Wald model, each subscale score was dichotomized from the median and taken into the model). p values of <0.05 were significant.

Results

The age, gender, marital status, and occupation data are in Table 1. The significant correlations between the C19P sub-scale and total scores and the working and living conditions are in Table 2.

Table 1. Socio-demographics

Characteristic		n (%)
Age (Mean±SD)	39.82±7.37	361 (100)
Gender	Female	252 (69.8)
	Male	109 (30.2)
Marriage	Married	268 (74.2)
	Single	60 (16.6)
	Separated+Widow	33 (9.1)
Profession	Physician	52 (14.4)
	Nurse	150 (41.6)
	Other medical staff: Health officer (n=3) + Midwife (3) + Health technician (14) + Laboratory technician (6) + Paramedic/EMT (2) + Biologist (1)	29 (8.0)
	Other staff: Secretary (58) + Caregiver (5) + Security guard (27) + Cleaning staff (40)	130 (36.0)

The following variables had no effect on the C19P-S scores: Age (H1 is not confirmed), marital status, profession, whether or not there are any children with whom they live in the same house (H4 is not confirmed), using or not using the administrative leave in the pandemic; working/not working in the emergency room, triage/outpatient clinic; working/not working in a radiology unit reserved for patients with suspected Covid-19 or definite diagnosis; attending/not attending in a public; compliance/non-compliance with national restrictions on days off duty; having necessary Personal Protective Equipment (PPE) in risky situations in terms of Covid-19, had no impact on C19P-S scores.

Gender, income, number of households, having chronic illness, diagnosed with Covid-19, and having patients with Covid-19 among family, relatives or neighbours predicted the coronaphobia among the pandemic hospital staff (Table 3).

Discussion

In this study, the correlation between C19P in PH staff and the socio-demographic characteristics, working and living conditions were investigated. The discussion will be carried out in variables that have a significant impact on the C19P-S scores and a few exceptional issues will be discussed when necessary.

Age did not affect the C19P-S scores. It was the first time that almost all participants encountered problems caused by a pandemic in biopsychosocial areas. Therefore, problem solving and coping skills, which may be influenced by the advancing age, were not a distinctive factor in the C19P scores during pandemic.

All sub-scale and total scores of the C19P of females are higher than males. C19P can be considered within the scope of specific phobias in the DSM-5 diagnostic system. Specific phobias, which have an incidence rate of 2.7% among the society, are more prevalent among females (3.8%) than males (1.4%). The mean age of specific phobias in community screenings is 37.9 years. The odd of having a comorbid psychiatric disorder is higher in patients with specific phobia, and depression is also detected in 28.6% (4% in population). Specific phobia, and in particular depression, lead to both losses of workforce and impairment in social life (16,17). As with other specific phobias, C19P was higher in females than males among our participants with a mean age of 39.8. Similarly, in the study of Haktanir et al. (2020), females reported much higher levels of coronavirus-related fear than males (18).

All sub-scale and total scores of the C19P of the participants, whose monthly income is lower than their monthly expenses, are higher compared to the others. Psychosocial and Environmental Problems are defined under nine categories in Axis-IV in the DSM-IV's five-axis diagnostic system (19) One of these categories is economic issues. The fact that their income is lower than their expenses is a chronic stress factor that may have led to anxiety and/or depression at threshold or disorder-level among the participants. Higher C19P levels can also be considered in the context of psychiatric comorbidity. However, only the female gender, having less monthly income than expenses, presence of chronic illness, and staying outside the home have an independent impact on the economic sub-scale. All the participants were permanent public hospital staff. Having a regular income and not losing their job due to the pandemic can account for the fact that an increase in the economic sub-scale scores is associated with only four variables. If this study is performed on individuals who have lost jobs and/or income due to the pandemic, it will not be surprising to determine higher scores in the economic sub-scale.

Table 2: Variables associated with covid-19 phobia scores					
Covid-19 Phobia Scale Characteristic (n)	**Psychological**	**Somatic Mean±SD**	**Social**	**Economic**	**Total**
Gender					
Female (252)	21.6±5.3	12.9±4.6	15.9±4.5	9.5±3.2	59.9±15.7
Male (109)	18.6±5.6	10.8±4.1	14.2±4.8	8.5±3.1	52.2±15.8
p[1]	<.001	<.001	.002	.010	<.001
Perception of Monthly Income-Expense					
income<expense (191)	**21.9±5.4**	**13.1±4.6**	**16.2±4.6**	**9.7±3.2**	**61.0±15.8**
income=expense (124)	19.6±5.2	11.4±4.2	14.7±4.6	8.6±3.0	54.4±15.4
income>expense (46)	18.9±5.7	11.1±4.8	14.2±4.4	8.5±3.1	52.7±16.4
p[2]	<.001	.001	.002	.005	<.001
Number of people living in the household Median (min-max)					
Living alone (18)	18(11-24)	13,5(5-18)	15(8-19)	7,5(4-13)	61(29-69)
2-3 (173)	20(6-30)	11(5-25)	15(5-25)	9(4-19)	53(20-96)
≥4 (170)	**23(6-30)**	**12(5-25)**	**16(5-25)**	9(4-20)	**59(20-99)**
p[3]	.005	.029	.011	.148	.009
Having chronic illness					
Present (125)	22.1±6.0	13.1±5.2	16.5±4.	9.8±3.4	61.5±17.7
None (236)	19.9±5.1	11.7±4.0	14.8±4.4	8.8±3.0	55.2±14.6
p[1]	<.001	.008	.001	.004	.001
Impact of pandemic on working order Median (min-max)					
None+Mild (21)	18 (6-30)	10 (5-22)	13(5-25)	8 (4-20)	49 (20-97)
Moderate (64)	19 (7-28)	10 (5-19)	15(7-24)	8 (4-15)	53 (24-86)
Severe+Extreme (276)	**22 (6-30)**	**12 (5-25)**	**15(5-25)**	**9 (4-19)**	**58 (20-99)**
p[3]	.001	<.001	.005	.110	.002
Hospital of duty					
X UHS XX TRH* (70)a	18.7±5.7	11.3±4.4	14.2±4.5	9.4±3.2	53.6±16.5
Y SH** (68)b	**22.8±5.2**	**13.6±4.9**	**16.2±4.6**	8.8±3.2	**61.3±15.8**
T four districts SH*** (223)c	20.7±5.4	12.1±4.5	15.5±4.7	9.2±3.2	57.6±15.9
p[2]	<.001	.011	.035	.523	.019
Covid-19 service throughout the pandemic (as of March 2020)					
Worked (200)	21.4±5.5	12.8±4.7	15.7±4.5	9.4±3.1	59.3±16.0
Did not work (161)	19.9±5.5	11.5±4.3	14.9±4.8	8.9±3.3	55.3±16.1
p[1]	.016	.005	.139	.211	.019
Employees' stay outside their home for quarantine, considering that they are working in departments at risk for Covid-19					
Accommodated outside home (55)	21.8±5.8	13.1±4.7	16.6±5.0	1.2±3.7	61.7±16.6
Accommodated at home (306)	2.5±5.5	12.1±4.6	15.2±4.6	8.9±3.1	56.7±15.9
p[1]	.117	.104	.028	.009	.032
Having symptoms suggestive of being infected with Covid-19					
Had (131)	22.6±5.5	13.9±4.8	16.9±4.7	1.1±3.5	63.5±16.4
Had not (230)	19.1±4.9	1.7±3.8	14.1±4.1	8.6±2.8	52.6±13.7
p[1]	<.001	<.001	<.001	<.001	<.001
Having any test for Covid-19 diagnosis					
Had (156)	21.4±5.7	13.1±4.8	16.1±4.9	9.7±3.2	6.2±16.6
Had not (205)	2.2±5.5	11.6±4.3	14.9±4.5	8.8±3.2	55.5±15.5
p[1]	.032	.002	.019	.014	.006

Table 2: Variables associated with covid-19 phobia scores

Covid-19 Phobia Scale Characteristic (n)	Psychological	Somatic Mean±SD	Social	Economic	Total
Being diagnosed with Covid-19 Median (min-max)					
Diagnosed (27)	25 (9-30)	14 (6-25)	17(7-25)	10 (4-19)	64 (27-99)
Had not diagnosis (333)	20 (6-30)	11 (5-25)	15(5-25)	9 (4-20)	56 (20-97)
p[4]	.003	.001	.012	.159	.002
Being hospitalized due to Covid-19 Median (min-max)					
Had hospitalization (11)	26 (17-30)	14 (11-25)	19(14-25)	9 (4-19)	67 (52-99)
Had not (350)	20 (6-30)	11 (5-25)	15(5-25)	9 (4-20)	56 (20-97)
p[4]	.004	.008	.012	.648	.011
Having isolation due to being infected with Covid-19					
Had isolation (37)	21.9±6.2	13.6±4.8	16.1±4.9	9.5±3.6	61.2±17.9
Had not (324)	2.6±5.5	12.1±5.5	15.3±4.7	9.1±3.2	57.1±15.2
p[1]	.150	.047	.334	.472	.139
Having Covid-19 patients among the family, relatives, or neighbors					
Had (91)	21.8±5.8	13.2±5.3	16.3±5.2	9.8±3.7	61.1±18.1
Had not (270)	2.4±5.5	11.9±4.3	15.1±4.5	8.9±3.0	56.3±15.2
p[1]	.040	.017	.030	.031	.015

**University of Health Science X Training and Research Hospital, **Y State Hospital, ***Y1, Y2, Y3 and Y4 State Hospital*
[1]p<0.05 in according to independent groups the t-test
[2]p<0.05 one-way analysis of variance (ANOVA), bold character posthoc Tukey HSD p<0.05
[3]p<0.05 Kruskal-Wallis test, bold character Bonferroni correction p<0.016
[4]p<0.05 Mann-Whitney U test

Table 3: Logistic regression explaining the relationship between phobia scores and independent variables

Phobia scale sub-dimension and total	Multiple regression OR value (95%CI)	p
[1]Psychological sub-dimension Nagelkerke R^2=0.19		
Gender (Female)	1.74 (1.06-2.87)	.028
Perception of income	1.64 (1.18-2.27)	.003
Having chronic illness	1.66 (1.03-2.67)	.035
Impact of pandemic on working order	1.47 (1.05-2.17)	.047
Having Covid-19 symptoms	1.88 (1.17-3.03)	.009
Having Covid-19 patients among the family, relatives, or neighbors	1.98 (1.17-3.35)	.010
[2]Somatic sub-dimension Nagelkerke R^2=0.20		
Gender (Female)	1.76 (1.07-2.89)	.025
Perception of income	1.58 (1.14-2.19)	.006
Impact of pandemic on working order	1.62 (1.09-2.40)	.017
Being diagnosed with Covid-19	8.21 (1.83-36.82)	.006
[3]Social sub-dimension Nagelkerke R^2=0.17		
Perception of income	1.69 (1.24-2.32)	.001
Having chronic illness	1.91 (1.17-3.31)	.005
Having Covid-19 patients among the family, relatives, or neighbors	1.97 (1.17-3.31)	.010
[4]Economic sub-dimension Nagelkerke R^2=0.10		
Perception of income	1.79 (1.15-2.79)	.010
Having chronic illness	1.55 (1.14-2.11)	.004

Table 3: Logistic regression explaining the relationship between phobia scores and independent variables

Phobia scale sub-dimension and total	Multiple regression OR value (95%CI)	p
[5]Total score Nagelkerke R^2=0.21		
Gender (Female)	1.97 (1.18-3.28)	.009
Perception of income	1.82 (1.30-2.55)	.000
Number of people living in the household	1.36 (1.08-1.72)	.009
Having chronic illness	1.88 (1.17-3.02)	.008
Being diagnosed with Covid-19	3.33 (1.16-9.60)	.025
Having Covid-19 patients among the family, relatives, or neighbors	2.15 (1.26-3.68)	.005

A. Gender
B. Perception of income
C. Number of people living in the household
D. Having chronic illness
E. Impact of pandemic on working order
F. Hospital of duty
G. Working in Covid-19 service throughout the pandemic
H. Number of Covid-19 patients served per day throughout the pandemic
I. Compliance with rules (wearing masks, social distancing)
J. Staying outside their home for quarantine, due to working in risky departments
K. Having Covid-19 symptoms
L. Having Covid-19 test
M. Being diagnosed with Covid-19
N. Having isolation due to being infected with Covid-19
O. Having Covid-19 patients among the family, relatives, or neighbors

[1]Variables included in the model: A-I, K-M, O
[2]Variables included: A-H, K-O
[3]Variables included: A-F, I-M, O
[4]Variables included: A, B, D, I, J, L
[5]Variables included: A-G, I-L, O

Except for the economic sub-scale, the other sub-scale and total scores were found to be higher among the participants living ≥4 people in their household. As the number of people living in the household increases, it will be difficult to maintain social distance and prevent contact. This situation might be increasing the fear of being infected and transmission as well as C19P-S scores. Milman et al. (2020) also have revealed that as social isolation decreases, negative psychological symptoms related to Covid-19 increase (20). It has been determined that healthcare professionals are highly anxious to infect their family members (21,22). There is also a high likelihood of having elderly people in a crowded household. The news and information that the mortality rates associated with Covid-19 increase significantly every 10 years in individuals ≥20, and that the risk of morbidity-mortality is higher among people ≥60, who are among the most affected by diseases (23), might have increased the C19P anxiety. However, the presence of a child with whom the participant lived in the same house did not affect the C19P-S scores. News and information that Covid-19 is milder in children compared to adults, 30% of the children infected with the virus can overcome it without any symptoms, death rates are lower, supportive treatment approaches are sufficient in many cases (2,24,25), might have prevented the expected increase in C19P anxiety in those living with children.

Increased number of cases and working periods during the pandemics are factors that increase psychological strain. The total, psychological, somatic, and social subscale scores were higher in our participants who reported that their work tempo and hours were 'significantly and excessively' affected during the pandemic. In a study (26) involving healthcare professionals from various parts of the world,73% of nurses and 77% of physicians stated that their working hours and tempo changed 'significantly or very significantly' due to the pandemic. Increasing working hours increases contact with patients, the risk of contamination, protective equipment load, and physical burnout, and this affects the psychological well-being of healthcare workers negatively (5,27).

The total and all subscale scores were higher in patients having chronic illness than those without the illness. In addition to people aged ≥60 and healthcare staff, those with chronic illnesses are stated to be among the individual who has been affected by Covid-19 substantially. News, warnings, and media messages emphasizing that the risk of morbidity-mortality is higher in those with chronic illnesses (1,3,4,23), might go beyond ensuring that employees act cautiously and have led to an increase in C19P-S scores.

The total, psychological, somatic, and social sub-scale scores were higher among the participants who work in Y-SH compared to other hospitals staff. As the Provincial PH, Y-SH started to serve only Covid-19 patients from the very beginning of the pandemic, and providing other health care services were stopped in this hospital. As it is a PH, the workload has increased because of the referral of suspected patients and patients with a definite diagnosis. With a capacity of 400 beds, Y-SH has 109 ICU beds including the tertiary health care services. With the decision taken by the management, personnel working in different departments of the Y-SH were assigned to ICU and Covid-19 services, if necessary. Heavy working conditions, stressful working order, and change in jobs, which are defined under the title of occupational problems within the scope of Psychosocial and Environmental Problems (19) are the problems that also affected our participants. This situation probably manifested itself with an increase in C19P-S scores.

The social and economic sub-scale and the total scores were found to be higher in those who thought they were working in departments at risk in terms of Covid-19 and housed in another place other than their home for quarantine, compared to those who stayed in their home. Those who stay outside of their home for quarantine may be sensitive and fearful of infecting their relatives. This sensitivity might also be associated with an increase in C19P levels. On the other hand, accommodation outside home might have created additional expenditure and increased the economic subscale scores. Röhr et al. (2020) revealed in their systematic review investigating the effects of quarantine measures on healthcare staff during the coronavirus pandemic, quarantine measures were associated with depressive symptoms, anxiety, anger, stress, and loneliness (27).

The total and all subscale scores are higher in our participants who have Covid-19 patients in their family, relatives, or neighbours compared to those who do not. As expected, PH staff will not be able to employ the protective measures they practice in the hospital using PPE during their normal life when they are outside the hospital and are with their relatives. This situation might have increased the risk of transmission and C19P levels if a person in the environment where they live outside the workplace is infected.

No difference was determined between the occupational groups in terms of C19P-S scores. There are Covid-19 patients with a high risk of transmission in every part of the PH, from the entrance door to the ICU. The fact that there is no difference in C19P levels among occupational groups indicate that each occupational group member who performs different duties in different departments of the hospital experiences similar risks and concerns about transmission. The use of additional PPE such as protective clothes and visors in addition to face masks in intensive care and ward conditions where contact duration is longer and risk of contamination is higher, may have prevented the expected increase in C19P levels in those working in these environments that are riskier than other parts of the hospital.

It has been revealed that providing PPE suitable for the risk of virus transmission to which they are exposed increases the sense of safety, mental endurance, and productivity of the staff (6). Almost all our participants stated that the PPE they need was provided. Thus, the potential effect of not providing PPE on phobia scores was not observed. This positive finding shows that the hospital managements participating in the study attach importance to employee safety in terms of contamination risk and take the necessary precautions. This measure probably prevented the increased risk of contamination and C19P while increasing employees' sense of safety, mental endurance, and trust in the organization.

Conclusion

In our study, the factors that have been determined to increase the C19P levels of PH employees including, female gender, having an economic problem, living in a crowded household, having a chronic illness, staying outside their home for quarantine and having an individual among relatives diagnosed with Covid-19 could be guiding in identifying healthcare staff with high risk. Re-planning the intense and high-risk working order, providing suitable conditions, and making plans for employees with limited work experience in outbreaks can reduce the negative psychological effects of the pandemic. The impact of the pandemic on the family and social lives of PH staff is also one of the considerable issues to be addressed, and it is considered that it should be addressed by managers and mental health professionals.

This study has some limitations, including: 1-It's limited to volunteers who use the mobile phone messaging and communication application; 2-Data were collected between July-September 2020, when the number of cases decreased.

Declarations

Ethical Approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of the university Local Ethics Committee of the Medical School (2020-07-22; 20.478.486/472) and the relevant Hospital Chief Physicians have approved the study. All processes of this study were conducted in accordance with the Helsinki Declaration ethical principles.

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Conflict of Interest

The authors declare no conflict of interest.

Availability of Data and Material

All data is available.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Psychiatry / Psikiyatri

Mentalization in Multiple Sclerosis: The Role of Mentalization in Anxiety And Depression

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ABSTRACT

Background: Multiple sclerosis (MS) is a chronic inflammatory disease and is characterized by impairment in cognitive and social functioning during the disease. Mentalization is of great importance in social functioning as it is the ability to understand oneself and others. Impaired mentalization constitute a risk for psychiatric diseases. In our study, mentalization skills and their relationship with anxiety and depression symptoms were investigated in MS patients.

Method: 31 consecutive MS patients (%64.5 female and Mean age was 36.26) were included in the study. Sociodemographic form, Beck depression inventory, Beck anxiety inventory, and mentalization scale were administered to the participants. Mentalization was considered in three sub-dimensions: self-based mentalization (MentS-S), others-based mentalization (MentS-O) and motivation to mentalize (MentS-M).

Result: Patients with Anxiety have significantly lower MentS-O scores. MentS-S scores of those with depression were found to be significantly higher and MentS-O scores were found to be lower (respectively; p=0.027, 0.032, 0.012). While positive moderate correlation was found between MentS-S (r=0.373) dimension and depression is, negative moderate correlation was found between MentS-M (r=-0.391) and MentS-O (r=-0.413) dimensions.

Conclusion: Mentalization to other scores is connected with anxiety and depression in MS patients. Depression may be connected with increased mentalization of self.

Keywords: Social cognition, mentalization, multiple sclerosis, anxiety, depression

Yasemin HOŞGÖREN ALICI

Müge KUZU KUMCU

Multipl Sklerozda Zihinselleştirme: Anksiyete ve Depresyonda Zihinselleştirmenin Rolü

ÖZET

Giriş: Multiple skleroz (MS) hastalığı kronik inflamatuar bir hastalık olup, hastalık seyrinde bilişsel ve sosyal işlevselliklerinde bozulma ile seyretmektedir. Mentalizayon, kendini ve diğerlerini anlama becerisi olduğu için sosyal işlevsellikte büyük önem sahiptir. Mentalizasyon bozuklukları psikiyatrik hastalıklar için risk oluşturmaktadır. Çalışmamızda MS hastalarında mentalizasyon becerileri ve bu becerilerin anksiyete ve depresyon semptomları üzerindeki ilişkileri incelenmiştir

Method: 31 ardışık MS hastası (%64.5'i kadın ve yaş ortalaması 36.26) çalışmaya dahil edilmiştir. Katılımcılara sosyodemografik form, Beck depresyon ölçeği, Beck anksiyete ölçeği ve mentalizasyon ölçeği uygulanmıştır. Mentalizasyon üç alt boyutunda ele alınmıştır: kendine dayalı zihinselleştirme (MentS-S), başkalarına dayalı zihinselleştirme (MentS-O) ve zihinselleştirme motivasyonu (MentS-M).

Bulgular: Anksiyetesi olan hastaların MentS-O skorları anlamlı derecede düşüktür. Depresyonu olanların MentS-S puanları anlamlı olarak daha yüksek, MentS-O puanları ise daha düşük bulunmuştur (sırasıyla; p=0.027, 0.032, 0.012). MentS-S (r=0.373) boyutu ile depresyon arasında pozitif orta düzeyde korelasyon bulunurken, MentS-M (r=-0.391) ve MentS-O (r=-0.413) boyutları arasında negatif orta düzeyde korelasyon bulunmuştur.

Sonuç: Diğerini zihinselleştirme MS hastalarında anksiyete ve depresyon ile bağlantılıdır. Depresyon artmış kendini zihinselleştirme ile bağlantılı olabilir.

Anahtar kelimeler: Sosyal biliş, mentalizasyon, multiple sklerosiz, anksiyete, depresyon

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Multiple sclerosis (MS) is a chronic demyelinating central nervous system disease. MS patients may have impaired cognitive and social functioning as part of the complex neurological symptomatology (1). Social cognition is the process through which individuals process, remember, and use knowledge in social circumstances to explain and predict how people behave, so it needs a broad repertoire of cognitive and emotional skills that allows us to infer the mental and emotional states of others to interact effectively with others and be included in a social group (2). An important aspect of social cognition is the capacity to interpret and predict other people's mental states in terms of thoughts, intentions, desires, and beliefs, known as the theory of mind (ToM), also referred to as mentalizing but only mentalizing to other minds. Theory of mind is achieved by decoding non-verbal cues such as facial expression, eye gaze, body movements, and complex abstract reasoning about verbal information (3). Social cognition may be independent or separable from general intelligence (2). In studies conducted on MS patients, it has been observed that patients have difficulties in both recognizing facial emotions and understanding the intentions of others (4)

The ability to mentalize is another key aspect of social cognition. Mentalization is defined as a mental process in which an individual perceives and interprets his or her own and other people's behaviors in an indirect or direct manner based on designed mental states such as personal desires, needs, emotions, beliefs, and reasons (5). This process entails interpreting others' behavior in terms of mental states, comprehending one's own mental states, and being able to discern one's own and others' mental states from each other and from outward reality. Although theory of mind and mentalization are used synonymously, they do not mean exactly the same thing. While both Theory of Mind(ToM) and mentalizing include the ability to understand other people's thoughts and emotions, mentalizing goes beyond the Theory of Mind by including self-reflection and emotional regulation (6). Mentalizing is a more complex and nuanced skill that involves understanding not only others but also oneself and how one's thoughts and feelings influence one's behavior. According to research, mentalization boosts mental health and is linked to a variety of aspects such as psychological resilience (7). Mentalization also overlaps with constructs such as empathy and emotional intelligence. Individuals with low mentalizing capacity may experience a number of deprivations such as a lack of interest in mental states, a lack of imagination about the mental world of others, and low awareness of the relationship between internal and external reality (8). This situation plays an important role in the development of various mental disorders(9, 10)

Depression and anxiety are common in MS (11, 12). In a tertiary neurological clinic, the prevalence of depression in MS patients is expected to be 50% (13). With depression, disease-related pain, fatigue and impairment in cognitive functioning can be exacerbated (11). Depression can also lead to the development of negative health behaviors such as excessive drinking or smoking (14). This process may also lead to the development of suicidal thoughts. The patient's treatment compliance may be impaired due to depression (11). All these variables mean the worsening of the disease course. Similarly, anxiety can increase to around 40% (12) . Despite being the two most frequent concomitant diseases, they appear with distinct MS manifestations. The literature revealed that Depression has been linked to neuropathology, cognitive impairment, and poor social support, whereas anxiety has been linked to increased disability levels and a progressive disease course and gender differences (11). Although the effect of mentalization on anxiety and depression is known, the effect of mentalization on anxiety and depression in MS patients has not been studied. As these psychiatric comorbidities have a negative impact on the patient's quality of life and functioning, it is important to identify associated factors (15). Our study aimed to measure mentalization skills in the MS patient population and observe the relationship between mentalization and anxiety and depression. We hypothesized that individuals with lower mentalization scores would have higher anxiety and depression scores.

MATERIAL AND METHOD

Procedure

Patients admitted to the neurology outpatient clinic of Lokman Hekim University and diagnosed with MS were consecutively included in the study. The individuals were given the sociodemographic form, Beck depression scale, Beck anxiety scale, and Mentalization Scale. Individuals who scored higher than 15 on the Beck depression and Beck anxiety inventories were examined for anxiety disorder and depression. All participants provided informed consent. The Research Ethics Committee at 2023/105 granted ethics committee approval.

Participants

31 MS patients enrolled in the study (mean age = 36.26 ± 9.12). Of these, 20 were female (64 .5%). Descriptive analyzes are given in Table 1.

Statistical Analysis

We used IBM SPPS Statistics version 26.0. Statistical significance was determined as $p<0.05$. Descriptive statistics included mean and standard deviation, median, minimum and maximum scores, and absolute and relative frequencies. Depending on whether the data satisfied normal distribution assumptions, either the Student T test or the Mann-Whitney U test was employed to look for statistically significant differences. To address between MentS dimensions, anxiety and depression scores, Spearman's correlation analysis was used.

Measures

Beck Depression Inventory: The scale measures emotional, physical, cognitive, and motivational symptoms seen in depression(16). The scale has 21 components. Each item is assigned a score between 0 and 3. A greater overall score implies a more severe or level of depression. Hisli (1989) carried out validity and reliability investigations in our country. Cronbach's alpha coefficient was determined to be 0.80 (17) in a reliability analysis of the Turkish variant.

Beck Anxiety Inventory: It was developed by Beck et al. (1988)(18) and adapted to Turkish by Ulusoy et al. (1993) (19). In the scale consisting of 21 questions, the questions are scored between 0-3, and the severity of anxiety symptoms is determined by the total score. The total score varies between 0-63. Cronbach's alpha coefficient was determined to be 0.93.

Mentalization Scale(MentS): It as a self-report scale designed by Dimitrijevi et al to measure mentalization (6). The MentS consists of 28 items with a 5-point Likert scale (1- Completely incorrect, 5- Completely correct). It is divided into three dimensions: self-based mentalization (MentS-Self, MentS-S) is for the ability to mentalize one's own mind, others-based mentalization (MentS-Others, MentS-O) is for the ability to mentalize others' mind, and motivation to mentalize (MentS-Motivation, MentS-M). Every contribution receives a grade between 1 and 5, for a possible total of 140 points. Higher scores show a stronger mental processing capacity. The scale demonstrated good internal consistency in the non-clinical sample (= 0.84) and acceptable outcomes in the clinical sample (= 0.75). The Turkish validity and reliability of the scale were done by Torenli Kaya et. al 2023 (20).

RESULT

Demographics and Clinical Characteristics

A total of 31 participants were included in our study, including 29 Relapsing-Remitting Multiple Sclerosis (RRMS), 1 Primer Progressive Multiple Sclerosis (PPMS), and 1 Seconder Progressive Multiple Sclerosis(2PMS) patients. Twenty of them (%64) were female. The age of participants ranges between 21 to 57 and the mean of them was 36.26 ± 9.12. The mean disease duration is 8.13 ± 5.17. The descriptive analysis of the participants according to age, gender, marital status, employment status, and education level is shown in Table 1.

Mentalization, Depression, and Anxiety

Mentalization dimensions, depression, and anxiety values are shown in Table 1. The participants with anxiety have significantly lower MentS-O scores($p=0.012$). MentS-S scores of those with depression were found to be significantly higher and MentS-O scores were found to be lower (respectively; $p=0.027$, $p=0,032$). They are shown in Table 2.

Correlation between Mentalization and Depression and Anxiety

A positive moderate correlation was found between the MentS-S dimension and depression, a negative moderate correlation was found between MentS-M and MentS-O dimensions. ($p< 0.005$). MentS-M and Ments-O dimensions had a moderate negative correlation with anxiety scores according to r values, but p scores were found to be statistically insignificant. Correlation values are shown in Table 3.

DISCUSSION

This study was planned considering that it is important to reveal whether mentalization is associated with comorbid conditions in MS. In our research, we observed that, while depression scores increase, mentalization scores for self decreases and mentalization scores for others increase. In patients with anxiety, on the other hand, only the mentalization to other scores decreases. In other words, anxiety and depression increase when the mentalization to others decreases. Although our statistical methodology does not allow for a causal explanation, these findings suggest that increased mentalization of one's own mental state may lead to a more depressive state.

Table 1: Demographics and Clinical Description of People With Multiple Sclerosis (N=31)

Demographic Characteristics (n=31)	
Age	
Mean ± Sd	36.26 ± 9.12
Median	35
Min-Max	21-57
Gender	
Female	
n (%)	20 (64.5)
Working Status	
n (%)	
Paid	14 (45.2)
Housewife	7 (22.6)
Student	3 (9.7)
Unemployed	5 (16.1)
Retired	2 (6.5)
Marital Status	
Partner, no	5 (16.1)
Partner, yes	6 (19.4)
Married	20 (64.5)
Education	
Mean ± Sd	12.45 ± 3.25
Median	12
Min-Max	3-18
Clinical Features	
Multiple Sclerosis Type	
Ppms	1 (3.2)
Rrms	29 (93.5)
2pms	1 (3.2)
Number of recurrences	
Mean ± Sd	3.58 ± 3.11
Median	2
Min-Max	1-11
Disease Duration	
Mean ± Sd	8.13 ± 5.17
Median	7
Min-Max	1-18
MentS Dimensions	
MentS-M	
Mean ± Sd	28.32 ± 4.3
Median	29
Min-Max	19-39
MentS-O	
Mean ± Sd	35.97 ± 3.99
Median	35
Min-Max	28-44
MentS-S	
Mean ± Sd	22.23 ± 5.17
Median	23
Min-Max	12-30
Depression And Anxiety	
Beck Anxiety	
Yes	
n (%)	21 (67.7)
Beck Depression	
Yes	
n (%)	15 (48.4)

PPMS: Primer Progressive Multiple Sclerosis, RRMS: Relapsing Remitting Multiple Sclerosis, 2PMS: Seconder Progressive Multiple Sclerosis MentS-S: MentS-Self, MentS-O: MentS-Others, MentS-M: MentS-Motivation

Psychiatric comorbidities are common in MS (11, 12). These comorbid conditions have been shown to have a negative relationship with social cognition skills (21, 22). Mentalization is one of these social cognitive domains (21). A person's perception and interpretation of their own and other people's behaviors, whether indirect or direct, are referred to as mentalization. This mental process is founded on predetermined mental states, such as individual needs, wants, emotions, and beliefs (23). Mentalization has been closely linked to depression and anxiety(9, 10). In addition, white matter lesions have been shown to impair mentalization due to dysconnectivity (24). As is well known, MS negatively affects many mental faculties and individuals with high mentalization may experience this with a more intense awareness. This can lead to a stronger confrontation with the difficulty and a negative emotional state. On the other hand, Fonagy claimed that mentalization disorder is not only hypomentalization but also hypermentalization. According to this, if a person is excessively mentalizing about himself, he may be disconnected from the outside world (23). This may explain why MS patients with depression have high MentS-S scores but low MentS-O scores.

Table 2: MentS dimensions of patients grouped in terms of depression and anxiety

(N)	Anxiety Yes (N=21)	Anxiety No (N=21)	P	Depression Yes (N=16)	Depression No (N=16)	P
MentS-M						
Mean ± Sd	27.33±4.32	30.4±3.59	0.062*	27.27±5.21	29.31±3.07	0.190*
Median				27	29.5	
Min-Max				19-39	24-34	
MentS-S						
Mean ± Sd	23.14 ± 5.13	20.3±6.65	0.2*	24.53±4.41	20.06±6.07	0.027*
Median	25	20		25	20	
Min-Max	12-30	12-30		16-30	12-29	
MentS-O						
Mean ± Sd	34.76 ± 3.98	38.50±2.71	0.012*	34.4±4.17	37.44±3.31	0.032*
Median	35	39		34	36.5	
Min-Max	28-44	34-42		28-44	33-43	

**Student T Test MentS-S: MentS-Self, MentS-O: MentS-Others, MentS-M: MentS-Motivation*

Table 3: The correlation between the MentS subgrups and anxitey/depression

	Anxiety		Depression	
	R	P	R	P
MentS-M	-0.341	0.06*	-0.391	0.029*
MentS-S	0.117	0.530*	0.373	0.039*
MentS-O	-0.329	0.071*	-0.413	0.021*

**Spearman's correlation test coefficient*
MentS-S: MentS-Self, MentS-O: MentS-Others, MentS-M: MentS-Motivation

Understanding the thoughts of others was lower in the anxious and depression groups. It is well established that high levels of stress when confronted with a threat or danger result in an arousal state that affects higher-order cognitive functioning(25). Such a stressful circumstance triggers the fight-or-flight response, which causes the sympathetic nervous system to fire in an effort to preserve essential organs and maintain survival. As a result, mentalization is compromised, and we begin to respond reflexively. According to the "biobehavioral switch model" of mentalization, the same reaction takes place under extreme relational stress even when there isn't a life-threatening situation (25) Mentalizing becomes temporally unavailable when there is a threat to a significant relationship, such as a dispute with a close friend or relative. Reflexive inferences, namely, can take the place of mentalization. In the context of complicated human relationships, this change to an automatic process could be misleading since it could encourage a quick and skewed view of mental states. According to some research, those who are already anxious will have lower arousal thresholds, meaning they will require less stress to transition from controlled to automatic mentalization(9). On the other hand, being able to see the behavior of others as meaningful and to attribute states of mind to that behavior makes it predictable. When mentalization is impaired, you may have difficulty attributing to others and thus feel more stressed.MS patients may have difficulty making sense of the outside world due to the loss of mentalization and therefore feel more anxious. Two important recent meta-analyses have shown that mentalization is impaired in patients with anxiety (9, 26). Therefore, the Ments-0 scores of MS patients with anxiety in this study may have been lower.

Patients with major depressive disorder (MDD) struggle with a variety of cognitive and affective skills, this makes people with MDD have impaired executive functions (EFs) and deficiencies in ToM, which is the capacity to guess other people's mental states. Impairment in executive functioning may impair perception of the environment and others, which may make it difficult to make inferences about others and thus impair mentalization, as secondary . Depression is also associated with helplessness, loss of recreational opportunities, low-quality relationships, and high stress(10). Mentalization is critical for the perception of stress and coping with it(27). Therefore, depression may occur when there is a change in the mentalization to others due to white matter involvement.

Through the theory of mind test, social cognition in MS patients has frequently been researched in the literature. This examination analyzes understanding others' intentions, even though it covers mentalization-related skills. According to reports, anxiety and depression are linked to the theory of mind impairment in MS patients (1). This is supported by the finding that MentS-O was related to both depression and anxiety in our study. According to recent reports, one's own and other people's mental states reflect them in distinct ways (28). This viewpoint is also supported by the disparate effects of MentS_S and MentS-O on anxiety and depression.

Being the first study to measure mentalization in MS patients is our strength, but we also have limitations. First, there was no healthy control group to compare mentalization skills, so a clear comparison of mentalization skills and its relationship with depression and anxiety could not be made in the general population. Secondly, because this study is cross-sectional and correlational in nature, we cannot determine the direction of causality. Finally, the current study's conclusions are tentative due to the small sample size. Future studies with larger samples and longitudinal evaluations will help us better understand the association between mentalization and depression and anxiety symptoms. Increasing the sample size will increase the generalizability of the findings.

CONCLUSION

In MS patients, lower mentalization to other scores are associated with both anxiety and depression. Increased mentalization to self may be associated with depression. Mentalization should be considered during the follow-up of patients in terms of predicting and treating anxiety and depression.

DECLARATIONS

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This research didn't receive any grand.

Conflict of interest

The authors disclose that they have no competing interests. The authors state that they do not have any known competing financial interests or personal ties that could appear to have influenced the work disclosed in this study.

Ethical approval

The study was approved by the Local Ethics Committee of Lokman Hekim University Ethics Committee (date: 13/06/2020 – 2023/105).

Author Contributions

Y.H.A: Conceptualization, methodology, statistical analysis, and writing - original draft. M.K.K: Conceptualization, methodology, Data collection, statistical analysis, review, and editing

Data availability

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

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Psychiatry / Psikiyatri

Changes in Symptom Severity and Sleeping Habits After Earthquake in Children and Adolescents with Autism Spectrum Disorder: The Case of the Kahramanmaras Earthquake in 2023, Turkey

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ABSTRACT

Purpose: Natural disasters, especially earthquakes, can cause psychological disorders. A review of the disaster literature shows that natural disasters do not affect individuals in the same way; children and people with disabilities such as Autism Spectrum Disorder (ASD) are considered the most vulnerable group. It was aimed to evaluate the post-earthquake effects on the children and adolescents diagnosed with ASD in the Kahramanmaras-centered earthquake on February 6, 2023.

Methods: 22 children and adolescents diagnosed with ASD were included in the study. Children with ASD who applied to the Hatay Field Hospital Child and Adolescent Psychiatry outpatient clinic three months after the earthquake were evaluated. Sociodemographic Data Form, Aberrant Behavior Checklist (AbBC), the Child Sleep Habits Questionnaire (CSHQ), Autism Behavior Checklist (ABC) scales were administered.

Results: This study included 19 (86.4%) boys and 3 (13.6%) girls. The age of the participants was 9.92±3.52 years. AbBC-hyperactive ($p<0.001$), AbBC-lethargy ($p=0.001$), AbBC-stereotype behaviours ($p<0.001$), AbBC-other behaviours ($p<0.001$) subscale scores; the CSHQ-sleep anxiety ($p=0.008$) subscale score; the ABC-sensory behaviour ($p=0.017$), ABC-social rating ($p=0.034$), ABC-social and adaptive skills ($p=0.026$) subscales scores significantly increased after the earthquake compared to pre-earthquake.

Conclusion: The study's findings give information about the increase in the severity of autism symptoms in this group after the earthquake. This study contributes to the literature by evaluating the impact of an important natural disaster, such as an earthquake on children and adolescents with ASD. We suggest that future studies compare different severity of ASD and further research on areas that have not been studied enough.

Keywords: autism, earthquake, natural disaster, child, Kahramanmaras, Turkey

Otizm Spektrum Bozukluğu Tanılı Çocuk ve Ergenlerde Deprem Sonrası Belirti Şiddeti ve Uyku Alışkanlıklarındaki Değişiklikler: 2023 Yılı Kahramanmaraş Depremi Örneği, Türkiye

ÖZET

Amaç: Doğal afetler, özellikle depremler psikolojik rahatsızlıklara neden olabilmektedir. Afet literatürünün gözden geçirilmesi, doğal afetlerin bireyleri aynı şekilde etkilemediğini göstermekte ve çocuklar ve Otizm Spektrum Bozukluğun (OSB) gibi engelliler (persons with disabilities) en savunmasız grup olarak kabul edilmektedir. 6 Şubat 2023 tarihindeki Kahramanmaraş merkezli depremde OSB tanılı çocuklar ve ergenlerin depremden sonraki etkilenimlerinin değerlendirilmesi amaçlanmıştır.

Yöntemler: Çalışmaya 22 OSB tanılı çocuk ve ergen alınmıştır. Depremden 3 ay sonra Hatay Sahra Hastanesi Çocuk Psikiyatri polikliniğine başvuran OSB tanılı çocuklar değerlendirilmiştir. Sosyodemografik Veri Formu, Sorun Davranış Kontrol Listesi (SDKL), Çocuk Uyku Alışkanlıkları Anketi, Otizm Davranış Kontrol Lisesi Kayıt Formu (ABC) ölçekleri değerlendirmede kullanılmıştır.

Bulgular: Çalışmamıza 19 (%86.4) erkek ve 3 (%13.6) kız çocuk ve ergen dahil edilmiştir. Katılımcıların yaş ortalaması 9.92±3.52 yıldır. SDKL-aşırı hareketlilik ($p<0.001$), SDKL-letarji ($p=0.001$), SDKL-yineleyen davranışlar ($p<0.001$), SDKL-diğer davranışlar ($p<0.001$) alt ölçek puanlarında; Uyku Alışkanlıkları Anketinin-uyku kaygısı ($p=0.008$) alt ölçeğinde; otizm-ABC formunda ABC-duyusal ($p=0.017$), ABC-ilişki kurma ($p=0.034$), ABC-sosyal ve özbakım ($p=0.026$) alt ölçeğinde deprem öncesi ve sonrası için istatistiksel olarak anlamlı şekilde puan artışı olduğu saptanmıştır.

Sonuç: Çalışma bulguları deprem sonrasında bu grubun otizm belirti şiddetinde artış olduğu hakkında bilgi vermektedir. Çalışmamız deprem gibi önemli bir doğal afetin OSB'li çocuk ve ergenler üzerindeki etkisini değerlendirerek literatüre katkıda bulunmaktadır. Gelecekteki çalışmaların otizm şiddetine göre farklı gruplar oluşturularak karşılaştırmalar yapmasını ve yeterince çalışılmamış alanların daha fazla araştırılmasını öneriyoruz.

Anahtar kelimeler: otizm, deprem, doğal afet, çocuk, Kahramanmaraş, Türkiye

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that emerges in early childhood, causes children to have problems in performing their daily life functions, is observed in different contexts and degrees, and is characterized by limited and repetitive patterns of behaviour, interest, and activity, as well as social interaction and communication inadequacies (1).

Natural disasters, especially earthquakes, can bring many problems, such as physical injury, loss of property, death and cause psychological disorders (2). A review of the disaster literature shows that natural disasters do not affect individuals in the same way. Considering their dependence on adults, children and disabled persons are considered the most vulnerable group. There is evidence that exposure to a major natural disaster, such as the earthquake in Haiti in 2010, can disrupt children's mental health and psychological development (3). Natural disasters result in severe disruption of the medical follow-up and rehabilitation of children with special needs to develop their mental and physical abilities, depriving them of many opportunities to improve their condition (4). Natural disasters cause sudden changes in the lives of all people and disrupt many life routines. Children with ASD have more difficulty in adapting to their routine changes compared to children with normal development (5) due to their desire to preserve stability (6) and to have limited behavioural patterns (7). Therefore, it is expected that an increase in the severity of autism symptoms and deterioration in functionality will occur in all situations, including natural disasters that disrupt daily routines. It has been reported that sensory-motor development, cognitive skills, sleep, behaviour, and social interaction were significantly affected in approximately 50% of children with special needs, whose routines are disrupted due to the COVID-19 pandemic, who have to be isolated at home and whose special education was disrupted (8). Therefore, while assessing the health effects of natural disasters, special attention should be paid to the individuals affected by psychiatric disorders, especially ASD. Children with ASD often have difficulty falling asleep and staying asleep, and nighttime awakenings are strongly associated with daytime behavioural problems (9). Sleep problems affect approximately 20-40% of healthy children (10). This problem is particularly evident in children with neurodevelopmental diseases, including autism, and can be observed in about 80% of patients (11). It is expected that the sleep problems of children diagnosed with ASD will increase with the earthquake.

On February 6, 2023, Hatay was one of the cities most severely affected by the 7.4 magnitude earthquake that occured in Kahramanmaras. Eighty-nine percent of the houses were severely damaged. For this reason, people had to live in containers or tents after the earthquake. As a result, the whole society was affected in terms of financial, social and psychological damage, and security and normality were further undermined by frequent aftershocks. This study was conducted to evaluate the psychological effects of the earthquake, which caused a compulsory transition and change in the lives of children and adolescents with ASD living in Hatay. Autism symptom severity and changes in sleep patterns were compared before and three months after the earthquake.

Method

Ethics Approval

This cross-sectional study was conducted after obtaining ethics committee approval (decision no: 2023/76-08) from Amasya University Ethics Committee and institutional permission from Hatay Field Hospital. In addition, written informed consent was obtained from the parents.

Participants

Twenty-four children and adolescents with ASD were reached in the study. Parents and children who applied to the Hatay Field Hospital Child and Adolescent Psychiatry Outpatient Clinic between 1-31 May 2023 and agreed to participate were included in the study. Physically disabled, visually impaired and hearing impaired patients were excluded from the study. One child was excluded because he had a severe physical disability (paraplegia) due to an inability to properly evaluate the changes in symptom severity before and after the earthquake, and the parent of one did not volunteer to participate in the study. Twenty-two children and adolescents were included in the study. One participant had a neurological disorder (epilepsy) and received medical treatment. Also, according to the parent statement, five children were diagnosed with Attention Deficit Hyperactivity Disorder and one with Anxiety Disorder. These comorbid children continued their treatment regularly. In addition, none of the 22 children who had special education before the earthquake could continue their education after the earthquake.

Measures

The parents completed the sociodemographic data form; In addition, during the clinical interview by the clinician, parents were asked to fill in The Aberrant Behavior Checklist, Children's Sleep Habits Questionnaire, and

Autism Behavior Checklist-ABC twice, considering both the situation of their children before the earthquake and the current situation three months after the earthquake.

Sociodemographic Data Form: The form was created by the researchers by examining the literature and consists of 19 questions, including information about the date of birth, sex, residence (tent or container), people living with, parent death in the earthquake, sibling death in the earthquake, relatives/friends death in the earthquake, being left under rubble and the duration of this, seeing the people who were removed from the ruble, father's occupation, autism diagnosis age. This form also includes an open-ended question, 'Please add your observations and opinions about your children during or after the earthquake' for more detailed information.

Aberrant Behavior Checklist (AbBC): It is a scale to determine the behaviour problems in children with ASD. The scale consists of 58 items and five subscales as 'Hyperactivity', 'Lethargy', 'Stereotype Behaviors', 'Self-injury' and 'Other Behaviors' and is completed by parents. Evaluation is made according to the scores of subscales. The validity and reliability study of the Turkish version was carried out by Sucuoglu (2003) (12). Cronbach Alpha coefficient was calculated as 0.96 (12).

Children's Sleep Habits Questionnaire (CSHQ): It consists of 33 items and determines sleep habits and sleep-related problems in children. The scale was developed by Owens et al. firstly (13). The validity and reliability study in Turkey was carried out by Perdahlı Fis et al. (14). There are eight subscales: Bedtime Resistance, Sleep Onset Delay, Sleep Duration, Sleep Anxiety, Night Wakings, Parasomnias, Sleep Disordered Breathing, and Daytime Sleepiness. In the scale, the parents are asked to evaluate the child's sleep habits retrospectively over the one last week. Cronbach Alpha coefficient was calculated as 0.78 (14).

Autism Behavior Checklist (ABC): It is an assessment tool consisting of 5 subscales (Sensory Behavior, Social Relating, Body and Object Use, Language and Communication Skills, Social and Adaptive Skills) and 57 items. The original form of the scale was developed by Krug et al. (15) and validated in Turkish by Yılmaz Irmak et al. in 2007. The cut-off point for the Turkish version of the scale was determined as 39 (16). Cronbach Alpha coefficient was calculated as 0.92 (16).

Statistical Analysis

In statistical analysis, the compatibility of continuous variables with normal distribution was evaluated with the Shapiro-Wilk test. The continuous variables were shown as mean±standard deviation. Categorical data were shown as frequency (n) and percentage (%). Wilcoxon Signed Ranks Test and Paired Sample Test were used to compare scale scores before and after the earthquake. The statistical significance level was accepted as $p<0.05$.

Results

This study included 19 (86.4%) boys and 3 (13.6%) girls. The age of the participants was 9.92±3.52 years. The age of ASD diagnosis was 3.86±1.66 years. It was determined that one of the participants lived in their house because it was mildly damaged, while the others were sheltered in containers or tents because their homes were severely damaged. No child was left under rubble and lost a parent or a sibling in the earthquake; 10 lost relatives/friends; 4 saw the people removed from the rubble. Other sociodemographic characteristics of the participants are summarized in Table 1.

In the analyses, AbBC-hyperactivity ($p<0.001$), AbBC-lethargy ($p=0.001$), AbBC Stereotype behaviours ($p<0.001$), AbBC-other behaviours ($p<0.001$) subscale scores were found to be significantly higher after the earthquake compared to before. No statistical difference was observed in the AbBC-Self-injury subscale. In the CSHQ-sleep anxiety ($p=0.008$) subscale scores of the participants, there was a statistically significant increase after the earthquake compared to before. No statistical difference was found in the other CSHQ subscales before and after the earthquake. It was shown that the participants had a significantly increased score of ABC-sensory behaviours ($p=0.017$), ABC-social rating ($p=0.034$), and ABC-social and adaptive skills ($p=0.026$) subscales of ABC. No statistical difference was found in the participants' ABC-language and communication skills and ABC-body and object use scales before and after the earthquake. The increase in the scores on the scales indicates an increase in the severity of symptoms (Table 2).

Figure 1 is added below to visually show the changes in the AbBC, CSHQ and ABC subscale scores before and after the earthquake.

Table 1: Participants' Sociodemographic and Earthquake Death/Injury Characteristics

		n	%
Age (years)		9.92 *	3.52§
Sex	Boy	19	86.4
	Girl	3	13.6
ASD diagnosis age (years)		3.86 *	1.66§
Neurological disease diagnosis	Absent	21	95.5
	Present	1	4.5
Parent status	Married	17	77.3
	Widowed	3	13.6
	Father death	2	9.1
	Mother death	0	0.0
Housing status	Container	16	72.7
	Tent	5	22.7
	House	1	4.5
Parent death in the earthquake	Yes	0	0.0
	No	22	100.0
Parent injury in the earthquake	Yes	4	18.2
	No	18	81.8
Sibling death in the earthquake	Yes	0	0.0
	No	22	100.0
Sibling injury in the earthquake	Yes	0	0.0
	No	22	100.0
Relatives/friends death in the earthquake	Yes	10	45.5
	No	12	54.5
Relatives/friends injury in the earthquake	Yes	3	13.6
	No	19	86.4
Being left under the rubble	Yes	0	0.0
	No	22	100.0
Being injured in the earthquake	Yes	0	0.0
	No	22	100.0
Permanent physical damage in an earthquake	Yes	0	0.0
	No	22	100.0
Outpatient treatment in an earthquake	Yes	0	0.0
	No	22	100.0
Inpatient treatment in an earthquake	Yes	0	0.0
	No	22	100.0
Seeing the people who were removed from the rubble	Yes	4	18.2
	No	18	81.8

**Mean, §Standard deviation*

Parents' answers to open-ended questions about the changes after the earthquake for their children with ASD included: 'Reduced spending time with people', 'Decreased playing with people', 'Increased spending time alone with inanimate objects', 'Making fewer friends with other children' 'He decreased spending time with his peers', 'Spends more time alone than before', 'Prefers to be alone', 'He became withdrawn after the earthquake', 'Repetitive movements increased', 'Repetitive speeches increased'.

Discussion

The present study evaluated the changes in the severity of autism symptoms and sleep patterns in children and adolescents with ASD, one of the vulnerable and risky groups affected by earthquakes. The study findings showed an increase in the severity of autism symptoms and a worsening in the clinic in the study group after the earthquake. Although there are numerous studies evaluating the impact of stressful life events on the course of psychiatric disorders, such as schizophrenia or mood disorders (17, 18) and an increasing body of literature addressing the psychological sequelae of children and adolescents after natural disasters (19, 20), the current literature is still lack of the knowledge about what kind of an adaptive process is experienced for the individuals with ASD after natural disasters. This study contributes to this deficient part of the literature by evaluating the impact of an important natural disaster, such as an earthquake, on children and adolescents with ASD.

In the present study evaluating children with ASD three months after the earthquake, It was determined that after the earthquake, there was a significant increase in the ABC sensory behaviour, social rating, and social and adaptive skills subscales compared to the pre-earthquake, that is, the children's current clinic worsened, and the severity of autism symptoms increased. By examining in detail which items caused the statistically significant increase in the ABC-sensory behaviour subscale, an increase of 'Covers ears at many sounds' and 'Stares into space for long periods of time' was observed. Parents stated that their children were terrified of the sound emerging with the earthquake, they shouted by covering their ears at that time, and then their children responded by closing their ears to loud noises similar to those during the earthquake. By examining in detail which items caused the statistically significant increase in the ABC-social rating subscale, It was observed that the scale items 'Often frightened or very anxious', 'Actively avoids eye contact', 'Frequently does not attend to social/environmental cues', 'Does not imitate other children at play' were mostly marked.

Table 2. Comparison of participants' AbBC, CSHQ, ABC subscale scores before and after the earthquake

	Pre-earthquake		Post-earthquake (3rd month)		Test statistics §	p-value
	Mean	Standard Deviation	Mean	Standard Deviation		
AbBC-hyperactivity	11.86	7.17	17.27	8.95	-3.833[a]	<0.001*
AbBC-lethargy	15.14	7.28	19.05	8.66	-3.997	0.001**
AbBC- stereotype behaviours	5.05	3.47	7.05	4.31	-4.690	<0.001**
AbBC- self-injury	1.32	1.91	1.86	2.73	-1.480[a]	0.139*
AbBC- other behaviours	4.77	2.16	6.50	2.74	-4.426	<0.001**
CSHQ- bedtime resistance	9.36	3.09	10.73	3.86	-1.890[a]	0.059*
CSHQ- sleep onset delay	1.36	0.66	1.36	0.66	0.000[b]	1.000*
CSHQ- sleep duration	3.36	0.73	3.55	1.22	-1.342[a]	0.180*
CSHQ- sleep anxiety	6.77	2.52	7.55	2.67	-2.642[a]	0.008*
CSHQ- night wakings	4.18	1.33	4.18	1.14	0.000[b]	1.000*
CSHQ- parasomnias	8.09	1.51	8.59	1.89	-1.964[a]	0.050*
CSHQ-sleep-disordered breathing	3.36	0.73	3.36	0.73	0.000	1.000*
CSHQ- daytime sleepiness	8.23	1.85	8.23	1.85	-.447[a]	0.655*
ABC- sensory behaviours	6.18	5.19	7.32	5.91	-2.595	0.017**
ABC- social rating	13.77	8.71	15.09	7.99	-2.263	0.034**
ABC- body and object use	13.68	6.95	15.36	7.64	-1.638	0.116**
ABC- language and communication skills	11.18	4.35	12.32	4.83	-1.977	0.061**
ABC- social and adaptive skills	12.86	5.87	14.55	5.37	-2.401	0.026**
ABC- total	57.68	22.21	61.45	24.17	-0.821	0.421**

§ Z for Wilcoxon Test and T for Paired Sample Test were demonstrated
**Wilcoxon Signed Ranks Test*
*** Paired Sample Test*
[a]Based on negative ranks. [b]The sum of negative ranks equals the sum of positive ranks

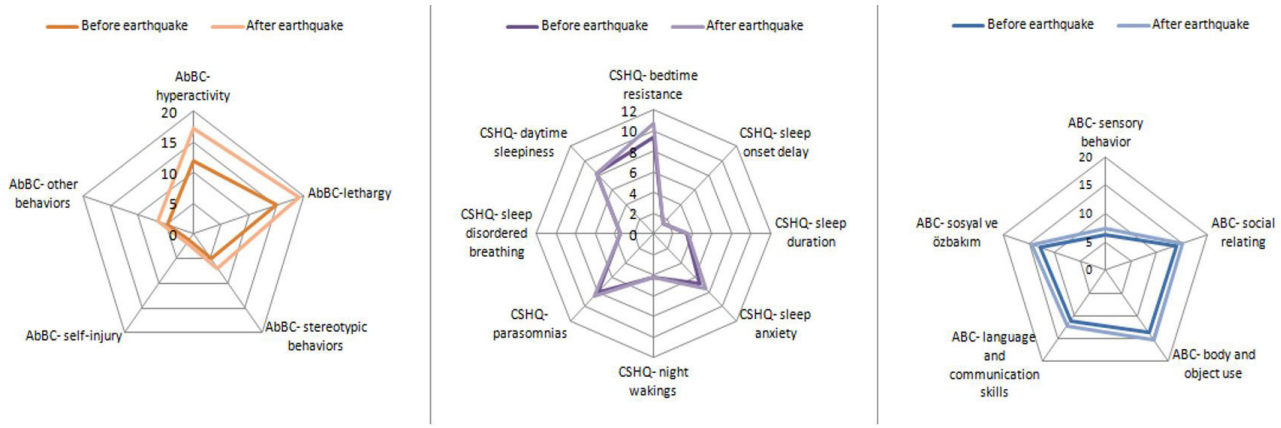

Figure 1: *AbBC, CSHQ and ABC subscale score changes with the earthquake*

It is seen that earthquake increases children's anxiety and decreases non-verbal communication with their environment. Some parents stated that their children became more timid and cowardly after the earthquake, their desire to initiate contact with people decreased, and they did not pay much attention to communicating with others. When the statistically significant increase in the ABC-social and adaptive skills subscale is examined in detail, it was determined that the scale items such as 'Severe temper tantrums and/or frequent minor tantrums', 'Hurts others by biting, hitting, kicking...', and 'Does not wait for needs to be met (wants things immediately)'. In addition, it was observed that parents who verbally stated that some children decreased spending time with people and playing games after the earthquake and increased spending time alone with inanimate objects also marked the scale item 'Prefers to manipulate and be occupied with inanimate objects' more. Parents stated that after the earthquake, their children developed fewer friendships and reduced spending time with their peers compared to pre-earthquake. Also, they said there was a notable increase in preferring to be alone, and their children became withdrawn. Apart from the direct effect of the earthquake, which is a serious source of stress, it is thought that apparent indirect effects, such as the disruption of education of children after the earthquake, having to live and shelter in places with limited facilities such as tents and containers, and the lack of opportunities to spend time with their peers are also responsible for the current clinical situation. When the ABC-language skills subscale scores were compared before and after the earthquake, there was no statistical significance. We believe that this situation is due to the relatively small number of our samples, and if a larger sample is studied, the difference will be significant in statistics. In interviews with parents, it was frequently heard that there was a substantial increase in children's stereotype and echolalia symptoms after the earthquake. Young people with ASD should be included in intensive rehabilitation programs immediately to regain their pre-disaster functions and return to their daily life routines as much as possible (21). If awareness of mental health problems and early intervention can ameliorate the negative psychological effects of disasters on children and adolescents in the general population (22), appropriate interventions need to be undertaken also for children and adolescents with ASD.

There was a statistically significant increase in the AbBC-hyperactivity, AbBC-lethargy, AbBC-stereotype behaviours and AbBC-other behaviours subscale scores, indicating that the clinic of the children with ASD worsened and the symptoms increased after the earthquake. We interpreted that the restlessness of the child with ASD, indicated by the increase in the post-earthquake AbBC-hyperactivity score, is associated with irritability. The increased score of the items 'demands must be met immediately', 'mood changes quickly', 'seeks isolation from others', 'repetitive speech' in the AbBC- other behaviours subscale support the irritability of the children with ASD after the earthquake and the increase in echolalia also stated by the parents. Likewise, the increase in the AbBC-stereotype behaviour scores indicates the increase in the stereotype of the children with ASD after the earthquake also said by the parents. The children with ASD, whose routines are disrupted in their normal daily life, are irritable, and their stereotypy and echolalia symptoms increase under distressing situations; It is known that most of them exhibit problem behaviours in their routine lives (23). Children with autism have more difficulty transitioning from one activity or environment to another and adapting to routine changes compared to children with normal development. Because they want to maintain sameness, need predictability in activity or environment changes, and have limited behavioural patterns (5). The changes in daily routines after the earthquake, the necessity of living in containers or tents, and the disruption of education caused compulsory social isolation. We can see the effect of these from the increase in the AbBC-lethargy score.

Sleep problems affect approximately 20-40% of healthy children (10). This problem is particularly evident in children with neurodevelopmental diseases, including autism, and can be observed in about 80% of patients (11). It is expected that the sleep problems of children with autism will increase with the earthquake. In the present study, it was determined that there was a statistically significant increase in the CSHQ-sleep anxiety score after the earthquake compared to the pre-earthquake. Also, it was stated by the parents that most of the children with ASD began to fear sleeping alone after the earthquake.

Life stressors rarely affect the entire population simultaneously. Therefore, identifying subpopulation differences in disaster preparedness is particularly important because different public health messages, programs, and distribution channels may be required to improve preparedness among different subgroups (24). Unfortunately, a devastating earthquake provided an opportunity to explore the effects of such a devastating natural disaster on ASD patients. In the Kahramanmaras-centered earthquake, most people living in the centre of Hatay lost their homes. Outpatient treatment, rehabilitation centres, and entire

schools were severely damaged, and public services and education were seriously disrupted. It is a major issue that needs to be known regarding proper interventions and how children with special needs are affected in a natural disaster that affects life so clearly in general. Since few studies specifically address the impact of natural disasters on the adaptation to changing daily routines of the ASD patients, the present study will contribute notably to the literature in this sense.

An exciting finding of open-ended statements was that the earthquake effect was more prominent in children with ASD whose symptoms and severity were less before the earthquake and that it was more difficult to detect the impact in children with ASD whose symptoms and severity were more intense. Therefore, considering these findings as preliminary, we strongly recommend further studies to make comparisons between the severity groups of ASD, and the areas that have not been adequately studied should be investigated further.

Limitations and strengths

One of the limitations of this study is being in a cross-sectional design, and the second is that the sample size is relatively small. Since the pre-earthquake ASD clinical status and sleep habits of the children were questioned retrospectively, it may have created a minimal level of recall bias. Still, three months is not a very distant date to remember. On the other hand, one of the study's strengths is that the mother, the parent who is more interested and spends time with the child, filled out the forms; the second was that the scales were explained to the parent by the clinician in the form of a clinical interview.

Conclusion

The most important contribution of this study to the literature is that it investigated the effect of an important natural disaster event, such as an earthquake, on children with ASD. There was an increase in the severity of autism symptoms and a worsening in the clinic in the study group after the earthquake. Also, the earthquake disturbed sleep habits in terms of sleep anxiety. Therefore, particular measures and approaches related to children with ASD having special needs should be highlighted in disaster preparedness. Especially the physical conditions should be established as soon as possible after the earthquake for children with autism to continue their special education.

Declarations

Acknowledgement

None.

Data availability

The data supporting this study's findings are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Conflicts of interest

The authors declare no conflict of interest.

Statement of Ethical Considerations

The study was conducted according to acceptable research standards. Informed consent was obtained from study subjects. The comparative cross-sectional study was carried out after getting ethics committee permission (decision no: 2023/76-08) from the Ethics Committee of Amasya University and institutional permission from Hatay field hospital, where the study was conducted. All authors have read and approved the submitted manuscript.

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Supplemental Tables

Supplemental Table 1. Pre- and post-earthquake AbBC items scores of the participants

		Pre-earthquake		Post-earthquake (3rd month)	
		Mean	Standard Deviation	Mean	Standard Deviation
1	Excessively active at home, school, work,or elsewhere	1.00	0.87	1.55	1.01
2	Injures self on purpose	059	0.85	0.73	1.16
3	Listless, sluggish, inactive	0.27	0.46	0.50	0.86
4	Aggressive to other children or adults (verbally or physically)	0.73	0.98	1.55	1.26
5	Seeks isolation from others	1.50	0.67	2.05	0.95
6	Meaningless, recurring body movements	1.09	0.81	1.73	1.08
7	Boisterous (inappropriately noisy and rough)	0.77	0.92	1.18	1.22
8	Screams inappropriately	0.95	0.90	1.18	1.14
9	Talks excessively	0.50	0.86	0.68	0.99
10	Temper tantrums / outbursts	1.23	0.81	1.73	0.98
11	Stereotyped behavior; abnormal, repetitive movements	1.14	0.77	1.73	1.08
12	Preoccupied; stares into space	0.55	0.80	0.82	0.96
13	Impulsive (acts without thinking)	0.64	0.73	0.82	0.96
14	Irritable and whiny	1.18	0.73	2.05	0.95
15	Restless, unable to sit still	0.95	0.90	1.50	1.26
16	Withdrawn; prefers solitary activities	1.36	0.85	1.86	0.99
17	Odd, bizarre in behavior	1.14	0.77	1.64	1.05
18	Disobedient; difficult to control	0.68	0.65	1.32	1.25
19	Yells at inappropriate times	0.86	0.71	1.50	1.10
20	Fixed facial expression; lacks emotional responsiveness	0.41	0.50	0.59	0.85
21	Disturbs others	0.36	0.49	0.73	1.03
22	Repetitive speech	0.95	1.00	1.32	1.21
23	Does nothing but sit and watch others	0.68	0.78	0.82	0.85
24	Uncooperative	0.18	1.10	1.32	1.13
25	Depressed mood	0.59	0.67	0.82	0.91
26	Resists any form of physical contact	0.41	0.59	0.64	1.00
27	Moves or rolls head back and forth repetitively	0.45	0.60	0.64	0.85
28	Does not pay attention to instructions	0.77	0.75	0.91	0.87

29	Demands must be met immediately	1.23	0.92	1.64	1.00
30	Isolates himself/herself from other children or adults	1.41	0.73	2.00	1.02
31	Disrupts group activities	0.27	0.46	0.23	0.43
32	Sits or stands in one position for a long time	0.45	0.74	0.50	0.96
33	Talks to self loudly	0.91	0.81	1.18	1.10
34	Cries over minor annoyances and hurts	1.18	0.66	1.82	0.96
35	Repetitive hand, body, or head movements	1.05	0.95	1.45	1.18
36	Mood changes quickly	1.09	0.68	1.50	1.01
37	Unresponsive to structured activities (does not react)	1.05	1.00	1.14	1.08
38	Does not stay in seat (e.g., during lesson or training periods, meals, etc.)	0.73	0.83	0.91	1.11
39	Will not sit still for any length of time	0.64	0.90	0.73	1.08
40	Is difficult to reach, contact, or get through to	0.86	0.77	1.05	0.95
41	Cries and screams inappropriately	0.68	0.72	1.14	1.13
42	Prefers to be alone	1.27	0.77	1.73	1.03
43	Does not try to communicate by words or gestures	0.64	1.05	0.64	1.05
44	Easily distractible	1.41	0.91	1.86	1.04
45	Waves or shakes the extremities repeatedly	0.64	0.85	0.73	0.94
46	Repeats a word or over and over	0.91	0.87	2.27	4.13
47	Stamps feet or bangs objects or slams doors	0.82	0.96	1.32	1.36
48	Constantly runs or jumps around the room	1.00	1.02	1.09	1.15
49	Rocks body back and forth repeatedly	0.68	0.78	0.77	0.97
50	Deliberately hurts himself/herself	0.36	0.66	0.59	1.01
51	Pays no attention when spoken to	0.77	0.75	1.05	0.90
52	Does physical violence to self	0.36	0.58	0.55	0.86
53	Inactive, never moves spontaneously	0.23	0.61	0.23	0.61
54	Tends to be excessively active	1.14	0.94	1.45	1.22
55	Responds negatively to affection	0.36	0.49	0.45	0.67
56	Deliberately ignores directions	1.00	0.69	1.27	0.88
57	Has temper outbursts or tantrums when he/she does not get own way	1.27	0.70	1.86	0.99
58	Shows few social reactions to others	1.45	0.74	1.59	0.80

Supplemantal Table 2. Pre- and post-earthquake ABC items' presence ratio of the participants

		Pre-earthquake		Post-earthquake (3rd month)	
		n	%	n	%
1	Whirls self for long periods of time	5	22.7	6	27.3
2	Learns a simple task but "forgets" quickly	7	31.8	9	40.9
3	Frequently does not attend to social/ environmental cues	10	45.5	13	59.1
4	Does not follow simple commands (sit down, come here, stand up) given once	3	13.6	2	9.1
5	Does not use toys appropriately (spins wheels, etc.)	10	45.5	11	50.0
6	Poor use of visual discrimination when learning (fixates on parts of objects such as size, color, position…)	9	40.9	10	45.5
7	Lacks a social smile (may smile out-of-context)	2	9.1	3	13.6
8	Exhibits pronoun reversal (you for I…)	4	18.2	4	18.2
9	Insists on keeping certain objects with him/herself	11	50.0	13	59.1
10	Seems not to hear (despite normal hearing tests)	3	13.6	3	13.6
11	Speech is atonal and arrhythmic	10	45.5	13	59.1
12	Rocks self for long periods of time	4	18.2	6	27.3
13	Does not (or did not as a baby) reach out when reached for	8	36.4	8	36.4
14	Strong reactions to minor changes in routine/ environment	6	27.3	9	40.9
15	Does not respond to own name when called out among two or more other names	6	27.3	5	22.7
16	Lunges and darts about, interrupted by spinning, toe walking, hand flapping…	11	50.0	12	54.5
17	Not responsive to other people's facial expressions or feelings	11	50.0	11	50.0
18	Seldom uses "yes" or "I"	8	36.4	10	45.5
19	Has special abilities in one area – seems to rule out mental retardation	13	59.1	13	59.1
20	Does not follow simple prepositional commands (e.g., "put the ball in the box")	7	31.8	7	31.8
21	Sometimes shows no "startle response" to a loud noise	4	18.2	4	18.2

22	**Flaps hands (or other self-stimulating behavior)**	7	31.8	9	40.9
23	**Severe temper tantrums and/or frequent minor tantrums**	12	54.5	16	72.7
24	**Actively avoids eye contact**	10	45.5	12	54.5
25	**Resists being touched or held**	7	31.8	7	31.8
26	**Sometimes, painful stimuli (cuts, injections, bruises) evoke no reaction**	3	13.6	3	13.6
27	**Is (or was as a baby) stiff and hard to hold**	4	18.2	4	18.2
28	**Is flaccid (doesn't cling) when held in arms**	5	22.7	5	22.7
29	**Gets desired objects by gesturing**	10	45.5	11	50.0
30	**Walks on toes**	3	13.6	3	13.6
31	**Hurts others by biting, hitting, kicking…**	5	22.7	8	36.4
32	**Repeats phrases over and over again**	9	40.9	12	54.5
33	**Does not imitate other children at play**	12	54.5	12	54.5
34	**Often will not blink when a bright light is directed toward eyes**	0	.0	0	.0
35	**Hurts self by biting hand, banging head…**	4	18.2	7	31.8
36	**Does not wait for needs to be met (wants things immediately)**	13	59.1	17	77.3
37	**Cannot point to more than five named objects**	4	18.2	4	18.2
38	**Has not developed any friendships**	12	54.5	13	59.1
39	**Covers ears at many sounds**	11	50.0	14	63.6
40	**Twirls, spins, and bangs objects a lot**	10	45.5	11	50.0
41	**Difficulties with toilet training**	4	18.2	5	22.7
42	**Uses 5 or less words per day spontaneously to communicate wants or needs**	9	40.9	9	40.9
43	**Often frightened or very anxious**	8	36.4	11	50.0
44	**Squints, frowns, or covers eyes when in the presence of natural light**	5	22.7	6	27.3
45	**Does not dress self without frequent help**	10	45.5	10	45.5
46	**Repeats sounds or word over and over again**	9	40.9	10	45.5
47	**"Looks through" people**	2	9.1	2	9.1
48	**Echoes questions or statements made by other people**	5	22.7	5	22.7
49	**Frequently unaware of surroundings and may be oblivious to dangerous situations**	11	50.0	11	50.0
50	**Prefers to manipulate and be occupied with inanimate objects**	16	72.7	16	72.7
51	**Will feel, smell, or taste objects in the environment**	12	54.5	12	54.5
52	**Frequently has no visual reaction to a "new" person**	7	31.8	7	31.8
53	**Gets involved in complicated "rituals" such as lining things up…**	9	40.9	10	45.5
54	**Is very destructive (toys and household items are quickly broken)**	5	22.7	6	27.3
55	**A developmental delay was identified at or before 30 months of age**	21	95.5	21	95.5
56	**Uses at least 15 but less than 30 spontaneous phrases daily to communicate**	13	59.1	12	54.5
57	**Stares into space for long periods of time**	3	13.6	3	13.6

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Radiology / Radyoloji

Can Cellular Differentiation and Microvascular Invasion in Hepatocellular Carcinoma be Predicted by Contrast-Enhanced Computed Tomography?

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ABSTRACT

Purpose: The purpose of our study was to examine the contrast-enhanced computed tomography (CECT) characteristics of hepatocellular carcinoma (HCC) in explanted liver, the association between microvascular invasion (MVI) and cellular differentiation, and to predict the severity of HCC.

Methods: CECT images of 54 surgically proven HCCs were evaluated with abdominal radiologist. Our CECT protocol was composed of precontrast, arterial, portal and delayed venous phases. The radiologist analysed the CT images for; tumor size, tumor margin, presence of intratumoral vessels; presence of capsule; intratumoral fat accumulation; and macroinvasion. The imaging features were correlated with cellular differentiation and MVI using Fisher's exact test or the χ^2 test.

Results: The results of our study indicated that there was a significant inverse correlation between the presence of capsule and MVI ($p<0,05$, $r= -0, 37$) and the grade of HCC ($p=0,001$, $r = -0,42$) while a positive correlation was observed between macroinvasion and the grade of HCC ($p=0,02$).

Conclusion: CECT-observed incomplete tumor capsule and macroinvasion accurately predict MVI and tumor grade prior to surgery and provide a more precise prognosis without a tissue sample, which will benefit in the management of cirrhosis and HCC patients.

Keywords: Hepatocellular carcinoma, liver transplantation, microvascular invasion, prognosis, tomography

Hepatoselüler Karsinomda Hücresel Diferansiyasyon ve Mikrovasküler İnvazyon Kontrastlı Bilgisayarlı Tomografi ile Öngörülebilir mi?

ÖZET

Amaç: Çalışmamızın amacı, eksplante karaciğerde hepatoselüler karsinomun (HCC) kontrastlı bilgisayarlı tomografi (CECT) özelliklerini, mikrovasküler invazyon (MVI) ve hücresel farklılaşma arasındaki ilişkiyi incelemek ve HCC'nin derecesini tahmin etmektir.

Yöntem: Cerrahi olarak kanıtlanmış 54 HCC' nin CECT görüntüleri, batın radyoloğu tarafından değerlendirildi. CECT protokolümüz kontrast öncesi, arteriyel, portal ve geç venöz fazlardan oluşuyordu. BT görüntüleri tümör boyutu, tümör sınırı, tümör içi damarların varlığı; kapsülün varlığı;nintratümöral yağ birikimi; ve makroinvazyon olarak analiz edildi. Görüntüleme özellikleri, Fisher exact test ve χ^2 testi kullanılarak hücresel farklılaşma ve MVI ile ilişkilendirildi.

Bulgular: Çalışmamızın sonuçları, kapsül varlığı ile MVI varlığı ($p<0,05$, $r= -0, 37$) ve HCC derecesi ($p=0,001$, $r = -0,42$) arasında anlamlı bir ters korelasyon olduğunu, makroinvazyon ile HCC derecesi arasında ise, pozitif korelasyon olduğunu göstermiştir ($p=0,02$).

Sonuç: CECT ile tanı alabilen makroinvazyon varlığı ve tümör kapsülü yokluğu, operasyon öncesinde MVI ve tümör derecesini doğru bir şekilde belirleyerek doku örneklemesine gerek kalmadan siroz ve HCC hastalarının tedavisinde prognozu öngörebilir.

Anahtar kelimeler: Hepatosellüler karsinom, karaciğer nakli, bilgisayarlı tomografi, mikrovasküler invazyon, prognoz

Hepatocellular carcinoma (HCC) is the fourth leading cause of cancer-related death worldwide and the sixth most prevalent malignancy overall (1). HCC is a rare type of cancer that can be identified by radiological imaging methods without requiring a confirmed biopsy. The current practice guidelines state that imaging modalities can diagnose HCC with high specificity and acceptable sensitivity (2).

Because the prognosis of HCC depends on the stage at which it is identified, imaging techniques are important factors in selecting the best course of treatment for patients among a variety of alternatives. The primary objective in the early phases is the cure. In this situation, liver transplantation and total or partial hepatectomy are performed. Transarterial chemoembolism (TACE) or radiofrequency ablation (RFA) or microwave ablation are suggested when surgical removal is not an option (3).

Contrast-enhanced computed tomography (CT) and/or magnetic resonance imaging (MRI) imaging criteria for HCC are early contrast uptake in the arterial phase, followed by washout in the portal venous or equilibrium phases. Dynamic computed tomography is commonly utilized in the diagnosis, staging, and monitoring of HCC (4). The development of imaging technology and intensive follow-up in high-risk populations have enabled the early detection of HCCs, which has improved prognosis. CECT has the benefit of being a quick imaging technique.

The two most important risk factors for the recurrence of HCC after surgical treatment are tumor grade and microvascular invasion. A preoperative evaluation of microvascular invasion (MVI), which could be utilized to guide therapy in patients with HCC, has received a lot of attention recently (5, 6).

Studies have revealed that MVI is a distinct histopathological prognostic feature linked to survival in patients with all stages of HCC (7). Additionally, compared to the Milan criteria, MVI has been shown to be a more accurate predictor of tumor recurrence and overall survival (8).

The aim of this study was to find accurate CT markers of MVI and tumor grade in patients undergoing living donor liver transplantation, including tumor sizes, multinodularity, macrovascular invasion, tumor margin, fat accumulation and capsule.

MATERIALS AND METHODS

Patients

Ethical approval was obtained from local ethics committee on clinical research. We analysed 220 cirrhotic patients between June 2015 and 2021 underwent liver transplantation. Exclusion criteria was tumors smaller than 1 cm, history of radiofrequence ablation, trans-arterial chemoembolization or systemic therapy before operation. A total of 220 patients; 54 patients (43 male,11 female patients; with a mean age of 58,91±7,89) could be included in the study based on the inclusion criteria. The age, gender, serum preoperative and postoperative AFP level, cause of the cirrhosis were collected from medical records. Clinical features and demographics of patients enrolled in the study are shown in Table 1.

CT Protocol

CT was performed using 100 mL of Omnipaque (Omnipaque, GE Healthcare) with multiphasic 256–section multi-detector CT (Siemens Definition Flash CT, Siemens Healthineers, Erlangen, Germany) at baseline before liver transplantation. The hepatic study protocol phases for imaging were precontrast, arterial, portal and delayed venous phases.

All images were loaded to picture and communication system (PACS, GE Healthcare). Two abdominal radiologists with 10 years experiences (AAK, BKS) qualitatively evaluated all CT images. According to Liver Imaging Reporting and Data System version 2018 (LIRADS) all lesions were reported based on imaging appearance that reflect the probability of HCC or malignancy with or without tumor in vein (9).

Image Analysis

There were totally of 54 HCCs that were detected on CT imaging and recorded by the radiologist. Blinded to pathology reports, the imaging findings of HCC such as, capsule appearance, the diameter of HCC, smooth margin or irregular margin, fat accumulation, macrovascular invasion, visualization of the internal arteries, and multifocality were evaluated for per patient during image analysis.

Figure 1 illustrates evidence of the capsule, with a surrounding hyperattenuation linear structure. Fat accumulation was depected with measuring the density of tumor on precontrast CT images. The tumors were classified as smooth or irregular according to their margins. Smooth margin includes a smooth interface between the tumor and normal liver parenchyma. Figure 2 shows the irregular-edged tumor, with infiltration into the surrounding liver parenchyma.

The HCC attenuation in each phase was characterized as nodular, heterogenous, and halo enhancement patterns in order to assess the enhancement pattern of different histological grades of HCC. Each lesion was examined for washout during the delayed phase observation.

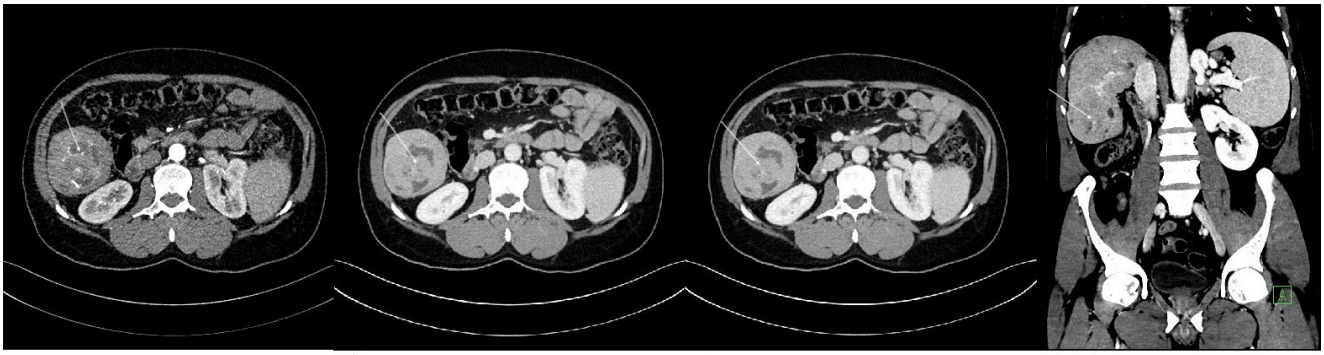

Fig. 1. *A 61-year-old man with cryptogenic cirrhosis. Axial contrast-enhanced arterial (a), portal (b), delayed (c) and coronal delayed (d) phase contrast-enhanced Computed Tomography scans show a heterogenous encapsulated mass, that is histopathology proven to be Grade 3 Hepatocellular carcinoma after liver transplantation.*

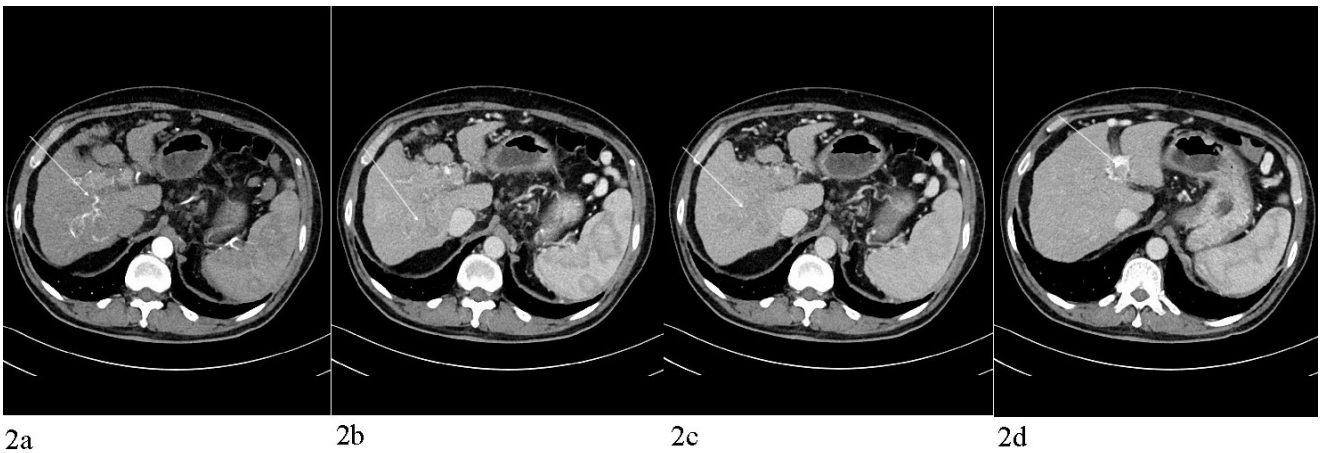

Fig. 2. *Images in a 63-year-old man with Hepatocellular carcinoma and Hepatitis B related cirrhosis. Early hepatic arterial (a) phase image shows heterogenous hypodense mass in segments VI - VII with arterial supply, relative to liver; mass enhances on portal (b) phase. In delayed venous phase it becomes hypoattenuating. Mass has irregular-edge shown to best in delayed venous phase. Malignant tumor trombus is shown in axial portal phase (d). Histologic examination showed Edmondson-Steiner Grade II tumor.*

Histopathological Assessment

A senior pathologist with 20 years experience evaluated the whole specimen and noticed the grade of HCCs according to Edmondson–Steiner (E-S) and microinvasion of the patients. E-S system also divides HCC in 4 grades based on an assessment of cellular atypia and nuclear- cytoplasm ratio (10).

According to E-S; Grade 1 and 2 lesions were included in low-Grade group; Grade 3 and 4 lesions were included in high-Grade group.

Statistical Analysis

Statistical analyses were done using SPSS v. 21 (SSPS, IBM Inc.) package programme and $p < 0.05$ was considered significant. Numerical variables were expressed as mean and standard deviation (SD) if distributed normally; median and minimum–maximum values if not. Categorical variables were given as numbers and percentages.

The Shapiro-Wilk test was used to decide whether the data (age, preoperative and postoperative AFP) were normally distributed or not. The Chi-square test and Fisher's exact test were performed to compare the grade and MVI. Student's t test was performed to compare the two means for both paired and unpaired data.

Performance of the diagnostic criteria compared to pathology was evaluated using the group of one largest HCC per patient. E-S Grade group and microvascular invasion were compared with CT features including tumor size, visualization of internal arteries, smooth or irregular margin, capsule presence, intralesional fat and macrovascular invasion using Fisher's Exact test.

RESULTS

54 patients with a pathological diagnosis of HCC were included in this study. Of these patients, 43 (79.63%) were male. The mean age of the patients was 58,91±7,89. AFP levels were 43,04±74,20 ng/ml while postoperative AFP levels were 2,64±2,53 ng/ml. All lesions were divided into E-S grade groups [Grade 1 (2 lesions); grade 2 (10 lesions); grade 3 (33 lesions) and grade 4 (9 lesions)]. 12 lesions were in low grade group and 42 lesions were in high grade group. 38 of the HCC lesions were in the right lobe of the liver and 16 of them were in the left lobe of the liver.

Demographic features and laboratory values are shown in Table 1.

Table 1. Demographic features and laboratory values of patients

Variables	Patients with surgically confirmed Hepatocellular Carcinoma (n=54)
Age (mean±SD)	58,91±7,89
Sex (M:F)	43 (79,63 %) :11 (20,37%)
Underlying cause of liver disease	
Hepatitis B	20
Hepatitis C	12
Cryptogenic	7
Hepatitis B and Hepatitis D coinfection	6
Hepatitis D	2
Non-alcoholic fatty liver disease	3
Autoimmune hepatitis	2
Wilson disease	1
Alcoholism	1
Preoperative alpha-fetoprotein (ng/ml)	43,04±74,20
Postoperative alpha-fetoprotein (ng/ml)	2,64±2,53
Edmonson- Steiner grade	
Grade 1	2
Grade 2	10
Grade 3	33
Grade 4	9

Intratumoral feeding artery was visualized in 49 HCC nodules on CECT. 28 HCCs have nodular, 15 HCCs have halo and 11 HCCs have heterogenous contrast enhancement. More than half of the HCCs (35 of 54) exhibited the characteristic CT features of HCC. 29 of 54 HCCs had smooth margin and the others have irregular margin.

Smooth or irregular margin, intralesional fat, presence of satellite lesion, multifocality, size and visualization of feeding artery on CT images were not correlated with the grade of HCC and MVI. However there was a significant inverse correlation between the tumor grade and capsule present (p=0,001) while a significant positive correlation between the tumor grade and macroinvasion (p=0,02). Capsule was absent in 72,5 % of high grade group, while the capsule was present in all of low grade group.

Macroinvasion was present 40 % of high grade group. MVI was inverse correlated with the presence of capsule according to radiology features (p<0,05). Correlation of grade and CT findings was reviewed in Table 2.

Table 2. Correlation of tumor grade and Computed Tomography Features

Computed Tomography Features	Group 1 N=12	Group 2 N=42	p
Smooth margin	8	21	0,41
Capsule	10	11	0,001
Multifocality	5	17	0,72
Size (mm)	33,10±13,69 (mm)	31,20±17,11 (mm)	0,75
Fat accumulation	2	6	0,67
Feeding artery	5	21	0,94

According to the pathology reports; the presence of microinvasion was correlated with the tumor grade (p=0,01). MVI is more common in poorly differentiated HCCs than well differentiated. MVI was founded of 64.1 % of high grade group while MVI was not founded in low grade group. Correlation of MVI and imaging features was reviewed in Table 3.

Table 3. Correlation of microinvasion and Computed Tomography features

Computed Tomography Features	Group 1*	Group 2**	p
Smooth margin	20	15	0,15
Capsule	18	2	0,01
Multifocality	16	8	0,06
Size (mm)	28,5±9,13	30,3±13,12	0,89
Fat accumulation	4	4	0,9
Feeding artery	14	14	0,9

**Group 1 Pathologically microinvasion negative*
***Group 2 Pathologically microinvasion positive*

DISCUSSION

This study revealed findings that might be used as prognostic CT characteristics of HCC. For the purpose of directing treatment plans and enhancing therapeutic results for HCC patients, a preoperative noninvasive prediction of grade and MVI may be crucial. In this work, we demonstrated a positive correlation between the tumor's macrovascular invasion and its cellular differentiation, which was inversely connected with the tumor capsule. Inverse association was also found between MVI and capsule presence. MVI and the other imaging characteristics of HCC did not correlate.

After resection or transplantation, the recurrence incidence is greater in patients with vascular invasion. According to Rodriguez et al. (11), 3 years following liver transplantation, MVI reduces overall survival and disease-free survival. Furthermore, Huang et al. (12) observed that the presence of MVI was associated with higher tumor recurrence following resection (hazard ratio (HR) = 4.07; p <0.001) and decreased overall survival following a second resection.

Consequently, the development of noninvasive imaging tools to reliably and safely determine the pathological grade of HCC and estimate the presence of MVI will increase patient survival rates. In several recent investigations, the presence of MVI in HCC has been predicted using radiological or radiomics parameters. According to these research, radiographic characteristics such the tumor margin, internal arteries, peritumoral enhancement, and hypodense halos play a significant role in the prediction of MVI. Along with our study, cellular differentiation and MVI were inversely correlated with capsule presence. Internal arteries, intralesional fat, the existence of satellite lesions, the uneven border, and tumor size were not linked to cellular differentiation and MVI.

In a study comparable to ours, Lim et al. (13) showed that there was a strict association between the grading of the HCC and the occurrence of microvascular emboli; MVI was more prevalent in moderately differentiated HCCs by E-S grading using a retrospective investigation on 368 patients.

The relationship between MVI and the tumor margin and tumor capsule in HCC has been the subject of numerous investigations, however the findings have been mixed. An irregular tumor border indicates that the tumor has infiltrated the liver parenchyma. According to Chou et al., the presence and location of MVI on the histopathology was linked with irregular tumor borders seen on multiphasic CT scans (14). We found no significant correlation between the irregular border and the histological degree of HCC and MVI in our investigation, despite the fact that this feature has been reported to be substantially associated with high MVI risk. High-Grade HCCs had smooth margins in our study.

In 10%–70% of cases, HCC may have a surrounding fibrous capsule (15). Our findings demonstrate decreased rates of microinvasion in capsulated HCCs, which is consistent with recent research (p=0.02 and p=0.01) (16).

According to Chandarana et al., the only factor that significantly correlated with MVI was tumor multifocality (17). Our study's findings, however, showed that satellite lesions did not correlate with tumor grade or MVI.

In our investigation, there was no statistically significant correlation between tumor size, internal artery identification, or tumor differentiation level. Paradis et al. (18) reported that tumor size is a significant predictive factor, which is contrary to our study's findings. On the other hand, Goh et al. researched patients who had multifocal HCC surgically removed. They claimed that the presence of MVI is a more significant predictive factor than tumor size (19). According to Lim et al. (20), this was most likely caused by its connection to MVI .

The fat content typically regresses in advanced HCC, contrary to what has been previously demonstrated in research on dysplastic nodules and early HCC (21). Patients with fat-containing HCCs may have a better clinical result than patients without fat-containing HCCs, according to research by Siripongsakun et al. (22). In contrast to these investigations, we were unable to demonstrate that the prevalence of fat alterations decreased with histological grade in our study. We believe that this may be because the etiology of HCC in our study were heterogeneous.

In this work, we have demonstrated a statistically significant superiority of capsule appearance and macroinvasion in evaluating the prognosis of HCC compared to other CT features. Radiologists should be knowledgeable about the diagnosis and staging of HCC as well as the imaging characteristics that show the MVI of the tumor. Because local therapies may be beneficial for these patients before liver transplantation. Particularly in situations when the waiting list for a liver transplant exceeds six months, RFA and TACE have been suggested as bridging therapy (23).

Our study had several limitations. Firstly, this is a retrospective study. Secondly, sample size is small. Prospective studies with more lesions should be investigated. On the other hand, prospective studies are required to assess the effectiveness of the Edmondson-Steiner grade and MVI as a marker of post-operative recurrence.

CONCLUSION

The presence of MVI, in addition to tumor grade, is a marker of aggressive biological tumor behavior that significantly changes the prognosis of the disease, particularly following potentially curative treatment. Patients with cirrhosis and HCC will benefit greatly from imaging methods and discoveries that can predict tumor and MVI grade ahead of treatment without the need for a biopsy. Numerous imaging features are highlighted in the present literature, and our investigation found that the presence of a capsule was a significant prognostic indicator of HCC. To improve HCC management and provide an assessment of the prognosis for HCC, large-scale studies are nevertheless required.

DECLARATIONS

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Conflicts of interest/Competing interests

Authors declare no conflict of interests/competing interests.

Ethics approval

This study was approved by the local ethics committee on clinical research (Date: 03/12/2020, Number: ATADEK-2020/25).

Availability of data and material

Not applicable.

Authors' contributions

All authors conceived and designed the analysis, collected the data, contributed data analysis and wrote the paper equally.

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Fall From Height Cases of Pediatric Intensive Care Unit and The Curfew of the COVID-19 Period Possible Effects on it

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Background/Purpose: To investigate whether the curfew of the COVID-19 pandemic influences the fall from height cases in children's age group.

Methods: This study was conducted in the Pediatric Intensive Care Unit (PICU) of University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Bursa, Turkey between 01 January 2017 and 01 January 2022. This study enrolled 39 males (35.1%) and 72 females (64.9%) aged 4.4 ±4.1 years.

Results: The findings indicate that when the school precautions existed, the number of fall cases who were admitted to PICU decreased 10-fold. Additionally, when the general precautions were performed, the number of fall cases who were admitted to PICU decreased 31,8%. On the other hand, the logistic regression model, which was established to predict the independent factors of higher fall cases among all of the fall cases admitted to PICU, was found to be significant. Falling from the 'storey of building', which is one of the variables included in the analysis, contributed significantly to the model and was in a 54.4-fold significant relationship with High Falls (above 4.57 meters). While pneumocephalus injury was associated with High Falls 9.2 times, pneumothorax was associated 15.9 times.

Conclusion: Our results have three implications. First, it was presented that above 4,57 meter falls cause more severe injuries than lower falls. Second, injury patterns, social parameters, epidemiological differences, required prevention equipment, and education of caregivers of fall cases were revealed. Third, the influences of the curfew on the COVID-19 pandemic were discussed.

Keywords: Fall, Fall from Heights, Pediatric Intensive Care Unit, The COVID-19 Pandemic

Çocuk Yoğun Bakım Ünitesinde Tedavi Gören Yüksekten Düşme Vakaları ve Covid-19 Kısıtlamalarının Bu Durum Üzerindeki Muhtemel Etkileri

ÖZET

Amaç: COVID-19 pandemisinde uygulanan sokağa çıkma yasağının çocuk yaş grubundaki yüksekten düşme vakalarını etkileyip etkilemediğini araştırmak.

Gereç ve Yöntemler: Bu çalışma 01 Ocak 2017 - 01 Ocak 2022 tarihleri arasında SBÜ, Bursa Yüksek İhtisas Eğitim ve Araştırma Hastanesi Çocuk Yoğun Bakım Ünitesi (ÇYBÜ)'nde yapılmıştır. Bu çalışmaya 4,4 ±4,1 yaşında 39 erkek (%35,1) ve 72 kız (%64,9) hasta dahil edilmiştir.

Bulgular: Bulgular, okul önlemleri alındığında ÇYBÜ'ye başvuran düşme vakalarının sayısının 10 kat azaldığını göstermektedir. Ayrıca genel önlemler alındığında ÇYBÜ'ye başvuran düşme vakası sayısı %31,8 azalmıştır. Öte yandan ÇYBÜ'ye başvuran tüm düşme olguları içinde yüksek düşme olgularının bağımsız faktörlerini yorumlamak için kurulan lojistik regresyon modeli anlamlı bulunmuştur. Analize dahil edilen değişkenlerden biri olan 'bina katından düşme' modele anlamlı katkı sağlamış ve Yüksekten Düşmeler (4,57 metre üzeri) ile 54,4 kat anlamlı bir ilişki içinde olmuştur. Pnömosefali yaralanması istatiksel olarak Yüksekten Düşme ile 9,2 kez ilişkilendirilirken, pnömotoraks 15,9 kez ilişkilendirilmiştir.

Sonuç: Sonuçlarımızın üç etkisi vardır. İlk olarak 4,57 metreden yüksekten düşmelerin, alçaktan düşmelere göre daha ağır yaralanmalara neden olduğu sunuldu. İkinci olarak, yaralanma paternleri, sosyal parametreler, epidemiyolojik farklılıklar, gerekli koruyucu ekipman ve düşme vakalarının bakım verenlerinin eğitimi ortaya konulmuştur. Üçüncüsü, sokağa çıkma yasağının COVID-19 salgını üzerindeki etkileri tartışılmıştır.

Anahtar Kelimeler: COVID-19 Pandemisi, Çocuk Yoğun Bakım Ünitesi, Düşme, Yüksekten Düşme.

Falling is a common phenomenon worldwide. However, data on fall cases who were treated in the Pediatric Intensive Care Unit (PICU) are scarce. Additionally, the influences of curfew during the COVID-19 period on such cases were not completely evaluated. The term 'Fall' refers to an injury to a person after landing on the floor after falling or jumping from a high place such as a building, ladder, etc. (1). The Accidental fall is a significant cause of morbidity and mortality in children. Falls are in seventh place in terms of global injury deaths to children (2). In the USA, Fall From Heights (FFH) cases are 2.81 per 100.000 population, annually (3). The crude mortality rate of falls was 9.55 per 100.000 population in China (4). In the USA, FFH is the fourth common cause of trauma-related deaths (5). In 2008, 43 children deaths caused by accidental falls were declared by the goverment in Turkey (6). Although fall-related injuries in children generate a significant health burden, the risk factors for these injuries have not been determined in a regular and comprehensive way. Our study identifies injury patterns and medical and social parameters of fall cases admitted to PICU.

After the first COVID-19 case emerged in China on 01.12.2019, the infection began to spread to the whole World and became a pandemic. The pandemic measures involving the closure of schools and curfews were declared as of 21.03.2020 in Turkey and worldwide. The pandemic lockdown was performed between 29/04/2020 and 17/05/2021 in Turkey. Along with the curfew, individuals under the age of 20 were completely prohibited from leaving their homes (7). Covid-19 Pandemic (C19P) affected almost every edge of the health system in the last two years. The goal of this study was to reveal the effects of the C19P lockdown period involving restrictions on fall cases in the pediatric age group. It is also aimed at drawing attention to epidemiologic data of fall cases. Our goal is to show the significant risk of pediatric accidental falls.

Material and Methods

Our study was approved by Bursa Yuksek Ihtisas Training and Education Hospital Ethics Committee (No:2011-KAEK-25 2022/06-04). While conducting this study, the 1975 Helsinki report and subsequent revisions were considered. A review was performed of the cohort of 111 children who suffered from falling injuries and were admitted to the PICU of University of Health Sciences, Bursa Yuksek Ihtisas Training and Research Hospital, Bursa, Turkey between 01/01/2017 and 01/01/2022. Children admitted due to superficial injuries were not included in the dataset. Our study does not involve many patients evaluated in the Emergency Department (ED) and discharged home. All patients were enrolled retrospectively.

We were inspired by a study which reported that falling from above 15 feet (4.57 meters) has important implications for pediatric emergency care (8). Therefore, we found this approach appropriate to design our study. We classified our cases as low falls (LF) (below 4.57 meters) and high falls (HF) (> or =4.57 meters). In the current study, one case was reported as an intentional fall. The rest of the cases were accepted as unintentional or accidental cases.

The data could not be obtained as coded with the International Classification of Diseases-10th Revision (ICD-10) trauma codes. Because when we began to search for fall cases via health records, it was figured out that so many inappropriate diagnostic terms were used for such cases. For this reason, the medical history of all trauma cases who underwent treatment in PICU was read one by one. Follow-up data of the cases were as much achieved as available in medical records. After that, the decision was made whether the patient was a fall case. Therefore, our study comprehends all of the fall cases who were admitted to the PICU of our hospital. The information was obtained by reviewing the patient files. Patients who had incomplete or missing data were excluded from the study because there was no facility for communication via post or telephone to the patient due to logistic causes. One case had autism, and one suffered from development disorder and was excluded from the study. The patient information was collected, including the medical status and epidemiological information. With regard to fall, the time, place, mechanism of the fall, and diameters of height were collected. Trauma findings were documented and referred to body parts.

Standard diameters were determined according to the hospital district's legal, authorized, and valid parameters. The building height of a standard flat is 3.2 m according to the municipality building by-law of the city (Table-1). The diameter of the caregiver arms in Turkish society as 1.1 m (Average length of human thorax-foot) was taken from an anthropometric research (9). Falling heights were calculated by using these data.

For the statistical analyses, the SPSS 15v Chicago IL program was used. A significant p-value was allowed as $p<0.05$. In the presentation of qualitative data, frequency and percentage were used; in the presentation of the numeric data, mean value, standard deviation, median

value, and minimum and maximum values were used. Analyses of data normality tests (Kolmogorov-Smirnov and Shapiro-Wilk) were performed due to heterogeneous distribution of averages Mann-WhitneyU, Chi Square test, and Fisher's Exact V test were used. Multivariable Analyses were performed in the second step because some variables are significant in the bivariate analyses at the 0.05 level and are also suitable for a binary Logistic Model.

Results

Epidemiologic characteristics

One hundred eleven accidental fall patients were admitted to the PICU of Bursa Yuksek Ihtisas Training and Research Hospital between 01.10.2017 and 01.01.2022. Of 55 patients the height of the fall was over 4.57 m. Four of them died as a consequence of FFH.

The most significant proportion of the cases who were admitted to PICU caused by a fall (57.6%) were preschool infants, followed by school-age children (19.8%)(Table-2). The most common falls are (47.72%) storey of a building (Table-2). The cases of 'Other Place of Falls' were; hitting a stone as a result of falling while standing, falling from a wall, falling into a water well, falling on a toy, and hitting his/her head. The majority of other falls (86.4) were significantly LF ($p < 0.001$).

No significant statistical relation was found between being a refugee in terms of HF and LF. The statistical calculations of mortality could not be made due to insufficient deaths. Two-thirds of the children's families lived in an urban area of the city, and one-third of the cases lived in rural areas and counties (Table-2). Almost one-third of cases were female. No significant gender differences were found (Table-2). The mean patient age was 4.4 years (0.1-16.2 years)(Table-3). 21.6 % of the children were refugees (Table-3). 3.6% (n=4) of all cases died (Table-4). Three of the falls were buffered by something: clotheslines, a ceiling of a car, and a branch of a tree. In one adolescent, attempted suicide was the cause of fall, accounting for 0.9% of the cases. In our study, we calculated that the mean voice of treatment of a case is 4756 ₺ (around US$221). A significant difference occurred between HF and LF cases in terms of the cost of staying in the PICU (table-4).

Factors Associated with Severity of Injuries

The logistic regression model, which was established to predict the independent factors of higher fall cases among all of the fall cases admitted to PICU, was found to be significant. Falling from the 'storey of building', which is one of the variables included in the analysis, contributed significantly to the model and was in a 54.4-fold significant relationship with HF (Table-5). While pneumocephalus injury was associated with HF 9.2 times, pneumothorax was associated 15.9 times (Table-5).

Medical care

The length of stay was recorded for all patients. The average hospital stay in the ward was 7,1 (1-42) days; in PICU was 5 (1-27) days (Table-3). Although infants (87.5) fall likelihood more LF, preschool children (62.5) tend to have HF (p=0.001). While the bed/armchair/couch/bunk bed (81.8) contributed significantly to more LF cases, the cases of falls from storey buildings (86.8) were significantly higher in HF (p=0.028 and p=0.001) (Table-2).

Patient Management

17,1 percent of the patients (n=11) required the surgery. Most of the cases require a multidisciplinary approach. In turn, 88 patients (79.2%) were consulted by Neurosurgery, and 23 patients (20.7%) were evaluated by Orthopedics (Table-4).

Mortality

Four patients died, each from trauma to the head. In addition, two fatalities resulted from falls from over 14.4 m. Due to the low number of victims, no association was calculated between the mortality and any variables.

Head Injuries

Eighty patients (72%) suffered a severe head injury; of these, 19 were brain contusions (Table 2). Pneumocephalus (78.9) was seen as significantly higher in HF rather than LF (p=0.005)(Table-2). The computed tomography (CT) study detected intracranial hemorrhage in 55 (49.5%) patients. Eighty patients (72%) suffered linear skull fracture; of these most common cranial bone which has a fracture line is occipital bone in 20 patients (25%)(Figure-1). Some patients had more than one bone involving a fracture line.

Thorax, Abdominal, and Extremity Injuries

Among thorax injuries, pneumothorax and lung contusion are found significantly higher in HF than in LF (p=0.001 and p=0.008) (Table-2). Liver damage, in turn, was the most frequent abdominal injury. As for extremity injuries, Upperextremity (80.0%) and pelvic fracture (100.0) injuries were significantly higher in HF rather than LF (p=0.011 and p=0.027).

Table-1.Standard Measures

Place	Altitude (m:meter)	Reference
Flat	3.2	https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=24623&mevzuatTur=KurumVeKurulusYonetmeligi&mevzuatTertip=5
Stairs	0.175	https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=24623&mevzuatTur=KurumVeKurulusYonetmeligi&mevzuatTertip=5
Sliding Fall	0	-
Caregiver arms in Turkish Society (Average length of human thorax-foot)	1.1741	Calis S, Calis C, Kocali K, et al. "18-65 Yaş arası kişilerin antropometrik verilerinin belirlenmesi üzerine bir alan araştırması: yükseköğretim kurumu uygulaması." Ergonomi 4.3 (2021): 147-161.
Bunk bed	1.86	https://www.ikea.com.tr/urun-katalogu/ikea-cocuk/8-12-yas/ranzalar-ve-karyolalar/20247982/svarta-ranza.aspx
Bed	0.66	https://www.ikea.com.tr/urun-katalogu/yatak-odalari/karyolalar/karyolalar/49009551/hemnesluroy-tek-kisilik-karyola.aspx
Baby car	1.03	https://www.kanzcocuk.com/kanz/bebek-arabasi/b-go-pratik-bebek-arabasi-fume/
Trampoline	0.215	https://www.decathlon.com.tr/p/fitness-trambolini-100/_/R-p-147480?mc=8558559
Armchair	0.45	https://www.ikea.com.tr/urun-katalogu/oturma-odalari/koltuklar/kumas-koltuklar/10438557/muren-yatar-koltuk.aspx
Chair	0.45	https://www.ikea.com.tr/urun-katalogu/yemek-odalari/sandalyeler/70103250/ingolf-sandalye.aspx
Slide/Swing	1.5	https://www.konak.bel.tr/ilan/2019-358781c.pdf

Table-2. The Possible Independent Factors Showing High Falls

Variables	HF (n/ %)	LF (n/ %)	p value
Head			
Linear fracture	42 (52.5)	38 (47.5)	0.318
Epidural hemorrhage	6 (30.0)	14 (70.0)	0.053
Subdural hemorrhage	10 (71.4)	4 (28.6)	0.080
Subarachnoid hemorrhage	10 (47.6)	11 (52.4)	0.844
Brain contusion	12 (63.2)	7 (36.8)	0.193
Pneumocephalus	15 (78.9)	4 (21.1)	**0.005**
Brain oedema	6 (75.0)	2 (25.0)	0.162
Thorax			
Pneumothorax	14 (87.5)	2 (12.5)	**0.001**
Hemothorax	3 (100.0)	0 (0.0)	0.118
Lung contusion	9 (90.0)	1 (10.0)	**0.008**
Rib fracture	4 (100.0)	0 (0.0)	0.057
Atelectasis	1 (25.0)	3 (75.0)	0.618
Extremities			
Lower extremity fracture	7 (77.8)	2 (22.2)	0.094
Upper extremity fracture	12 (80.0)	3 (20.0)	**0.011**
Pelvic fracture	5 (100.0)	0 (0.0)	**0.027**
Vertebral Fracture	3 (30.0)	7 (70.0)	0.321
Abdomen-pelvis			
Liver injury	5 (50.0)	5 (50.0)	1.000
Splenic injury	7 (77.8)	2 (22.2)	0.094
Kidney damage	0 (0.0)	2 (100.0)	0.495
Gender			
Male	18 (46.2)	21 (53.8)	0.598
Female	37 (51.4)	35 (48.6)	
Age			
Infant	2 (12.5)	14 (87.5)	**0.001**
Preschool	40 (62.5)	24 (37.5)	**0.001**
School	8 (36.4)	14 (63.6)	0.167
Adolescent	5 (49.5)	4 (44.4)	0.742
Cause of fall			
Suicide	1 (100.0)	0 (0.0)	0.495
Unintentional	54 (49.1)	56 (50.5)	
Place of fall			
Bed/armchair/couch/Bunk bed	2 (18.2)	9 (81.8)	**0.028**
Window	3 (60.0)	2 (40.0)	0.679
Lap	0 (0.0)	5 (100.0)	0.057
Tree	0 (0.0)	3 (100.0)	0.243
Storey of Building	46 (86.8)	7 (13.2)	**0.001**
Stairs	2 (28.6)	5 (71.4)	0.438
Domestic Furniture	0 (0.0)	1 (100.0)	1.000
Child park/sport	0 (0.0)	5 (100.0)	0.057
Baby Carriage	0 (0.0)	1 (100.0)	1.000
Other	3 (13.6)	19 (86.4)	**0.000**
Race			
Domestic	41 (47.1)	46 (52.9)	0.331
Foreign	14 (58.3)	10 (41.7)	
Place			
Urban	31 (43.1)	41 (56.9)	0.063
Rural	24 (61.5)	15 (38.5)	
Surgery/Conservative			
Surgery	11 (57.9)	8 (42.1)	0.424
Conservative	44 (47.8)	48 (52.2)	

Table-3.Epidemiologic Data of the Cases

Parameter	Number
Age (year) (min-max, n±SD)	0.1-16.2, 4.4 ±4.1
Gender (male/female)	72 (64.9) / 39 (35.1)
Place (urban/rural area)	72 (64.9) / 39 (35.1)
Duration of stay in PICU (days) (min-max, n±SD)	1.0-27.0, 5.0 ±5.3
Duration of stay in inpatient care (days) (min-max, n±SD)	1.0-42.0, 7.1 ±8.2
Prognosis(death/injured)	4 (3.6) / 107 (96.4)
Race (local/immigrant)	87 (78.4) / 24 (21.6)
Range of fall (meter) (min-max, n±SD)	0.0-25.20, 6.1 ± 5.3

Table 5: Model for Fall From Height by Performed the Binary Logistic Regression Analyze

	B	p	O.R.	95 % Confidence Interval (O.R.)	
				Lower Limit	Upper Limit
Preschool	1.424	.070	4.155	.889	19.424
Storey of Building	3.997	.000	54.447	11.743	252.437
Pneumocephalus	2.221	.014	9.214	1.573	53.985
Pneumothorax	2.769	.018	15.935	1.619	156.811
Lung Contusion	1.133	.348	3.105	.291	33.104
Upper-extremity Fracture	.369	.742	1.446	.160	13.026
Pelvic Fracture	23.542	.999	<100	.001	<100.000

Table-4: Consequences of the Falls

Outcomes	HF* (n/ %)	LF** (n/ %)	p value
Prognosis			
Survive	53 (49.5)	54 (50.5)	1.000
Exitus	2 (50.0)	2 (50.0)	
Consultations			
Neurosurgery	47 (53.4)	41 (46.6)	0.112
Orthopedics	18 (78.3)	5 (21.7)	**0.002**
Ear, nose and throat	6 (75.0)	2 (25.0)	0.162
Ophthalmology	14 (70.0)	6 (30.0)	**0.043**
Other departments	3 (50.0)	3 (50.0)	1.000
Pediatric infectious diseases	2 (100)	0 (0)	
Pediatric neurology	4 (66,6)	2 (33,3)	
	Median (min-max)	**Median (min-max)**	
Cost (₺)	4756 (464-69953)	1857 (384-63911)	
Intensive Care (day)	4 (1-23)	2 (1-27)	**0.000**
Inpatient Care (day)	4 (1-42)	4 (1-37)	0.127

*Abbreviations: *HF:High Falls, **LF: Low Falls.*

Seasons and Daytimes

When the times of admission were evaluated, it was observed that 52.2% of the patients (n=58) presented between 22:00 and 03:00. The most common presentation daytime of fall cases to our center is found at 23:00 o'clock at night (Figure-2). Most of the falls occurred in summer (n=53, 47.7%, Figure-3). Almost three-quarters of the cases were seen in warm months of the year.

Lockdown of Covid19 Pandemic Effect

Surprisingly, when the school precautions existed, the number of fall cases who were admitted to PICU of our hospital decreased 10-fold (Figure-3). Additionally, when the general precautions were performed, the number of fall cases who were admitted to PICU of our hospital decreased 31.8% (Figure-3). A number of the cases were calculated separately in terms of school and general precautions. A considerable decrease was seen in terms of fall cases due to both general and school precautions for C19P. Primarily, school precautions reduced the number of fall cases almost 10-fold. However, during the period when schools were opened, the number of FFH cases was found to be 1.275 times higher than during the closed period (Figure-3).

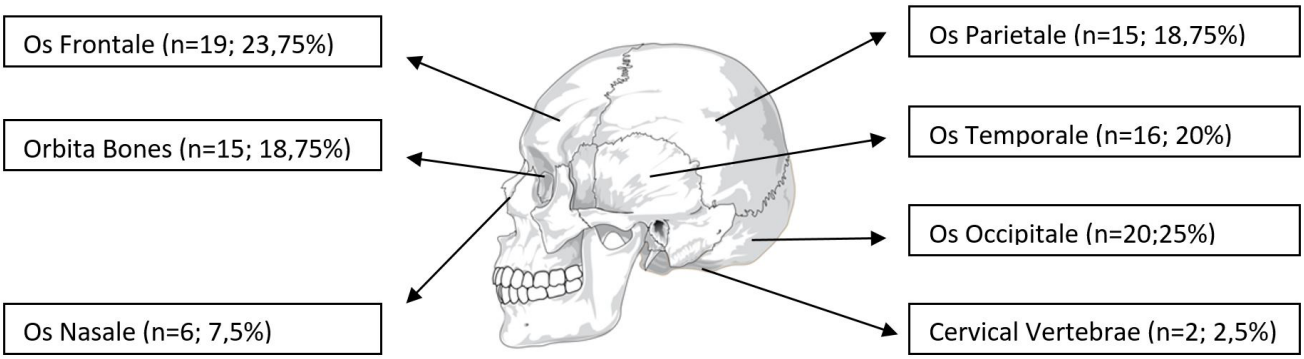

Figure 1. *Skull fractures in Our Cases*

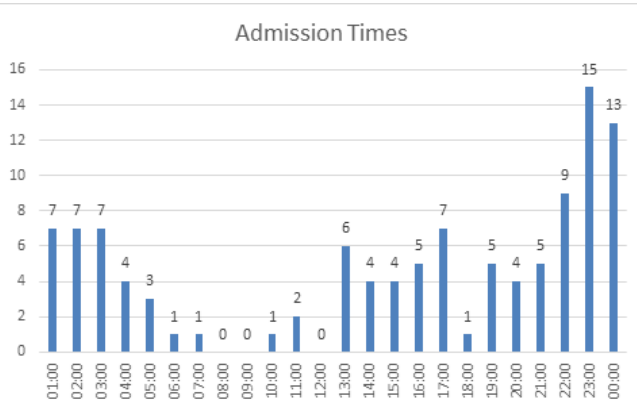

Figure 2. *Time of Admission of the Cases*

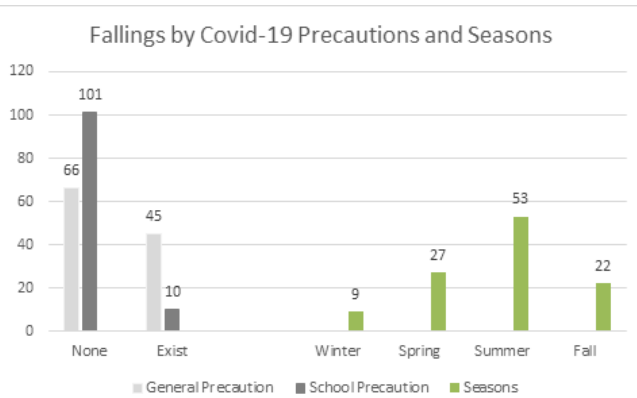

Figure 3. *Season of the Admission of the Cases*

Discussion

Similarly to our results, the fall of the height cases was more likely to be male (10)(12). A review revealed that preschool age, male gender, and poverty were found as higher risk factors for fall injuries (13). These findings are consistent with our results. Chaudhary et al. found that as age increases, the heaviness of the injury decreases (OR = 0.95, CI = 0.93–0.97) according to multinomial logistic regression models (14). Other researchers have reported that HF is more concerned with severe injuries than LF. For instance, Wang et al. suggested that the frequencies of emergency presentation, injury of nerve, fractures of spin, lower extremity, craniofacial, sternum, and rib, and early complications or associated injuries were significantly associated with the HF compared to LF (all P<.001) (10). Another study observed a negative correlation between trauma scores and falling distance (15). Muneshige et al. reported that the falling range was associated with the duration of treatment in the hospital. They also emphasized that the ratio of suicides, the number of lower-extremity fractures, the classification score of McCormack, and the time intervals of ICU and hospital stay were found to be significantly higher in cases falling from above 6 meters than lower (16). Falls are seen frequently in two age groups; one is very young people and the other is older adults (14). Similar to our results, most fall cases among the children's age group are preschool children (15). In our study, the mean patient age was 4,4 years. Therefore, our study consisted of literature. Some studies which comprehend fall cases 18 years old and below suggested different average ages. For example, Wang et al. found 10.8 (10).

In some studies, race and ethnicity may indicate the number of cases of sustained trauma. Interestingly, falls among

black children who live in poor districts were found to be higher as well as falls among whites who live in high-income districts of the city (17). In a study, it was suggested that low-income urban families need education on injury prevention against falls and other accidents (18). Faelker et al. suggested that children from low-income families sustained trauma, including falls, 1.67-fold higher than those who do not suffer from poverty (19). In addition, 6% of cases had no insurance (12). Chaudhary and colleagues reported that black children patients were younger than whites in their study, comprehending 1086 FFH patients (14). Gyedu et al. suggested that inconsistency was found between child falls and the education of the caregiver, socioeconomic status, and beliefs in terms of the cause of household child injuries (20).

During the COVID-19 days, while infections, malignities, and dermatologic illnesses decreased, trauma in children increased (21). In a study which was investigated COVID-19 effects on pediatric trauma cases, the number of cases of outdoor traumas, traumas with high energy, the rate of cases that required surgery, and the presentations to the emergency department were found to increase when compared to the results of the same months of a year ago (22). It was stated that the number of trauma cases decreased in the curfew period, but the proportions of the types of trauma were not changed (23). Aydın and colleagues revealed that the number of pediatric fall cases decreased, but its proportion among the injury-related cases could not reach a significant ratio (24). Many studies confirmed that trauma presentations were reduced in half during the lockdown (25)(26). From the view of our findings, it was revealed that when the school precautions existed, the number of fall cases who were admitted to PICU of our hospital decreased nearly 90% (Figure-3). In addition to this result, when the general precautions were performed, the number of fall cases who were admitted to PICU of our hospital decreased to nearly two third (Figure-3). Giudici et al. found that the number of deaths caused by accidental falls on the death scene decreased by half during the COVID-19 outbreak (27). On the other hand, the same investigators reported that suicidal falls increased seven times higher in the same time interval (27). Chiba et al. found similar results compared to last one year (respectively n=36 (3.1%), n=30 (2.5%))(28). Additionally, Ferro et al. revealed that the number of pediatric FFH cases increased in COVID-19 compared to one year before the pandemic (n=591 and 67.24%, n=695 and 69.99)(29). In Germany's lockdown sample, the number of admissions of injury-related trauma cases decreased (30). It was reported in many countries that admissions of trauma-related pediatric cases decreased to almost one-third in the lockdown period (30). It is unclear why this decline occurred.

Mental disorders were found to be linked with higher rates of spinal cord injury (17). Additionally, those cases are more likely to suffer multiple trauma (17). Not only psychiatric diagnosis but also alcohol dependency was associated with accidental falls in adolescents (16). A study revealed that three-quarters of the cases who fell from above six meters suffered from a mental illness (16).

Liver, spleen, or kidney damage was determined in 17.1% (n=19) cases. On the other hand, some researchers suggested that abdominal injury accounted for only 3% of patients (12). Our study on FFH showed that falling from the storey of a building, pneumocephalus, and pneumothorax have higher odds with height falls. Kocak et al. suggested that loss of consciousness and falling from higher than lower distances were significantly associated (15). In contrast to our results, the rates of injury are usually higher in rural than in urban areas (2). Nevertheless, Kocak et al. found that nearly two third of child falls occur in city centers, similar to our results (15).

Among the patients who suffered from craniofacial fractures, occipital fractures were observed in 20 patients, frontal fractures in 19 patients, and temporal fractures in 16 patients (Figure-1). Some researchers have suggested that skull fractures are the most common fracture line in parietal bone (10).

Falls from height are the reason for either severe injuries or loss of money. Although average hospital charges for injuries from falls from heights were almost $9000 in the USA (11). Our study revealed that it was costed 4057₺ (around US$221) per child in Turkey. This finding is contrary to our results. Presumably, the different health care costs, economic status, and health systems are reasons for this discrepancy.

Results from a study on the height of falls suggested that extremity injuries were the most common body part for falls in children (10). However, our findings revealed that head trauma is the most common result of falls in children. Similar to our results, some researchers revealed that the most common injury was head trauma in FFH cases (12) (15).

More than half of the fall cases were admitted between 22:00 and 03:00 o'clock (n=58, 52.2%, Figure-2). Some researchers had found similar results to ours (12). Wang and colleagues reported that one-third of presentations occurred between 16:00 and 20:00 o'clock (10). Many researchers suggested that most of the falls occurred in warm months of the year (10)(12). Similarly, our results showed that falls from heights occurred in the same season of the year.

Our study's in-hospital mortality rate was 3.6% (n=4). Different mortality rates were reported in the literature. For instance, Pressley et al. reported twelve deaths (11%) (17). Kocak revealed six deaths (4.5%) (15). The ultimate cause of all four deaths was head trauma. It reflects the results of the previous studies (12).

Kocak and colleagues reported that the most frequent falling place cases were balconies (38%) (15). Our results show that the average hospital stay in the ward was 7,1 (1-42) days; in PICU was 5 (1-27) days. Vish et al. reported that the median length of stay was two days (12).

Strengths and Limitations of the Study

Neither Pediatric Trauma Score nor Glasgow Coma Score could not be achieved in the medical records of the cases. Perhaps these scores are recorded in the more comprehensible patient files. Unfortunately, medical doctor orders with handwriting do not exist in the digital patient files. It is the limit of our study.

Conclusions

Accidental falls in children may cause serious injuries and even death. Many factors affect the survey of these types of injuries such as softness of the ground, hit on the sharp shape of the things, age of the victim. It is vital to have safety systems in home windows or balconies against falls. Designing strategies to prevent falls based on the environmental circumstances and social context in which they occur.

Our findings have three implications. First, it was presented that above 4.57 meter falls cause more severe injuries than lower falls. Second, injury patterns, social parameters, epidemiological differences, required prevention equipment, and education of caregivers of fall cases were revealed. Third, the influences of the curfew on the COVID-19 pandemic were discussed.

Declaration

Statement of Ethics

This study was approved by Bursa Yuksek Ihtisas Training and Education Hospital Ethics Committee (No:2011-KAEK-25 2022/06-04).

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

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No funding was received for conducting this study.

Author Contribution

Serbülent Kılıç, Arzu Oto: collected the data. Musa Şahin: analyzed the data. Serbülent Kılıç wrote the first draft of the manuscript. Serbülent Kılıç, Arzu Oto and Musa Şahin: designed the manuscript. Serbülent Kılıç, Arzu Oto and Musa Şahin: read and revised the manuscript.

Data Availability Statement

All data is available.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Emergency Medicine / Acil Tıp

Effect of COVID-19 on Emergency Service Trends

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ABSTRACT

Purpose: The aim was to determine the variation in emergency service attendance occurring during the COVID-19 pandemic by assessing the monthly attendance distribution, monthly trends in emergency service attendance, hourly emergency service attendance trends and triage areas of patients attending the emergency service.

Material and Methods: This retrospective, descriptive research was completed based on records for 608,837 patients attending the emergency service of Eregli State Hospital in Konya from 11.09.2018 to 11.09.2021. Patient data for 18 months until the COVID-19 pandemic declaration on 11.03.2020 and 18 months after the pandemic declaration were assessed with the Joinpoint regression analysis program to analyze attendance. Analyses were completed at $P<0.1$ significance level.

Results: During this time interval, the highest number of attendances was 26,946 in December 2018, with the lowest number of attendances 6728 in April 2020 (N=608,837). Of attendances, 62% were in the period before the COVID-19 pandemic, while 38% occurred during the COVID-19 pandemic. There was a 39% reduction in monthly emergency service attendance during the COVID-19 pandemic and the pandemic caused a significant change in monthly attendance.

Conclusion: The COVID-19 pandemic caused significant changes in the emergency service attendance trends. Awareness of society by increasing health literacy levels, implementation of the referral chain, regulation of contributions and ensuring access to clinical services outside of office hours are predicted to lower the intensity of emergency service attendance.

Keywords: Emergency Service, COVID-19, Attendance Trend

Acil Servis Trendine COVİD-19 Etkisi

ÖZET

Amaç: Acil servise müracaat eden hastaların aylık müracaat dağılımı, aylık acil servis müracaat trendleri, saatlik acil servis müracaat trendleri, triyaj alanlarının değerlendirilerek Covid-19 pandemi süreci ile birlikte ortaya çıkan acil servis başvurularındaki değişimin belirlenmesi amaçlandı.

Gereç ve Yöntem: Konya'da Ereğli Devlet Hastanesi acil servisine 11.09.2018 ile 11.09.2021 tarihleri arasında müracaat eden 608 837 hastaya ait kayıttan yola çıkılarak retrospektif tanımlayıcı araştırma olarak gerçekleştirildi. 11.03.2020 tarihli Covid-19 pandemi öncesi 18 aylık ve pandemi sonrası 18 aylık hasta verileri Joinpoint Regresyon Analizi programı ile değerlendirilerek müracaatlara yönelik analizler yapıldı. Analizler $P<0,1$ anlamlılık düzeyinde değerlendirildi.

Bulgular: Belirlenen zaman aralığında en yüksek müracaat sayısının 26 946 müracaat ile 2018 Aralık ayında olduğu en düşük müracaat sayısına ise 6 728 müracaat ile 2020 Nisan ayında olduğu görüldü (N=608 837). Müracaatların %62 oranında covid-19 pandemi öncesi döneme ait olduğu, %38 oranında ise covid-19 pandemi süreci içerisinde meydana geldiği belirlendi. Covid-19 pandemisinin acil servis aylık müracaatları üzerinde %39 oranında azalmaya ve aylık müracaatlar üzerinde anlamlı değişime neden olduğu belirlendi.

Sonuç: Covid-19 pandemi sürecinin acil servis müracaat trendi üzerinde anlamlı değişimlere neden olduğu görüldü. Toplumun sağlık okuryazarlığı düzeyinin artırılarak bilinçlendirilmesi, sevk zinciri uygulanması, katkı paylarında düzenleme ve mesai saatleri dışında poliklinik hizmetlerine erişimin sağlanması acil servislerdeki yoğunluğu düşüreceği öngörülmektedir.

Anahtar Sözcükler: Acil Servis, COVİD-19, Müracaat Trendi

The emergency service is the first unit for hospital attendance by cases with sudden illness and injury (1,2). The emergency service treats and assesses acute illness and injury, and refers the patient to the relevant hospital department or an upper-level hospital (3). In Türkiye, the emergency service is shaped by the Anglo-American model. In this model, for patients to be able to receive better health services, they are transported to the hospital by land, air or sea ambulances. The target is to transfer the patient from the site of the event in the shortest time using a well-equipped ambulance (4). Additionally, emergency services are identified as a legal requirement to be offered to anyone who requires them, without regard to the person's income and health insurance. Along with emergency services being based on patient declaration, the principle emerges that every patient not examined is an emergency (5). Research by Yorulmaz et al. (6) about determining the emergency service intensity observed that patients attend the emergency service within the first 6 hours, with general patient density from 18:00 to 23:00. The basic reason for the intensity of emergency service attendance appears to be that services are offered without interruption 7 days a week, 24 hours a day and are free. When emergency service attendance is assessed, the majority of patients are treated as outpatients, while very few of the remainder are truly emergency patients and require admission for treatment. It appears emergency services are generally used inappropriately. The legal requirement to accept patients in the emergency service, increased population, internal migration, inadequacy of primary health services and inappropriate attendance cause the intensity of use of the emergency service (7). When the outcomes of inappropriate emergency service use are examined, the main negative outcomes include lengthened wait duration, reduced patient satisfaction, reduced efficiency of work by doctors and personnel, inadequate personnel numbers, dangers to patient health, increased cost of services provided, delays in laboratory and imaging services, need to refer emergency ambulances elsewhere, violence problems, and lengthened duration of patient complaints (2,8).

In this context, this research aimed to determine the variation in emergency service attendance occurring with the COVID-19 pandemic by assessing monthly attendance distribution, monthly emergency service attendance trends, hourly emergency service trends and triage areas.

Material and Methods

Research Type

The research was a retrospective descriptive study based on patient records for those attending the emergency service.

Population and Sample

The research accessed records for 609,687 patients attending Eregli State Hospital Emergency Service from 11.09.2018 to 11.09.2021 in the hospital information management system. Investigations of the records found information errors, triage errors, deficient information and records opened for trial purposes in records for 850 patients. After removal of these files, 608,837 patient records were used. A sampling method was not used in the research, as the target was to perform the study with the whole population.

Data Collection

Within the scope of the research, the monthly attendance distribution, monthly emergency service attendance trends, hourly emergency service attendance trends and which triage area was attended were recorded from the patient files (N=608,837). Recording of data was performed from April 2020 to December 2021.

Analysis

Organization of data obtained inthe study used the Microsoft Excel 365 electronic table software program. Classification and summarization of data was provided by Microsoft Excel Power Pivot. After classification, the Joinpoint Trend Analysis Software 4.9.0.1 (February 2022) version was used to determine the breakpoints in attendance data. Joinpoint regression analysis is a method used with the aim of investigating variation trends occurring over time and investigating important trend points (9). Joinpoint regression analysis is used to determine groupings to explain the relationship between two variables (10).

Results

Within the scope of the research, when monthly attendance numbers are examined in patient records, the highest number of attendances was 26,946 in December 2018with lowest number of attendances of 6728 in April 2020 (N=608,837) (Table 1). Eleven days were included in September 2021. The linear breaks in the trend analysis graph calculated with the Joinpoint regression program for monthly emergency service attendance distribution are shown in Figure 1.

Table 1. Monthly attendance numbers							
Pre-Covid-19 Applications		%	Total	Total	%	Applications After Covid-19	
2018	Sep	2,2	13105	6564	1,1	Sep	2021
2018	Oct	3,2	19394	21534	3,5	Aug	2021
2018	Nov	3,2	19277	23274	3,8	Jul	2021
2018	Dec	4,4	26946	15862	2,6	Jun	2021
2019	Jan	2,9	17859	13412	2,2	May	2021
2019	Feb	2,8	16770	10720	1,8	Apr	2021
2019	Mar	3,2	19450	11193	1,8	Mar	2021
2019	Apr	3,1	18880	9201	1,5	Feb	2021
2019	May	3,2	19787	8720	1,4	Jan	2021
2019	Jun	3,9	23925	8075	1,3	Dec	2020
2019	Jul	3,7	22736	8800	1,4	Nov	2020
2019	Aug	4,3	26459	10384	1,7	Oct	2020
2019	Sep	3,5	21152	12322	2	Sep	2020
2019	Oct	3,4	20458	17827	2,9	Aug	2020
2019	Nov	3	18507	16218	2,7	Jul	2020
2019	Dec	3,9	23932	12887	2,1	Jun	2020
2020	Jan	3,9	23916	9270	1,5	May	2020
2020	Feb	3,1	19004	6728	1,1	Apr	2020
2020	Mar	2,3	14289				
	1-10 Mar		6603	7686		11-31 Mar	

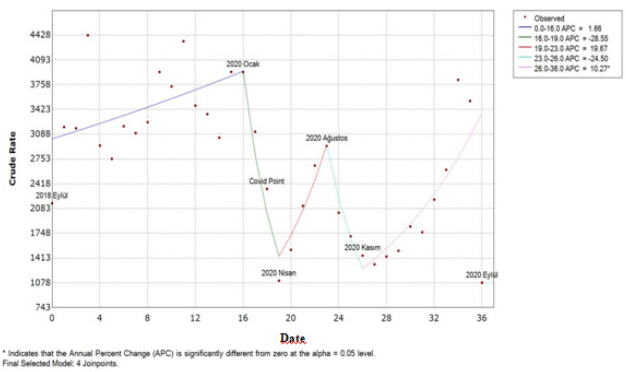

Figure 1. *Monthly emergency service referral trend*

The trend model with 4 breakpoints was suitable for monthly emergency service attendance according to trend analysis calculated by the Joinpoint regression program. When the MAPC for the monthly attendance trend is examined, it appears the COVID-19 pandemic created a significant difference in the monthly attendance trend (p>0.1) (Table 2).

Within the scope of the research, attendance at the emergency service was assessed in four 6-hour periods according to patient records. The data for the trend analyses calculated with the Joinpoint regression program for hourly attendance distribution is shown in Table 3. The COVID-19 pandemic created a significant difference in attendance trends (p>0.1).

Within the scope of the research, attendances from 11 September 2018 to 11 September 2021 were assessed in 4 groups according to triage as red, green, yellow and black areas. When the number of attendances are examined according to triage type, 78.97% of total attendances (n=480,777) were patients treated in the yellow area, 20.44% (n=124,450) were patients treated in the green area, 0.55% (n=3322) were patients treated in the red area and 0.05% comprised patients treated in the black area (N=608,837).

Table 2. Trend analysis calculated by the Joinpoint regression program

Segment	Lower Endpoint	Upper Endpoint	Date Range	APC	Lower CI	Upper CI	Prob>[t]	AAPC	P -Value
1	0	16	2018 Sep-2020 Jan	1.7	-0.7	4.1	0.158		
2	16	19	2020 Jan-2020 Apr	-28.5	-63.5	39.9	0.311		
3	19	23	2020 Apr-2020 Aug	19.7	-19.0	76.7	0.351		
4	23	26	2020 Aug-2020 Nov	-24.5	-66.4	69.4	0.479		
5	26	36	2020 Nov-2021 Sep	10.3*	3.4	17.6	0.005		
	0	36	2018 Sep-2021 Sep		-8.8	10.3		0.3	1

AAPC=Average Annua lPercent Change, APC= Annual Percent Change

Table 3. The data for the trend analyses calculated with the Joinpoint regression program for hourly attendance distribution

Time Periods	Segment	Lower Endpoint	Upper Endpoint	DateRange	APC	Lower CI	Upper CI	Prob>[t]	AAPC	P -Value
00:00:00-03:59:59	1	0	11	2018 Sep-2019 Aug	4.8	-0.2	10.0	0.057		
	2	11	28	2019 Aug-2021 Jan	-4.9*	-7.7	-2.0	0.002		
	3	28	36	2021 Jan-2021 Sep	11.6*	11.6	1.7	0.023		
		0	36	2018 Sep- 2021 Sep		-1.3	4.4		1.5	<0.1
04:00:00-07:59:59	1	0	11	2018 Sep-2019 Aug	5.0*	0.1	10.1	0.044		
	2	11	28	2019-Aug-2021 Jan	-5.0*	-7.9	-2.1	0.002		
	3	28	36	2021 Jan-2021 Sep	11.9*	1.6	23.1	0.024		
		0	36	2018 Sep-2021 Sep		-1.3	4.5		1.6	<0.1
08:00:00-11:59:59	1	0	16	2018 Sep-2020 Jan	1.3	-1.3	3.9	0.310		
	2	16	19	2020 Jan-2020 Apr	-26.1	-65.2	57.0	0.415		
	3	19	23	2020 Apr-2020 Aug	22.9	-17.4	82.8	0.294		
	4	23	26	2020 Aug-2020 Nov	-26.3	-68.4	72.0	0.464		
	5	26	36	2020 Nov-2021 Sep	10.4*	3.3	18.0	0.005		
		0	36	2018 Sep-2021 Sep		-9.1	11.2		0.6	1
12:00:00-15:59:59	1	0	16	2018 Sep-2020 Jan	1.4	-0.7	3.4	0.177		
	2	16	19	2020 Jan-2020 Apr	-18.2	-53.8	45.1	0.476		
	3	19	31	2020 Apr-2021 Apr	-0.9	-5.3	3.7	0.688		
	4	31	34	2021 Apr-2021 Jul	29.2	-28.8	134.6	0.383		
	5	34	36	2021 Jul-2021 Sep	-35.2	-69.3	36.5	0.240		
		0	36	2018 Sep-2021 Sep		-9.0	6.3		-1.6	1
16:00:00-19:59:59	1	0	16	2018 Sep-2020 Jan	1.2	-1.0	3.5	0.281		
	2	16	20	2020 Jan-2020 May	-26.2	-52.3	14.2	0.163		
	3	20	23	2020 May-2020 Aug	31.4	-40.5	190.6	0.483		
	4	23	27	2020 Aug-2020 Dec	-18.7	-47.5	25.9	0.337		
	5	27	36	2020 Dec-2021 Sep	10.8*	2.3	20.0	0.014		
		0	36	2018 Sep-2021 Sep		-9.1	9.4		-0.3	1
20:00:00-23:59:59	1	0	11	2018-Sep-2019 Aug	4.7*	0.9	8.6	0.016		
	2	11	29	2019-Aug-2021 Feb	-7.2*	-9.4	-4.9	< 0.001		
	3	29	34	2021 Feb-2021 Jul	26.8*	1.2	58.8	0.039		
	4	34	36	2021 Jul-2021 Sep	-33.1	-69.5	46.8	0.303		
		0	36	2018 Sep-2021 Sep		-6.4	4.2		-1.3	1

AAPC=Average Annua lPercent Change, APC= Annual Percent Change

The trend analysis graph calculated by the Joinpoint regression program for distribution of emergency service attendance by patients treated in the green area is given in Figure 2. The data for the trend analysis calculated by the Joinpoint regression program for emergency service attendance by patients treated in the green area are shown in Table 4. When the MAPC for the emergency service attendance of patients treated in the green area is examined, the COVID-19 pandemic created a significant difference in attendance trends (p>0.1).

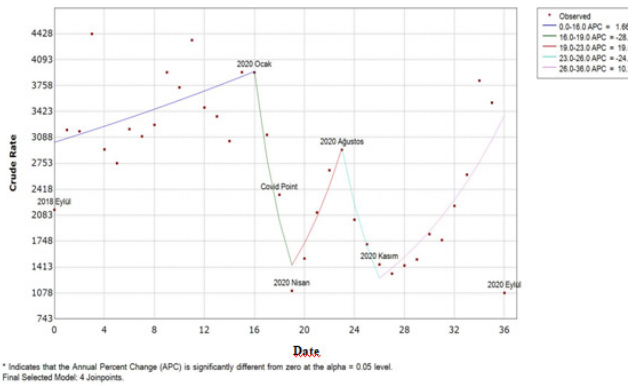

Figure 2. *Green field referral trend*

Table 4. The data for the trend analysis calculated by the Joinpoint regression program for emergency service attendance by patients treated in the green area

Segment	Lower Endpoint	Upper Endpoint	Date Range	APC	Lower CI	Upper CI	Prob>[t]	AAPC	P -Value
1	0	15	2018 Sep-2019 Dec	0.8	-2.6	4.3	0.634		
2	15	28	2019 Dec-2021 Jan	-10.0*	-15.3	-4.3	0.001		
3	28	36	2021 Jan-2021 Sep	17.6*	3.4	33.7	0.015		
	0	36	2018 Sep-2021 Sep		-3.5	3.9		0.1	1

AAPC=Average Annua lPercent Change, APC= Annual Percent Change

Discussion

When the monthly distribution of emergency service attendance from 11 September 2018 to 11 September 2021, assessed within the scope of the study, is examined, the highest number of attendances was 26,946 (4.43%) in December 2018 and the lowest number of attendances was 6728 (1.11%) in April 2020. The results of the study identified that the COVID-19 pandemic caused significant differences in monthly emergency service attendance trends.

The COVID-19 pandemic has caused some changes in emergency department attendance in Turkey, as in the rest of the world. When the literature is examined, it should be seen that Görmeli Kurt & Güneş (11) Yılmaz Başer & Başer (12) Giamello et al. (13) and Muselli et al. (14) Tan and Lai (15) Cheng et al. (16) Kam et al. (17) when the general results of the studies were examined, the effects of the COVID-19 pandemic on emergency departments changed proportionally, but in general, there was a significant decrease in patient attendance.

Literature screening found limited numbers of studies investigating the direct correlation between emergency service and COVID-19 and as these were regional studies, the findings from studies related to indirect emergency service and attendance are included in the discussion. Giamello et al. (13) reported that 46,154 patients attended the emergency service of Santa Croce and Carle Hospital in Cuneo, Italy in 2018, while 45,395 patients attended in 2019. Compared with 2019, there was a 50% reduction in patientsuntil February 2020, while patient attendance reduced 68% since the start of the pandemic. Yılmaz Başer and Başer (12) compared 8 months of pandemic in 2020 with the same period in 2019 and identified a 31.05% reduction in emergency service attendance. Muselli et al. (14) identified a 60.4% reduction in patient numbers attending an emergency service and admissions department in Abruzzo, Italy from 9 March 2020 to 3 May 2020 for reasons other than COVID-19. They found a 66.6% reduction in emergency attendance with an increase from 30% to 39% for hospital admission rates. A study by Görmeli Kurt & Güneş (11) compared patients attending from 28 March 2020 to 28 April 2020 with the same period in 2019 and found 47,681 patients attended the emergency service in 2019, while 9455 patients attended during the pandemic in 2020. Tan & Lai (15) studied emergency service attendance during the new year holiday in Taiwan from 2017 to 2021 and identified a fall in emergency service attendance due to the COVID-19 pandemic.

Cheng et al. (16) assessed emergency service attendance in 4 hospitals in Singapore from 7 April 2020 to 1 June 2020 as the pandemic period with the period from 7 April 2019 and 1 June 2019 and identified that 29,267 patients attended in 2020, while 36,370 patients attended in 2019. They stated that the rate of inappropriate use of the emergency services reduced during the COVID-19 pandemic in 2020 compared to 2019. Kam et al. (17) performed a study comparing emergency service attendance in the West Sydney local health region from 29 March 2020 to 21 May 2020 with the same period in 2019. They found 35,268 attendances in 2019, with 26,617 attendances in 2020 with a 25% fall in attendance numbers. They stated that 34% of patients were admitted to hospital in 2019 (11,838), while 30% (8047) were admitted in 2020. They stated that demand for emergency services reduced due to the impact of COVID-19 on the health services. In this study, a 39% reduction in the total number of attendances was observed after the COVID-19 pandemic. The COVID-19 pandemic caused a reduction in the monthly patient attendance in the emergency service, which appears to overlap with the general effect seen in other studies. When the differences between research are examined, accessibility of health services, general prevalence of health insurance systems in countries, economic opportunities and differences in the progression of the pandemic are thought to have caused changes in the results. When compared with regional studies, the population of the region served, density and proximity of health institutions, general lockdowns and transport restrictions in countries are considered to have impacted the results. Topaloğlu et al. (18) stated that the highest monthly attendance at the emergency service was 55,537 (10.2%) in August, with lowest monthly attendance of 37,674 (6.9%) in November. In the study by Çevik and Tekir (19), highest emergency service attendance occurred in October at rates of 9.29%, with lowest rates in February of 7.08%. Özer et al. (20) identified that highest attendance at the emergency service was 22,027 patients (11.2%) in August, with lowest attendance of 12,518 patients (6.3%) in April. Studies found as a result of literature screening do not overlap with the monthly attendance findings in this study. In the literature, studies about emergency services are generally retrospective, not all studies encompass the COVID-19 pandemic, the geographical distance between emergency service locations included in studies differs, and factors like tourism, agricultural activities, seasonal migration and education are thought to have impacts at different levels.

Study Limitations

The study is limited to Eregli State Hospital emergency service. The most basic limitation is that results emerging from this study completed in the emergency service of a single state hospital may remain inadequate to explain variations in the use of emergency services for the country in general.

Conclusion

The following conclusions were reached as a result of researching the impact of the COVID-19 pandemic in the long term on emergency service use by patients attending Eregli State Hospital Emergency Service from 11 September 2018 to 11 September 2021. The results of the study observed that the COVID-19 pandemic caused a significant difference in monthly emergency service attendance. A reduction in the number of patients attending the emergency service was identified during the COVID-19 pandemic. As the data do not contain adequate information about misuse of emergency services, overcrowding and inappropriate use of the emergency service, it is considered necessary to support and compare studies investigating the impacts of COVID-19 on the emergency service from different perspectives. With the aim of maintaining the positive impact of changes occurring in attendance trends due to the COVID-19 pandemic for patients attending the emergency service, it is necessary to support implementations like increasing health literacy about emergency service use, making primary health services more common and useable, and overtime work ensuring clinical services can be actively preferred. Financial models such as out-of-pocket pay and participation shares should be developed to prevent unnecessary uses. It is recommended to overcome emergency service crowding with implementation of the referral chain to increase the efficacy of primary health services.

Declarations

Ethical Consideration

An ethical permission was obtained from the Faculty of Health Sciences Non-Interventional Clinical Research Ethics Committee at Karamanoglu Mehmetbey University. (Numbered: 06-2021/33, dated: 27.10.2021)

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Conflicts of Interest

The authors declare no conflict of interest.

Author Contribution

Kubilay Özer: %50, Cumali Bozkuş:%50

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Public Health / Halk Sağlığı

Evaluation of Third Hand Cigarette Smoke Exposure and Awareness in University Students

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ABSTRACT

Background: Third Hand Smoke (THS) is tobacco dust that settles in the environment after smoking. It combines with other pollutants in the air and diffuses back into the air. It can enter the systemic circulation by inhalation, absorption through the skin, and ingestion of tobacco dust-contaminated objects. Exposure to THS negatively affects the health of all people, especially infants and children. The aim of the study is to reveal THS exposure and awareness in 6th grade students of Ankara Yıldırım Beyazıt University (AYBU) Faculty of Medicine and the factors associated with it.

Methods and Results: As a data collection tool, a questionnaire consisting of a Beliefs About Third Hand Smoke (BATHS-T) Scale was prepared to recognize sociodemographic data form, smoking status, tobacco control policies, smoking bans at home and in the car, attitudes towards buying / renting a house / car, and THS awareness. Using an online survey, 322 people were reached.

Conclusions: As a result of this study, it was found that the sixth grade students of the medical faculty had a good level of beliefs about third-hand smoke; It has been seen that he believes in its effect on health and its permanence in the environment. Female gender, living with family, having good or higher academic achievement, not smoking, supporting anti-tobacco policies, not living with a smoker were associated with higher BATHS-T score. In this respect, the study reached different results from the existing literature. Further studies is needed to elucidate this difference.

Keywords: Awareness, Beliefs About Third Hand Smoke (BATHS-T), Third Hand Smoke

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Üniversite Öğrencilerinde Üçüncü El Sigara Dumanı Maruziyet ve Farkındalığının Değerlendirilmesi

ÖZET

Giriş: Üçüncü El Sigara Dumanı (ÜESD), sigara içildikten sonra çevreye yerleşen tütün tozudur. Havadaki diğer kirleticilerle birleşerek tekrar yayılır. Solunum yoluyla, deri yoluyla emilmeyle ve tütün tozuyla kontamine olmuş nesnelerin yutulması yoluyla sistemik dolaşıma girebilir. ÜESD 'ye maruz kalmak başta bebek ve çocuklar olmak üzere tüm insanların sağlığını olumsuz etkiler. Araştırmanın amacı Ankara Yıldırım Beyazıt Üniversitesi (AYBÜ) Tıp Fakültesi 6. sınıf öğrencilerinde ÜESD maruziyeti ve farkındalığını ve ilişkili faktörleri ortaya koymaktır.

Yöntem ve Bulgular: Veri toplama aracı olarak sosyodemografik veri formu, sigara içme durumu, tütün kontrol politikaları, ev/araba satın alma/kiralamaya yönelik tutumları evde ve arabada sigara içme yasaklarını tanımaya yönelik sorular Üçüncü El Sigara Dumanı Hakkında İnançlar (ÜESDHİ) Ölçeği' nden oluşan bir anket hazırlandı. Çevrimiçi anket kullanılarak 322 kişiye ulaşıldı.

Sonuç: Bu çalışmanın sonucunda tıp fakültesi altıncı sınıf öğrencilerinin üçüncü el sigara dumanına ilişkin inançlarının iyi düzeyde olduğu; Sağlığa etkisine ve çevrede kalıcılığına inandığı görülmüştür. Kadın cinsiyet, aileyle birlikte yaşama, akademik başarısının iyi veya yüksek olması, sigara içmeme, tütün karşıtı politikaları destekleme, sigara içen biriyle yaşamama daha yüksek ÜESDHİ puanı ile ilişkiliydi. Bu açıdan çalışmada mevcut literatürden farklı sonuçlara ulaşılmıştır. Bu farklılığın aydınlatılması için ileri çalışmalara ihtiyaç vardır.

Anahtar Kelimeler: Farkındalık, Üçüncü El Sigara İçme Hakkında İnançlar (ÜESDHİ), Üçüncü El Sigara Dumanı

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Smoking is a risk factor for the world's leading causes of death, including lung and other cancers, heart disease and respiratory diseases. Firsthand cigarette smoke; It is the smoke that the user inhales into their own lungs while breathing. It is also called active smoking or widespread smoking. Substances such as acid, alcohol, aldehyde, ketone, cyanide, and carbon monoxide, which are among the chemicals found in tobacco smoke, have a direct toxic effect and cause damage to tissues and organs (1). Secondhand cigarette smoke (SHS/passive cigarette smoke) is the smoke that comes from the burning end of a cigarette or tobacco product. It is also the smoke that smokers breathe (1). Third-hand smoke (THS) is the invisible tobacco "dust" that settles in and stays in the environment after you quit a cigarette. Thirdhand smoke contains more than 250 chemicals; these substances accumulate on the surfaces after smoking tobacco, pass into the gas phase and disperse again or combine with other pollutants in the environment to form secondary pollutants. These harmful chemicals remain on clothes, hair, carpet, furniture, curtains, toys; Covers all surfaces in the home and car. Infants and children can inhale or inhale toxins through the skin and mouth when crawling on the floor, sitting in car seats, or in the lap of adults exposed to THS. THS contributes to indoor air pollution. THS exposure may continue long after SHS occurs. It has been found that harmful particles can remain on surfaces even weeks and months after smoking. It has also been found that it is almost impossible to completely remove THS residues from surfaces with conventional cleaning methods, resulting in continued exposure to THS. In addition, dangerous carcinogens called tobacco-specific nitrosamines (TSNA) are formed when the nicotine in tobacco smoke reacts with nitrous acid (HONO), a common component of indoor air pollutant (2).

Human exposure to THS and its health, behavioral, and social-cultural consequences have not been conclusively proven. However, the existing literature reveals that THS poses a potential health hazard for non-smokers. Infants and young children are particularly susceptible to THS exposure because of their immature respiratory and immune systems. One study reported that THS accumulates in the homes of smokers and persists even after the smokers have moved and the homes have been cleaned and painted for new residents (3). Non-smokers residing in houses where smokers lived before are unintentionally exposed to.

Knowledge and beliefs about SHS are associated with smoking cessation and reduction; however, few studies have examined similar constructs for how THS and Beliefs About Third Hand Smoke (BATHS-T) Scale can influence smoking-related preventive behaviors. It has been found that awareness of the harmful effects of THS is associated with the stricter enforcement of indoor smoking bans and the increased number of smoking cessation attempts. Based on this literature, informing the individuals trained in THS about the harms of THS will cause them to develop more accurate attitudes about having a smoke-free house and being protected from the harmful effects of THS. In the national and international literature review, it was seen that studies on THS belief generally focused on parents, and a study was conducted with family physician(4-6).

In a study by Matt et al., THS was found to be associated with high nicotine levels in the hands of non-smokers who lived in houses where cigarettes had been previously smoked, and this led to unwanted exposure (7). Quarantine precautions were implemented throughout the world during the COVID-19 pandemic. This resulted in a great increase in the time spent at home, and, therefore, greater exposure to indoor air pollutants, including the toxic substances of tobacco smoke (8). THS is found in many enclosed spaces, including homes, public buildings, rented houses and apartments and rented cars, and despite the smoking ban can affect non-smokers. Although the restrictions in public places are promising, these restrictions have made passive smoking in home environments the main source of THS (9). In a study related to the smoking ban, it was shown that young children could be less protected by these restrictions than adults (10).

In this study, it was aimed to examine the third hand smoke exposure and awareness level of sixth grade students at Ankara Yıldırım Beyazıt University (AYBU) Faculty of Medicine.

METHOD

Study Design

This cross-sectional study was conducted by Ankara Yıldırım Beyazıt University Faculty of Medicine, Department of Public Health, with sixth grade students between 20.03.2020 and 07.11.2021.

Sample

In our study, no sample calculation was made, and it was aimed to reach all the sixth grade students of the medical faculty actively continuing their education and training at Ankara Yıldırım Beyazıt University. There are a total of 630 students in Turkish-English classes in the 2020-2021 and 2021-2022 academic years. Our questionnaire is shared in student WhatsApp communication groups. Before starting the study, it is guaranteed that no personal information will be requested from the participants, that the information will be collected anonymously, that the information will be used for scientific purposes and will not be shared with third parties, and that the Declaration of Helsinki will be complied with. Informed consent was obtained from each participant. On a voluntary basis, 322 (51%) answers were obtained. Since it was planned to

include all intern physicians present at the planning stage of the study, a sample size and power calculation was not made. It is aimed to reach the whole universe. However, the Covid 19 epidemic experienced during the implementation period of the study created difficulties in reaching all students. However, we have completed our work by reaching more than half of our universe. The result of the power analysis after the study on the current number of people reached was found to be 0.90. The strength of our work is sufficient.

Ethical Issues

Approval was obtained with the decision of Ankara Yıldırım Beyazıt University ethics committee dated 14.06.2021 and numbered 76.

Measurement Tools

1. Sociodemographic Characteristics: The sociodemographic questions section consisting of 27 questions was created by the researchers using the existing literature. The sociodemographic characteristics of the participants (age, gender, monthly income, who they live with now, academic achievement), smoking status, consisting of 7 questions, their opinions about the smoking policies of the state, consisting of 4 questions (such as banning tobacco use in indoor and public places, taxation of tobacco products, increasing the price of tobacco products, prohibiting the sale of tobacco products to those under the age of 18, prohibiting the sale of tobacco products to those under the age of 18), the presence of a smoker at home, the rules of smoking at home consisting of 3 questions and the presence of a personal vehicle, and the rules of smoking in their personal vehicles consisting of 3 questions and the vehicle when purchasing/renting; There are 4 questions that question the effect of THS exposure on choices when buying/renting a house and choosing a room in a hotel (3,4,11-13).

2. Beliefs About Third Hand Smoke (BATHS-T) Scale: BATHS-T measures individuals' beliefs about third-hand smoke (14). Turkish validity and reliability study of the beliefs about third-hand smoke (BATHS-T) scale was conducted. The Cronbach's alpha value is 0.90 (15). The Cronbach's alpha value of current study is 0.95. Scale; It consists of 9 questions, 5 of which (1, 2, 3, 7 and 8) question the effects of THS on health, and 4 of them (4, 5, 6 and 9) question the persistence of THS in the environment. The answers are arranged in a 5-point likert type. Individuals choose one of the answers 1: Strongly disagree, 2: Disagree, 3: Undecided, 4: Agree, 5: Strongly agree. The average score is obtained by dividing the total score by the number of questions. A minimum of 1 and a maximum of 5 points can be obtained. The higher the score, the higher the awareness of individuals is interpreted. These tools were uploaded to the Google search engine as a questionnaire and applied to the students online. These tools were uploaded to the Google search engine as a questionnaire and applied to the students online. The survey link was shared in the contact WhatsApp groups of the 6th grade students of AYBU Faculty of Medicine. Personal data of the participants, such as mobile phone numbers and e-mail, were not used.

Statistical Analyses

Data were evaluated using the IBM-SPSS (Version 22.0) program. The normal distribution of data was evaluated with the Kolmogorov-Smirnov test. Mann-Whitney U test was applied for the 2 groups that did not fit the normal distribution. Kruskall-Wallis test and pairwise comparison post hoc test were applied for more than 2 groups that did not fit the normal distribution. The statistical significance was accepted as $p<0.05$.

RESULTS

322 (51%) people with a mean age of 24.31± 1.69 participated in the study. The mean BATHS-T total score of the participants was 4.12±0.90. Table 1 shows the distribution of the participants' BATHS-T scores according to their sociodemographic characteristics. 55.6% of the participants were women; 44.4% are male. The mean BATHS-T total score of female participants was 4.25±0.78, and the mean BATHS-T total score of male participants was 3.95± 1.02. The mean BATHS-T total score of female participants was higher than the BATHS-T total score of male participants (MW-U=10916, $p<0.05$). In the BATHS-T scale health impact subscale, female participants scored higher than male participants (MW-U=10529.50, $p<0.05$). There was no statistically significant relationship between the gender variable and the BATHS-T environmental permanence subscale score (MW-U=11524.50, $p>0.05$). 74.5% of the participants reported a monthly income of 4500 TL or more, and the difference between monthly income and BATHS-T score both in total and permanence in the environment and health impact subscale scores is nvot significant (M-WU=9503, $p>0.05$; M-WU=9675.50, $p>0.05$; M-WU=9129.50, $p>0.05$). 47.8% of the participants live with their families, 40.7% stay in the student house and 11.5% live in the dormitory. A statistically significant difference was found between the place where the participants lived and their BATHS-T total score, BATHS-T environmental permanence subscale score, and BATHS-T health impact subscale score (KW=16.19, $p<0.05$; KW=14.54, $p<0.05$; KW=15.31, $p<0.05$). 59.6% of the participants defined their academic achievement as good or above. A significant difference was found between academic achievement and BATHS-T total score (both environmental permanence and health impact subscale) (M-WU=10504.50, $p<0.05$; M-WU=10300.50, $p<0.05$; M-WU=10691.50, $p<0.05$).

Table 1: Distribution of participants' BATHS-T scores according to their sociodemographic characteristics					
CHARACTERISTIC	Mean ± standard deviation	N (%)	Scale (Total) median (min-max)	Scale (Persistence in the environment) median (min-max)	Scale (Health effect) median (min-max)
Age	24,31 ± 1,69				
Gender	Male	179 (55,6)	4,11 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Female	143 (44,4)	4,44 (1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
P value			0,022	0,116	0,006
M-WU			10906	11524,50	10529,50
Income status	4500 and below	82 (25,5)	4,28 (1,00-5,00)	4,25 (1,00-5,00)	4,20 (1,00-5,00)
	over 4500	240 (74,5)	4,33 (1,00-5,00)	/4,25 (1,00-5,00)	4,20 (1,00-5,00)
P value			0,640	0,817	0,322
M-WU			9503	9675,50	9129,50
Living together	With family	154 (47,8)	4,56 (1,00-5,00)	4,75 (1,00-5,00)	4,40 (1,00-5,00)
	Student house	131 (40,7)	4,00 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Dormitory	37 (11,5)	4,56 (1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
P value			<0,001	0,001	<0,001
KW			16,19	14,54	15,3
Academic success	Middle and below	130 (40,4)	4,11 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Good and above	192 (59,6)	4,44 (1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
P value			0,015	0,007	0,027
M-WU			10504,50	10300,50	10691,50

Table 2 shows the distribution of the participants' scores on the BATHS-T scale according to some characteristics of smoking. The smoking rate of the participants was 28.6%. While the mean BATHS-T total score of non-smokers was 4.20±0.87, the mean total score of BATHS-T of smokers was 3.92±0.95. A statistically significant difference was found between the smoking status of the participants and the BATHS-T total, BATHS-T environmental permanence subscale, and BATHS-T health impact subscale scores (M-WU=8814 p<0.05; M-WU=8804 p<0.05; M-WU=8709 p<0.05). The majority of the participants stated that they support the ban on smoking indoors, increasing the tax on tobacco products, bans on advertising and not selling under the age of 18 within the scope of the anti-tobacco policy. 98% of the participants supported the ban on the sale of tobacco products to individuals under the age of 18. The least supported policy (51%) was to increase the tax on tobacco products. The average BATHS-T total score of those who support the law prohibiting tobacco use in closed places such as restaurants and bars and in public areas as part of the fight against tobacco; The mean BATHS-T total score of those who did not support was 4.17±0.87; 3.69±1.17 mean BATHS-T total score of the undecided; It is 3.63±1.07. Those who supported the law prohibiting tobacco use in closed spaces such as restaurants and bars and in public spaces within the scope of combating tobacco received higher BATHS-T total and BATHS-T environmental permanence subscale scores (KW=6.32, p<0.050; KW=7.50, p<0.050). No statistically significant difference was found between supporting the relevant law and BATHS-T health impact subscale scores (KW=5.66, p>0.050) While the average BATHS-T total score of those who support the increase in the tax (price) of tobacco products is 4.28±0.90, the BATHS-T total score of those who are undecided is 3.63±1.07; the mean BATHS-T total score of those who did not support it was 3.97±0.097. Supporters of increasing the tax (price) of tobacco products received higher BATHS-T total, BATHS-T environmental permanence subscale, BATHS-T health impact subscale scores (KW=17.90, p<0.050; KW=19.72, p<0.050; KW=16.37 p<0.050). While the mean BATHS-T total score of those who support the banning of tobacco products is 4.18±0.87, the mean BATHS-T total score of those who do not support it is 3.74±1.67, and the mean BATHS-T total score of those who are undecided is 3.82±0.87. Those who supported banning the advertising of tobacco products had higher BATHS-T total and BATHS-T environmental persistence subscale scores (KW=7.72, p<0.05; KW=9.57, p<0.05). However, no statistically significant difference

was found between supporting the prohibition of advertising of tobacco products and BATHS-T health effect subscale scores (KW=5.86, p>0.05). While the mean BATHS-T total score of those who support the ban on the sale of tobacco products to those under the age of 18 in the fight against tobacco is 4.12±0.89, the mean BATHS-T total score of those who do not support it is 2.81±1.57; the mean BATHS-T total score of the undecided was 5.00±0.00. Those who supported the ban on the sale of tobacco products to those under the age of 18 in the fight against tobacco received higher BATHS-T total and BATHS-T health impact subscale scores (KW=7.16, p<0.05; KW=7.65, p<0.05). However, no statistically significant difference was found between supporting the prohibition of selling tobacco products to those under the age of 18 and BATHS-T (permanence in the environment subscale) scores (KW=5.31 p>0.05).

Table 3 shows the distribution of the participants' scores on the BATHS-T scale according to some characteristics of smoking at home. 34.5% of the participants stated that they had a smoker at home other than themselves. The mean BATHS-T total score was 3.95±0.94 in the group who responded that there was someone outside of the house who smoked; The mean BATHS-T total score was 4.20±0.88 in the group who answered that there was no smoker at home. Participants who answered that they smoked outside the home had statistically lower BATHS-T total, BATHS-T environmental permanence subscale, and BATHS-T health impact subscale scores (KW=7.33, p<0.05; KW=6.53, p<0.05; KW=7.69, p<0.05).

Table 2: Distribution of participants' BATHS-T scores according to some characteristics of smoking

CHARACTERISTIC		N (%)	Scale (Total) median (min-max)	Scale (Persistence in the environment) median (min-max)	Scale (Health effect) median (min-max)
Smoking status	Smoke	230 (71,4)	4,44 (1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
	Don't smoke	92 (28,6)	4,00 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
P value			0,018	0,016	0,012
M-WU			8814	8804	8704
In the fight against tobacco, do you support the law that prohibits the use of tobacco in indoor and public spaces such as restaurants and bars?	Yes	290 (90,1)	4,33 (1,00-5,00)	0,25 (1,00-5,00)	4,40 (1,00-5,00)
	No	22 (6,8)	3,83 (1,22-5,00)	3,88 (1,00-5,00)	4,00 (1,20-5,00)
	Don't know	10 (3,1)	3,33 (1,67-5,00)	3,25 (1,75-5,00)	3,50 (1,60-5,00)
P value			0,042	0,023	0,059
KW			6,32	7.50	5,66
Do you support increasing the tax (price) of tobacco products in the fight against tobacco?	Yes	165 (51,2)	4,56 (1,00-5,00)	4,75 (1,00-5,00)	4,60 (1,00-5,00)
	No	108 (33,5)	4,11 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Don't know	49 (15,2)	3,89 (2,00-5,00)	3,75 (2,00-5,00)	3,80 (2,00-5,00)
P value			<0,001	<0,001	<0,001
KW			17,90	19,72	16,37
Do you support banning the advertising of tobacco products in the fight against tobacco?	Yes	273 (84,8)	4,33 (1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
	No	30 (9,3)	3,72 (1,00-5,00)	4,00 (2,00-5,00)	3,80 (1,00-5,00)
	Don't know	19 (5,9)	4,00 (2,00-5,00)	34,00 (2,00-5,00)	4,00(2,00-5,00)
P value			0,021	0,008	0,053
KW			7,72	9,57	5,86
Do you support the ban on the sale of tobacco products to persons under the age of 18 in the fight against tobacco?	Yes	317 (98,4)	4,33 (1,00-5,00)	4,25 (1,00-4,00)	4,25 (1,00-5,00)
	No	3 (0,9)	3,66 (1,00-3,78)	3,75 (1,00-4,00)	3,60 (1,00-3,60)
	Don't know	2 (0,6)	5,00 (5,00-5,00)	5,00 (5,00-5,00)	5,00 (5,00-5,00)
P value			0,028	0,070	0,022
KW			7,16	5,31	7,65

Table 3: Distribution of participants' BATHS-T scores according to some characteristics of smoking at home					
CHARACTERISTIC		N (%)	Scale (Total) median (min-max)	Scale (Persistence in the environment) median (min-max)	Scale (Health effect) median (min-max)
Does anyone (other than you) smoke in your home?	Yes	111 (34,5)	4,00(1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	No	211 (65,5)	4,44(1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
P value			0,007	0,011	0,006
M-WU			9578,50	9727,50	9541,50
Are there rules regarding smoking in your home?	No, smoking is allowed anywhere in the house.	17 (5,3)	4,00 (1,67-5,00)	4,00 (1,75-5,00)	4,00 (1,60-5,00)
	Yes, smoking is allowed in some rooms/sometimes.	81 (25,2)	4,00 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Yes, smoking is prohibited inside the house.	224 (69,6)	4,44 (1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
P value			0,108	0,093	0,075
KW			4,44	4,75	5,19
Do guests at your home ask permission to smoke?	None	34 (10,6)	4,44 (1,33-5,00)	4,63 (1,50-5,00)	4,40 (1,20-5,00)
	Sometimes	111 (34,5)	4,11 (1,11-5,00)	4,25 (1,00-5,00)	4,20 (1,20-5,00)
	Generally	78 (24,2)	4,00 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Always	99 (30,7)	4,67 (1,00-5,00)	4,75 (1,00-5,00)	4,60 (1,00-5,00)
P value			0,027	0,010	0,090
KW			9,16	11,41	6,48
Would you warn the guest who smokes without permission?	None	60 (18,6)	4,11 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Sometimes	72 (22,4)	4,11 (1,11-5,00)	4,00 (1,00-5,00)	4,10 (1,20-5,00)
	Generally	69 (21,4)	4,33 (1,00-5,00)	4,00 (1,00-5,00)	4,20 (1,00-5,00)
	Always	121 (37,6)	4,44 (1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
P value			0,320	0,198	0,418
KW			3,50	4,66	2,83

69.6% of the participants stated that smoking is prohibited inside the house. The mean BATHS-T total score of those who stated that smoking was prohibited at home was 4.20±0.84, those who stated that smoking could be allowed in some rooms/sometimes was 3.97±1.02, and those who stated that smoking could be anywhere in the house was BATHS-T. T total score is 3.73 ±1.11. There was no statistically significant difference between the participants' mean BATHS-T total, BATHS-T environmental permanence subscale, BATHS-T health impact subscale scores according to the variable of smoking rules at home (KW=4.44, p>0.05; KW=4.75, p>0.05; KW=5.19, p>0.05).

"Do your guests who come to the house ask permission to smoke?" 10.6% of the participants never; 34.5% sometimes; 24.2% generally; 30.72% always gave the answer.

The mean BATHS-T total score of the always responders was 4.31±0.78; the mean BATHS-T total score of those who responded generally was 3.94±0.93; the mean BATHS-T total score of sometimes responders was 4.07±0.95; The mean BATHS-T total score of those who gave no response was 4.13±1.01. While it was determined that the mean BATHS-T total and persistence in the environment sub-domain score of the always responders were higher than the participants who responded generally, sometimes or never (KW=9.16, p<0.05; KW=11.41, p<0.05); it was determined that the mean scores obtained from the health effect sub-domain of the scale did not differ between the groups (KW=6.48, p>0.05). "Would you warn the guest who smokes without permission?" 18.6% of the participants never; 22.4% sometimes; 21.4% generally; 37.6% always gave the answer. The mean BATHS-T total score of the

always responders was 4.21±0.90; the mean BATHS-T total score of those who responded generally was 4.07±0.97; the mean BATHS-T total score of sometimes responders was 4.14±0.81; The mean BATHS-T total score of those who gave no response was 3.98±0.96. There is no statistically significant difference between the participants' mean BATHS-T total, BATHS-T environmental persistence subscale, BATHS-T health impact subscale scores according to the variable of warning the unauthorized smoker (KW=3.50, p>0.05; KW=4.66, p>0.05; KW=2.83, p>0.05).

Table 4 shows the distribution of the participants' BATHS-T scores according to some characteristics of smoking in their personal vehicles. 74.7% of the participants stated that there is a smoking ban in their personal vehicle.

The mean BATHS-T total score of those who stated that smoking was prohibited in the vehicle was 4.20±0.88; The BATHS-T total score of those who stated that smoking could be smoked in the vehicle at some times was 4.11±0.76; The BATHS-T total score of those who stated that smoking could always be in the vehicle was 3.72 ±1.15.

There was no statistically significant difference between the participants' mean BATHS-T total, BATHS-T environmental permanence subscale, BATHS-T health impact subscale scores according to the variable of smoking rules in the vehicle (KW=4.26, p>0.05; KW=4.65, p>0.05; KW=4.97, p>0.05).

"Do the people you take in your car ask for permission to smoke?" 18.8% of the participants never; 13.5% sometimes; 21.8% generally; 45.9% always gave the answer. The mean BATHS-T total score of the always responders was 4.24±0.78; the mean BATHS-T total score of those who responded generally was 3.97±1.10; the mean BATHS-T total score of sometimes responders was 4.10±0.86; The mean BATHS-T total score of those who gave no response was 4.11±0.96. There is no statistically significant difference between the participants' mean BATHS-T total, BATHS-T environmental permanence subscale, BATHS-T health effect subscale scores according to the variable of asking for permission to smoke (KW=1.46, p>0.05; KW=0.70, p>0.05; KW=1.92, p>0.05).

Table 4: Distribution of participants' BATHS-T scores according to some characteristics of smoking in their personal cars

CHARACTERISTIC		N* (%)	Scale (Total) median (min-max)	Scale (Persistence in the environment) median (min-max)	Scale (Health effect) median (min-max)
Are there rules regarding smoking in your home?	No, smoking is always allowed inside the car.	23(10)	3,67 (1,33-5,00)	3,75 (1,50-5,00)	3,80 (1,20-5,00)
	Yes, only some times smoking is allowed.	35(15,3)	4,11 (2,44-5,00)	4,00 (2,75-5,00)	4,00 (2,20-5,00)
	Yes, smoking is prohibited inside the car.	171(74,7)	4,44 (1,00-5,00)	4,50 (1,00-00)	4,40 (1,00-5,00)
P value			0,118	0,098	0,083
KW			4,26	4,65	4,97
Do people you take in your car ask for permission to smoke?	None	43(18,8)	4,22 (1,78-5,00)	4,50 (1,75-5,00)	4,20 (1,40-5,00)
	Sometimes	31(13,5)	4,22 (1,67-5,00)	4,25 (1,75-5,00)	4,00 (1,60-5,00)
	Generally	50(21,8)	4,17 (1,22-5,00)	4,25 (1,00-5,00)	4,00 (1,20-5,00)
	Always	105(45,9)	4,33 (1,00-5,00)	4,25 (1,00-5,00)	4,40 (1,00-5,00)
P value			0,689	0,871	0,588
KW			1,46	0,70	1,92
Do you warn anyone who smokes in your car without permission?	None	19(8,30)	3,89 (2,00-5,00)	4,00 (2,00-5,00)	3,80 (2,00-5,00)
	Sometimes	32(14,00)	3,94 (1,33-5,00)	4,00 (1,50-5,00)	4,00 (1,20-5,00)
	Generally	29(12,70)	4,11 (1,89-5,00)	4,00 (2,00-5,00)	4,00 (1,80-5,00)
	Always	149(65,00)	4,44 (1,00-5,00)	4,50 (1,00-5,00)	4,40 (1,00-5,00)
P value			0,164	0,138	0,177
KW			5,10	5,50	4,93

**93 people who do not have a car are excluded from the analysis in this table.*

"Would you warn anyone who smokes in your vehicle without permission?" 8.3% of the participants never; 14% sometimes; 12% usually; 65% always gave the answer. The mean BATHS-T total score of the always responders was 4.22±0.89; the mean BATHS-T total score of those who responded generally was 4.13±0.77; the mean BATHS-T total score of sometimes responders was 3.88±1.02; The mean BATHS-T total score of those who gave no response was 3.90±0.93. There is no statistically significant difference between the participants' mean BATHS-T total, BATHS-T environmental permanence subscale, and BATHS-T health impact subscale scores according to the variable of warning an unauthorized smoker in the vehicle (KW=5.10, p<0.05; KW=5.50, p<0.05; KW=4.93, p<0.05).

Table 5 shows the distribution of the participants' scores on the BATHS-T scale according to some characteristics of some purchasing/renting behaviors. "Does smoking in the car before while buying or renting a vehicle create a negative belief in you?" 16.5% of the participants never; 24.8% sometimes; 24.2% generally; 34.5% always gave the answer.

The mean BATHS-T total score of the always responders was 4.29±0.81; the mean BATHS-T total score of those who responded generally was 4.16±0.87; the mean BATHS-T total score of sometimes responders was 4.06±0.95; The mean BATHS-T total score of those who gave no response was 3.78±1.01. It was found that the mean BATHS-T total and environmental persistence sub-domain and health impact sub-domain scores of the always responders were higher than the participants who responded generally, sometimes, or never (KW=10.97, p<0.05; KW=1.93,0 p<0.05; KW=10.60, p<0.05).

"While choosing a room at the hotel, does the presence of smoking affect your choice negatively?" 21.4% of the participants never; 26.7% sometimes; 22.7% generally; 29.52% of them always gave the answer. The mean BATHS-T total score of the always responders was 4.46±0.69; the mean BATHS-T total score of those who responded generally was 4.00±1.01; the mean BATHS-T total score of sometimes responders was 3.95±0.92; The mean BATHS-T total score of those who gave no response was 3.99±0.94.

Table 5: Distribution of participants' BATHS-T scores according to some characteristics of some purchasing/renting behaviors

CHARACTERISTIC		N (%)	Scale (Total) median (min-max)	Scale (Persistence in the environment) median (min-max)	Scale (Health effect) median (min-max)
Does smoking in the car before while buying or renting a car create a negative belief in you?	None	53(16,5)	4,00 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Sometimes	80(24,8)	4,17 (1,00-5,00)	4,00 (1,00-5,00)	4,20 (1,00-5,00)
	Generally	78(24,2)	4,33 (1,00-5,00)	4,25 (1,00-5,00)	4,30 (1,00-5,00)
	Always	111(34,5)	4,66 (1,00-5,00)	4,75 (1,00-5,00)	4,40 (1,00-5,00)
P value			0,012	0,012	0,014
KW			10,97	10,93	10,60
When choosing a room in the hotel, does the previous smoking affect your choice negatively?	None	69(21,4)	4,11 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Sometimes	86(26,7)	4,00 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Generally	73(22,7)	4,22 (1,00-5,00)	4,25 (1,00-5,00)	4,20 (1,00-5,00)
	Always	94(29,2)	4,78 (2,00-5,00)	5,00 (2,00-5,00)	4,70 (2,00-5,00)
P value			<0,001	<0,001	<0,001
KW			22,02	18,67	23,11
Does the previous use of cigarettes affect your choice while renting or buying a house?	None	119(37)	4,11 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Sometimes	86(26,7)	4,06 (1,00-5,00)	4,00 (1,00-5,00)	4,00 (1,00-5,00)
	Generally	58(18)	4,33 (1,00-5,00)	4,25 (1,00-5,00)	4,40 (1,00-5,00)
	Always	59(18,3)	4,89 (2,00-5,00)	5,00 (2,00-5,00)	5,00 (2,00-5,00)
P value			<0,001	<0,001	<0,001
KW			27,62	25,59	26,15

It was found that the mean BATHS-T total and environmental persistence sub-domain and health impact sub-domain scores of the always responders were higher than the participants who responded generally, sometimes, and never (KW=22.02, p<0.05; KW=18.67, p<0.05; KW=23.11, p<0.05).

Does the previous use of cigarettes affect your choice while renting or buying a house? 37% of the participants never; 26.7% sometimes; 18% usually; 18.3% always gave the answer. The mean BATHS-T total score of the always responders was 4.61±0.56; the mean BATHS-T total score of those who responded generally was 4.05±1.00; the mean BATHS-T total score of sometimes responders was 3.95±0.96; The mean BATHS-T total score of those who gave no response was 4.03±0.89. It was found that the mean BATHS-T total and environmental persistence sub-domain and health impact sub-domain scores of the always responders were higher than the participants who responded generally, sometimes, and never (KW=27.62, p<0.05; KW=25.59, p<0.05; KW=26.15, p<0.05).

DISCUSSION

As a result of this study, it was found that the sixth grade students of the medical faculty had a good level of beliefs about third-hand smoke; It has been seen that he believes in its effect on health and its permanence in the environment. Female gender, living with family, having good or higher academic achievement were associated with higher BATHS-T scores.

In our study, female participants were found to be more successful than men in the total score of the belief scale about THS according to gender. While the scores of female participants in the health effect sub-dimension of the scale were higher than that of male participants, no difference was found in the scores obtained in the sub-dimension of permanence in the environment. In a study in our country in which family physicians' beliefs about THS were evaluated with the BATHS-T scale, it was found that female family physicians had higher beliefs about THS than their male colleagues, both according to the whole scale and in terms of health and permanence (6). Although no significant relationship was found between THS knowledge level and gender in patients, it was associated with attitude and behavior (5). Xie et al. revealed that women are more likely to believe that THS affects the health of their children (16). In addition, in previous studies, male gender was associated with a lower probability of believing that THS is harmful (9, 10, 17), lower intention to quit smoking (18), and a lower perceived probability of developing lung cancer (19).

In our study, no statistically significant relationship was found between income status and BATHS-T score. Our finding is consistent with the existing literature (7,14). In the study, the BATHS-T total score of the participants living with their families and living in the student dormitory was found to be statistically higher than the participants living in the student dormitory. It was found that the 6th grade students of medical school, who defined their academic achievement as good and above, had higher BATHS-T scores. In the study by Haardörfer et al., it was found that more educated people had higher scores on the permanence of THS. However, in the same study, it was shown that the effect of THS on health and the total score of the scale of beliefs about THS did not differ according to the education level of the participants (14). 28.6% of the participants stated that they smoke. According to a study conducted at the same faculty, 14.3% of 6th grade students smoke (20). The prevalence of smoking among medical school students in our country is 15.1-36.6% (21).

In this study, the BATHS-T scale total score of non-smokers was found to be higher than that of non-smokers. Non-smoker participants scored higher in both the health impact and environmental permanence sub-dimensions of the scale. A previous study with family physicians revealed that non-smokers' beliefs about THS were higher than those who smoked, both in terms of the whole scale and in terms of health and permanence (6). In another study, current smokers and former smokers were found to be less likely to perceive the negative effects of smoking than those who have never smoked (22). Within the scope of the tobacco control framework agreement, 6 basic policies, abbreviated as MPOWER, were established to reduce the demand for tobacco products. The majority of the participants stated that they support the ban on smoking indoors, increasing the tax on tobacco products, bans on advertising, and not selling under the age of 18 within the scope of the anti-tobacco policy. Participants mostly supported the ban on the sale of tobacco products to individuals under the age of 18. The least supported policy was to increase the tax on tobacco products. More research is needed to reveal the reasons for this.

Considering the distribution of the participants' scores from the BATHS scale according to some characteristics of smoking at home; It was found that the awareness of third-hand smoke was lower in the participants who stated that there was someone else smoking at home than those who did not smoke at home.

In our study, it is noteworthy that there is no significant difference in the beliefs of the families who apply a strict smoking ban in their homes and cars towards THS compared to the others. In only one study, no statistically significant difference was found in the percentage of no smoking rules at home among participants who knew THS before compared to those who did not (23). Previous studies have shown that there is a statistically significant relationship between parents who believe that THS has an impact on their children's health and a smoking ban at home (24).

Existing studies have proven that belief in the health effects of THS has a statistically significant relationship with smoking ban at home(11). The scale scores of the parents who applied a complete smoking ban at home and in the car were found to be significantly higher than the others (4). Additionally, in one intervention study, belief in third-hand smoke harm was associated with having a strictly enforced smoke-free home and car policy. Parents with harmful beliefs about third-hand smoke were more likely to seek help to quit smoking. Parents who changed their third-hand smoking beliefs in favor of believing that third-hand smoke is harmful were found to be more likely to make at least one quit attempt (25). In our study, the participants stated that while renting a car and house, while choosing a hotel room, the possibility of smoking in these places would adversely affect their choices. In the literature, THS deposits have been found in previously smoking rental houses (3), cars and hotel rooms (13).

Our study is the only study in Turkey in which THS exposure and awareness was measured in medical school students. In this respect, young doctors' awareness of the long-term effects of smoking, which is known to have negative effects on health, will enrich the content of preventive medicine practices. There are also some limitations of our study. The study sample was applied only to sixth grade students of a university medical school, and does not represent all university students. The collection of data by online survey method may have caused information bias. THS exposure was assessed by the presence of tobacco use rules at home and in the vehicle. Therefore, the distinction between THS and THS exposure is weak. The content of the questionnaire focused on the use of cigarettes as a tobacco product, and the use of electronic cigarettes, cigars, pipes and hookahs was not questioned.

CONCLUSION

This study showed that THS awareness is high in sixth year students of AYBU Faculty of Medicine. It is important to determine the awareness of THS in the whole population and, if necessary, to increase it in terms of understanding the harms of smoking and making the decision to quit. The subject is especially important for young adults. It is not as important as first and second hand cigarette exposure. It is important to evaluate the long-term consequences of the health effects of this issue in additional studies with larger samples.

DECLARATIONS

Funding

None.

Conflicts of Interest/Competing Interests

None.

Ethics Committee Approval

Our study was approved by the Local Ethics Committee of Ankara Yıldırım Beyazıt University Rectorate Medical Research Ethics Committee (board decision dated 14.06.2021 and numbered 76).

Availability of Data

Available upon request.

Authors' Contributions

Emine AKBAL, Egemen ÜNAL, Mehmet Enes GÖKLER, Salih MOLLAHALİLOĞLU conducted this study and wrote the article.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nutrition and Dietetics / Beslenme ve Diyetetik

Children-Dietary Inflammatory Index and Adherence to the Mediterranean Diet in Children with Obesity: Are They Associated with Cardiometabolic Risk Parameters?

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ABSTRACT

Purpose: This study was planned to assess the relationship between the children's dietary inflammatory index (cDII), adherence to the Mediterranean diet (AMD), and metabolic control parameters in children with overweight and obesity.

Methods: This cross-sectional study was conducted in children with overweight and obesity aged 7-18 years. Sociodemographic, biochemical, dietary, and lifestyle data were collected using a questionnaire. Mediterranean Diet Quality Index (KIDMED) was used to evaluate AMD. Anthropometric measurements were performed. Dietary intake and cDII were assessed with a three-day food consumption record.

Results: The mean cDII score was 2.2±0.94 (range from -0.43 to 4.39). Of the total participants, 12% had high and 38.7% had low AMD. There were no significant differences between cDII and biochemical and anthropometric parameters. The proportion of participants with insulin resistance was higher in the low AMD group than in the moderate/high adherence group (53.4% vs. 37.0%, p=0.047). There was no significant relationship between AMD and lipid profile. Logistic regression analysis showed that participants with low AMD were 2.055 times (95% CI 1.009-4.186, OR=2.055) more likely to have high insulin levels than participants with high AMD (p=0.047).

Conclusion: This study showed that low AMD was associated with high insulin levels, but cDII was not associated with cardiometabolic risk factors in children with overweight and obesity.

Keywords: Diet, inflamation, Mediterranean diet, childhood obesity, cardiometabolic risk

Obezitesi Olan Çocuklarda Çocuk-Diyet İnflamatuar İndeksi ve Akdeniz Diyetine Uyum: Kardiyometabolik Risk Parametreleri ile İlişkili mi?

ÖZET

Amaç: Bu çalışma, fazla kilolu ve obezitesi olan çocuklarda çocukların diyet inflamatuvar indeksi (cDII), Akdeniz diyet uyumu (AMD) ve metabolik kontrol parametreleri arasındaki ilişkiyi değerlendirmek için planlandı.

Yöntemler: Bu kesitsel çalışma 7-18 yaş arası fazla kilolu ve obezitesi olan çocuklarda yapılmıştır. Sosyodemografik, biyokimyasal, diyet ve yaşam tarzı verileri bir anket kullanılarak toplanmıştır. AMD'yi değerlendirmek için Akdeniz Diyet Kalite İndeksi (KIDMED) kullanıldı. Antropometrik ölçümler yapıldı. Besin alımı ve cDII üç günlük besin tüketim kaydı ile değerlendirildi.

Bulgular: Ortalama cDII skoru 2,2±0.94 (-0,43 ile 4,39 arası) idi. Toplam katılımcıların %12'si yüksek ve %38,7'si düşük AMD'ye sahipti. cDII ile biyokimyasal ve antropometrik parametreler arasında anlamlı fark yoktu. İnsülin direnci olan katılımcıların oranı düşük AMD grubunda orta/yüksek uyum grubuna göre daha yüksekti (%53,4'e karşı %37,0, p=0,047). AMD ile lipit profili arasında anlamlı bir ilişki yoktu. Logistik regresyon analizi düşük AMD'li katılımcıların yüksek insülin düzeylerine sahip olma olasılığının, yüksek AMD'li katılımcılara göre 2,055 kat (%95 CI 1,009-4,186, OR=2,055) daha fazla olduğunu gösterdi.

Sonuç: Bu çalışma, fazla kilolu ve obezitesi olan çocuklarda düşük AMD'nin yüksek insülin seviyeleri ile ilişkili olduğunu, cDII'nin kardiyometabolik risk faktörleri ile ilişkili olmadığını göstermiştir.

Anahtar Kelimeler: Diyet, inflamasyon, Akdeniz diyeti, çocukluk çağı obezitesi, kardiyometabolik risk

Childhood obesity has recently emerged as a major public health issue (1). It is an important risk factor for cardiometabolic disorders such as type 2 diabetes, insulin resistance, dyslipidemia, and hypertension. In addition, it is a potential risk factor for obesity in later life and is associated with higher rates of morbidity and mortality in adulthood (2). In parallel with the increase in obesity, cardiometabolic diseases are become highly prevalent, accounting for an estimated 17.9 million fatalities per year (3).

Unhealthy diets that are typically high in sugars, processed carbohydrates, saturated and trans fats have the potential to increase oxidative stress and proinflammatory cytokines. It has been reported that proinflammatory diets are correlated with systemic inflammation and cardiometabolic risk indicators (3-5). Contrastly, healthier eating patterns such as the "Mediterranean diet (MD)" rich in fruits, vegetables, whole grains, legumes, poultry, and fish are linked to lowered cardiometabolic risk and decreased systemic inflammation (3). The MD is potentially effective in maintaining cardiovascular health in adults (6, 7). While there is considerable evidence for the MD's metabolic benefits in adults, the effects of the MD on metabolic markers in children are not clear (7).

General dietary patterns do not adequately reflect the overall inflammatory potential of the diet. Therefore, the dietary inflammatory index (DII) has been developed to assess the inflammatory effects of consumed micro and macronutrients, and various food parameters (3, 8). The proinflammatory or anti-inflammatory effects of food parameters were determined by evaluating the production of inflammatory blood biomarkers. The DII scores have been associated with inflammatory biomarkers, cardiometabolic risk factors, and metabolic syndrome (MetS) in adults (5). However, few studies have investigated the relationship between DII and cardiometabolic risk factors in children, and the findings were conflicted (9, 10).

Given the increasing prevalence of cardiometabolic disorders in pediatric populations and their potential impact on future health, it is critical to determine dietary factors that contribute to poor cardiometabolic health in childhood (3). There is a gap in the literature regarding the relationship between dietary inflammatory potential and cardiometabolic risk factors in children. In addition, no data comparing the effect of adherence to the MD (AMD) and the "Children's Dietary Inflammatory Index" (cDII) on cardiometabolic health exist. Therefore, this study was planned to evaluate the relationship between AMD, cDII, and metabolic control parameters in children with obesity.

MATERIAL AND METHODS

Participants

This cross-sectional study was conducted in 150 children with overweight and obesity between November 2022 and May 2023 aged 7-18 years and admitted to the outpatient pediatric clinic of a university hospital. To determine the relationship between insulin levels and cDII for r = 0.3 effect size (the medium effect size), 95% power, and 5% type 1 error, the sample size was calculated as 134 using G*Power (versiyon 3.1.9.7) programme. Participants using medications that may affect body weight, blood glucose, and lipid profile, those who regularly used any nutritional supplements in the last three months, those with growth retardation, genetic and endocrine problems, those with chronic diseases, and those on a weight loss diet were excluded from the study. A total of 150 participants were included to the study. Each participant and his or her parents signed a written informed consent.

This study was carried out in accordance with the Helsinki Declaration criteria and approved by non-interventional clinical trials ethics committee with reference number 0391 and date 22.09.2022.

Data Collection

The study data were obtained through a questionnaire using face to face interview technique. The questionnaire consisted of six sections. In the first section, general information about the participants (age, gender, educational status, etc.) was taken. In the second section, participants' eating habits were evaluated. In the third section, the anthropometric measurements and body composition analyses were performed and recorded in the questionnaire. In the fourth section, "Mediterranean Diet Quality Index for Children (KIDMED)" was applied to evaluate AMD. In the fifth section, 3-day food consumption records were taken to calculate cDII. In the sixth section, a 24-hour physical activity record form was filled out.

Dietary Intake and cDII

A 3-day food consumption record was taken to evaluate the dietary intake of the participants and to calculate the cDII. The researcher taught participants and their parents how to keep food consumption records. The data obtained were analyzed using the nutrient analysis program (BEBIS).

The cDII is an index that was developed by allocating pro- or anti-inflammatory weights to 25 food components (energy, carbohydrate, protein, total fat, folic acid, fiber, iron, selenium, zinc, magnesium, vitamin A, vitamin D, vitamin B12, thiamine, vitamin C, vitamin E, riboflavin, niacin, vitamin B6, saturated fatty acid (SFA), monounsaturated fatty acid (MUFA), cholesterol, alcohol, polyunsaturated fatty acid (PUFA), and beta carotene). These 25 food components obtained from a three-day food consumption record were used to calculate cDII in this study. Energy-adjusted cDII was utilized to minimize the difference in energy intake between participants by converting whole food parameters per 1000 kcal consumption. First, the z-scores were calculated and converted into percentile scores to normalize each dietary component. Second, to obtain a symmetric distribution, each percentile score was doubled and then "1" was subtracted. Third, the centralized percentile values for each food parameter were multiplied by the "customized full inflammatory effect score" and the resulting values were summed to obtain the cDII score. A high cDII score indicates that the diet shifts to the pro-inflammatory direction, while a low cDII score indicates that the diet has anti-inflammatory properties (11). Participants were categorized into low (<2.28) and high (≥ 2.28) cDII groups based on median cDII score

Anthropometric Measurements

Body weight and composition analyses were performed using the Tanita Body Composition 532 Innerscan brand bioelectrical impedance analyzer. Height was measured with a stadiometer with the head in the Frankford plane, with the feet together, the knees straight, and the heels, hips, and shoulder blades in contact with the vertical level (12). Body Mass Index (BMI) was calculated with the formula "BMI=[body weight (kg)/height (m^2)]". Waist, hip, and neck circumference measurements were made using a non-stretchable tape in accordance with the measurement method (12). BMI and height z scores were determined using the "WHO Antro Plus" program. Children with a BMI z score > +1 were included in this study.

Adherence to the MD

The KIDMED was applied to measure AMD. The KIDMED, developed by Serra-Majem et al. (13), is an index consisting of a total of 16 statements containing the characteristics of the MD, which can be applied spontaneously or interviewed. It was developed to measure dietary adequacy between the ages of 2-24. Of the expressions included in the KIDMED, 12 were positive and 4 were negative expressions, and those who answered yes to positive expressions got +1 and those who answered yes to negative expressions got -1 point. Afterward, total scores were divided into 3 groups ≥8 points for high AMD, 4-7 points for moderate AMD, and ≤3 points as low AMD (13).

Cardiometabolic Risk Factors

Biochemical parameters (fasting blood glucose, fasting insulin, low-density lipoprotein (LDL) cholesterol, alanine aminotransferase (ALT), triglyceride, high-density lipoprotein (HDL), and total cholesterol) were recorded from the patient files to assess cardiometabolic risk factors. Blood lipids of participants were grouped as high total cholesterol (≥200 mg/dL), high LDL cholesterol (≥130 mg/dL), high triglyceride (≥100 mg/dL for 0-9 years, ≥130 mg/dL for 10-18 years of age), and low HDL cholesterol (<40 mg/dL) (14). A fasting blood glucose level of ≥100 mg was classified as impaired fasting glucose and a fasting insulin level of ≥15 µU/mL was classified as hyperinsulinemia (15). The following formula was used to calculate the homeostatic model assessment of insulin resistance (HOMA-IR) =[Fasting blood glucose (mg/dL) × Fasting insulin (µU/mL)/405]. Insulin resistance was considered to be present if HOMA–IR ≥3.16 in pubertal participants and HOMA–IR ≥2 in prepubertal participants (16).

Physical Activity Levels

A 24-hour physical activity record form was used to determine the physical activity levels of participants. The time spent by the participants on daily sleep, laying activities, sitting activities, and light, moderate, and heavy activities were recorded on the physical activity record form. According to physical activity level (PAL values, participants were grouped as inactive (PAL<1.4), moderately active (PAL=1.4-1.69), and active (PAL≥1.7) (17).

Statistical Analysis

Statistical analyses were performed using the SPSS software version 25. To assess the conformity of the data to the normal distribution and analytical methods (Kolmogorov-Smirnov test) were used. Normally distributed data were expressed as mean and standard deviation, non-normally distributed data as the median and interquartile range (IQR), and categorical data as frequency and percentage. The Chi-Square test was used for categorical variables, the Student's t-test for regularly distributed data, and the Mann-Whitney U test for non-normally distributed variables when comparing two groups. In the comparison of the three groups, one-way ANOVA was used for normally distributed variables and the Kruskal-wallis test was used for non-normally distributed variables.

Posthoc tests were carried out when a significant difference was observed between the three groups (Tukey's test was used if variances were homogeneous, and the Tamhane T2 test was used if variances were not homogeneous). A partial correlation analysis was carried out to evaluate the relationship between anthropometric measurements and the KIDMED score, controlling for age. Logistic regression analysis was performed to evaluate the relationship between high insulin levels and insulin resistance with dietary indices. In the distribution of cardiometabolic risk factors according to the MD adherence groups of the participants, those with high and moderate adherence to the MD were combined. A p-value less than 0.05 was considered statistically significant in all analyses.

RESULTS

The general characteristics of the participants according to cDII and AMD groups are given in Table 1. The mean age was 12.2±2.82 years, 47.3% of them boys and 52.7% girls. The cDII mean of the participants was determined as 2.2±0.94, (range from -0.43 to 4.39) and the mean KIDMED score was 4.3±2.57. Of the total participants, 38.7% had low, 49.3% had moderate, and 12.0% had high AMD (not shown in table). The mean age of the participants with low and moderate AMD was found to be higher than those with high AMD group (p<0.001).

The energy and dietary intake of the participants according to cDII and AMD groups are presented in Table 2. The energy, carbohydrate, protein, animal protein, fat, SFA, MUFA, cholesterol, and vitamin B12 intake of the participants in the high DII group were significantly higher than those in the low cDII group. The low cDII group had higher fiber, vitamin E, and C intake and consumption of vegetables and fruits compared to the high cDII group. Vegetable consumption of the participants with high AMD was higher than those with low and moderate AMD (p=0.008).

The comparison of the biochemical, anthropometric, and body composition parameters of the participants according to the cDII and AMD groups is given in Table 3. Insulin levels and HOMA-IR values of participants with low AMD were significantly higher than those with high and moderate AMD. The LDL and total cholesterol levels of the participants with low AMD were found to be lower than those with high AMD. There were no significant differences between cDII groups and biochemical and anthropometric parameters. The body weights, neck, waist, and hip circumferences of the participants with low AMD were found to be significantly higher (p<0.05). There was no significant correlation between the KIDMED and body weight, height, neck, and hip circumferences (not shown in the table) when partial correlation analysis was performed by controlling the age.

The distribution of cardiometabolic risk factors according to cDII and AMD groups is shown in Table 4. The proportion of participants with high insulin levels (53.4%) was higher in participants with low AMD than in those with moderate/high AMD (32.6%) (p=0.011). The proportion of participants with insulin resistance was higher in the low AMD group than in the moderate/high AMD group (53.4% vs. 37.0%, p=0.047).

Binary logistic regression analysis was performed to evaluate the association of cDII score and AMD with high insulin levels and insulin resistance (Table 5). As a result, participants with low AMD were 2.055 times (95% CI 1.009-4.186, OR=2.055) more likely to have high insulin levels than participants with high AMD. The cDII scores and AMD were not associated with insulin resistance (Table 5).

DISCUSSION

This study showed a relatively low prevalence of high AMD over the studied population (12%). This finding is in line with a study conducted on Turkish adolescents with obesity, in which only 13.6 % of the participants adhered to the MD (18). cDII score of the studied population was ranged from -0.43 to 4.39. If the DII score is negative, the diet is thought to have anti-inflammatory effects; if the score is positive, the diet is assumed to have inflammatory effects (19). The DII score of Brazilian adolescents was found to be ranged from −2.8 to 4.3 (20). Açık et al. (10) found the mean cDII score in adolescents to be ranged from−3.22 to 4.09. Similarly, DII scores ranged from −4.87 (most anti-inflammatory) to 4.75 (most pro-inflammatory) in school-aged children (3). The data obtained showed that the diet in children with obesity shifted in a proinflammatory direction and moved away from the MD. These results suggest the need to improve diet quality in the studied population.

Table 1. General characteristics of the participants according to cDII and MD adherence groups

		cDII groups			Adherence to the MD groups			
	Total	**Low cDII (n=75)**	**High cDII (n=75)**	**p value**	**Low (n=58)**	**Moderate (n=74)**	**High (n=18)**	**p value**
Age (years) (x±SD)	12.2±2.82	12.1±2.88	12.4±2.77	0.437	13.2 ±2.51[a]	12.0±2.95[b]	10.3± 2.05[c]	**<0.001** a>b, a>c
Gender n (%)								
Boys	71 (47.3)	34 (45.3)	37 (49.3)	0.625	28 (48.3)	36 (48.6)	7 (38.9)	0.746
Girls	79 (52.7)	41 (54.7)	38 (50.7)		30 (51.7)	38 (51.4)	11 (61.1)	
Father education status n (%)								
No education	2 (1.3)	2 (2.7)	-	0.423	1 (1.7)	1 (1.4)	-	0.746
Primary school	55 (36.7)	29 (38.7)	26 (34.7)		17 (29.3)	30 (40.5)	8 (44.4)	
Secondary school	40 (29.7)	18 (24.0)	22 (29.3)		19 (32.8)	18 (24.3)	3 (16.7)	
High school/University	50 (33.3)	25 (33.3)	25 (33.3)		19 (32.8)	24 (32.4)	7 (38.9)	
Mother education status n (%)								
No education	9 (6.0)	5 (6.7)	4 (5.3)	0.492	4 (6.9)	3 (4.1)	2 (11.1)	0.736
Primary school	63 (42.0)	33 (44.0)	30 (40.0)		24 (41.4)	32 (43.2)	7 (38.9)	
Secondary school	24 (16.0)	14 (18.7)	10 (13.3)		11 (19.0)	12 (16.2)	1 (5.6)	
High school/University	54 (36.0)	23 (30.7)	31 (41.3)		19 (32.8)	27 (36.5)	8 (44.4)	
Number of children in the family n (%)								
1	24 (16.0)	12 (16.0)	12 (16.0)	0.679	13 (22.4)	9 (12.2)	2 (11.1)	0.309
2	64 (42.7)	28 (37.3)	36 (48.0)		21 (36.2)	32 (43.2)	11 (61.1)	
3	45 (30.0)	26 (34.7)	19 (25.3)		16 (27.6)	24 (32.4)	5 (27.8)	
4 and more	17 (11.3)	9 (12.0)	8 (10.7)		8 (13.8)	9 (12.2)	50 (0.0)	
Family income								
Low	121 (80.7)	57 (76.0)	64 (85.3)	0.780	46 (79.3)	13 (17.6)	14 (77.8)	0.269
Moderate	26 (17.3)	17 (22.7)	9 (12.0)		9 (15.5)	61 (82.4)	4 (22.2)	
Good	3 (2.0)	1 (1.3)	2 (2.7)		3 (5.2)	0 (0.0)	0 (0.0)	
BMI z score n(%)								
Overweight (z score 1-2)	17 (11.3)	7 (9.3)	10 (13.3)	0.362	8 (13.8)	7 (9.5)	2 (11.1)	0.716
Obese (>2 z score)	132 (88.0)	67 (89.3)	65 (86.7)		49 (84.5)	67 (90.5)	16 (88.9)	
Physical activity n (%)								
Inactive	99 (66.0)	57 (76.0)	42 (56.0)	**0.040**	39 (67.2)	48 (64.9)	12 (66.7)	0.974
Moderate active	41 (27.3)	13 (17.3)	28 (37.3)		15 (25.9)	21 (28.4)	5 (27.8)	
Active	10 (6.7)	5 (6.7)	5 (6.7)		4 (6.9)	5 (6.8)	1 (5.6)	

The bold values are indicates significant at p < 0.05. Each variable was identified with a different letter (a, b, c).
Abbreviations: BMI: Body mass index, cDII:children's dietary inflamatory index, MD: Mediterranean diet

Table 2. Energy and dietary intake of participants according to DII and adherence to the MD groups

		cDII groups			Adherence to the MD groups			
	Total	**Low cDII (n=75)**	**High cDII (n=75)**	**p[1]**	**Low (n=58)**	**Moderate (n=74)**	**High (n=18)**	**p[2]**
Energy (kcal)	1290.4 (609.15)	1176.6 (474.50)	1407.7 (727.22)	**0.002**	1317.5 (655.91)	1286.5 (614.10)	1269.7 (397.95)	0.851
Carbohydrate (g)	156.4 (80.40)	143.8 (65.11)	175.6 (91.85)	**0.020**	162.7 (95.38)	155.7 (76.99)	156.8 (75.50)	0.696
Carbohydrate (%)	49.0 (10.00)	51.0 (9.00)	49.0 (12.00)	0.543	49.0 (9.25)	50.0 (9.00)	48.0 (12.75)	0.381
Protein (g)	48.0 (24.70)	45.9 (20.19)	50.7 (29.87)	**0.028**	47.2 (22.77)	49.4 (26.55)	49.9 (18.01)	0.861
Protein (%)	15.0 (4.00)	16.0 (5.00)	15.0 (5.00)	0.272	15.5 (5.25)	15.5 (4.00)	16.0 (2.50)	0.989
Plant protein (g)	19.8 (11.89)	18.5 (8.16)	21.1 (13.23)	0.198	18.4 (14.86)	19.9 (10.3)	19.6 (5.8)	0.827
Animal protein (g)	28.0 (17.28)	26.7 (16.20)	32.3 (24.26)	**0.023**	28.4 (20.98)	27.6 (17.68)	31.4 (12.32)	0.949
Total fat (g)	49.5 (26.00)	43.2 (18.25)	54.5 (29.86)	**<0.001**	46.9 (27.80)	50.1 (23.63)	46.2 (19.88)	0.958
Total fat (%)	34.0 (10.00)	34.0 (7.00)	36.0 (10.00)	0.129	34.5 (8.50)	33.5 (11.00)	36 (9.00)	0.436
Saturated fat (g)	17.6 (11.23)	15.4 (8.10)	20.8 (13.55)	**<0.001**	17.4 (11.97)	17.7 (11.14)	16.9 (13.03)	0.874
MUFA (g)	16.3 (10.43)	15.3 (8.64)	18.8 (11.18)	**0.006**	17.2 (10.72)	16.9 (10.91)	15.9 (7.80)	0.946
PUFA (g)	9.8 (6.11)	9.4 (5.43)	9.8 (6.95)	0.386	10.1 (5.80)	9.4 (6.96)	9.2 (6.11)	0.757
Omega -3 (g)	0.7 (0.65)	0.6 (0.44)	1.0 (0.84)	0.006	0.78 (0.66)	0.79 (0.72)	0.67 (0.25)	0.626
Omega-6 (g)	8.5 (5.67)	7.8 (5.38)	8.5 (6.12)	0.466	8.4 (5.41)	8.1 (6.32)	7.89 (6.31)	0.943
Cholesterol (mg)	228.3(171.4)	202.2(161.9)	279.3(217.92)	**0.015**	224.1(171.58)	231.3 (196.5)	198.3(165.7)	0.596
Fiber (g)	12.8 (6.25)	14.1 (5.95)	11.6 (6.41)	**0.001**	12.2 (8.26)	13.2 (5.32)	13.8 (4.35)	0.354
Vitamin E (mg)	9.2 (6.51)	10.1 (6.03)	8.29 (5.62)	**0.023**	7.7 (6.27)	9.6 (6.02)	9. (8.88)	0.504
Tiamin (mg)	0.6 (0.29)	0.6 (0.26)	0.5 (0.35)	0.132	0.5 (0.36)	0.6 (0.24)	0.6 (0.12)	0.884
Riboflavin (mg)	0.9 (0.49)	0.9 (0.48)	1.0 (0.63)	0.147	0.9 (0.58)	0.9 (0.44)	0.8 (0.48)	0.396
Niasin (mg)	8.4 (4.62)	8.4 (5.64)	8.6 (4.49)	0.819	8.6 (5.59)	8.5 (4.78)	8.3 (4.57)	0.785
Vitamin B6 (mg)	0.7 (0.35)	0.8 (0.33)	0.7 (0.39)	0.015	0.7 (0.37)	0.7 (0.35)	0.8 (0.39)	0.479
Folic acid (µg)	186.3 (93.91)	197.1 (79.19)	182.0 (103.47)	0.075	174.7 (117.61)	194.9 (75.66)	189.9 (76.81)	0.398
Vitamin B12 (µg)	2.8 (2.44)	2.4 (1.87)	3.4 (3.34)	**0.029**	2.5 (2.73)	2.9 (2.31)	2.7 (2.03)	0.732
Vitamin C (mg)	55.8 (50.96)	67.9 (46.44)	40.3 (41.52)	**<0.001**	49.4 (48.09)	58.9 (51.35)	70.6 (37.70)	0.110
Iron (mg)	6.4 (3.09)	6.4 (2.70)	6.6 (3.70)	0.590	6.5 (3.63)	6.6 (3.06)	6.4 (3.16)	0.896
Magnesium (mg)	172.1 (69.44)	178.9 (66.22)	169.5 (91.12)	0.278	163.4 (95.57)	177.9 (65.19)	187.8 (46.36)	0.343
Zinc (mg)	6.5 (3.86)	6.5 (3.45)	6.5 (4.80)	0.579	6.5 (3.97)	6.44 (4.35)	6.41 (3.23)	0.941
Selenium (µg)	11.7 (15.18)	11.1 (12.16)	12.6 (16.8)	0.214	10.7 (16.08)	12.2 (14.6)	12.7 (16.96)	0.883
Food groups								
Vegetables	121.0 (120.00)	160.0 (119.50)	92.0 (90.00)	**<0.001**	111.5 (134.25)[a]	119.5 (104.75)[b]	170.5 (107.25)[c]	**0.008** c>b, c>a
Fruits	119.0 (213.00)	147.0 (186.00)	48.0 (175.00)	**<0.001**	92.5 (161.25)	150.5 (247.00)	123.5 (233.00)	0.061
Cereals	32.0 (46.00)	33.0 (44.00)	30.0 (42.00)	0.930	32.5 (37.25)	24.0 (41.50)	34.0 (53.25)	0.268
Meat and meat products	45.0 (78.00)	44.0 (59.00)	45.0 (93.00)	0.731	50.0 (87.75)	40.5 (53.25)	59.0 (129.25)	0.400
Dairy product	168.0 (186.00)	173.0 (173.00)	166.0 (184.00)	0.405	167.5 (192.50)	181.0 (177.75)	165.0 (232.75)	0.317

Data are expressed as median (IQR). The bold values are indicates significant at $p < 0.05$. [1]Difference between groups was obtained using Mann Whitney test. [2]Difference between groups was obtained using Kruskal–Wallis test. MUFA: Monounsaturated fatty acids. PUFA: polyunsaturated fatty acid.

Table 3. Biochemical, anthropometric, and body composition parameters according to cDII and MD adherence groups of the participants

		cDII groups			Adherence to the MD groups			
	Total	Low cDII (n=75)	High cDII (n=75)	p[1]	Low (n=58)	Moderate (n=74)	High (n=18)	p[2]
Biochemical parameters								
Fasting glucose (mg/dL)	87.0 (9.00)	87.0 (11.00)	87.5 (8.050)	0.789	88.0 (9.00)	88.0 (9.00)	85.5 (6.50)	0.433
Fasting insulin (IU/mL)	13.0 (10.10)	12.7 (8.88)	13.2 (10.38)	0.945	14.0 (9.93)[a]	12.4 (10.70)[b]	11.7 (8.44)[c]	**0.005** a>b, a>c
Total-C (mg/dL)	164.0 (39.00)	166.5 (36.75)	162.0 (48.50)	0.470	153.0 (56.00)[a]	167.0 (59.00)[b]	198.5 (136.75)[c]	**0.003** b>a, c>a
HDL-C (mg/dL)	45.0 (11.00)	45.0 (9.50)	46.0 (13.50)	0.146	42.0 (11.00)	47.0 (11.00)	45.5 (37.50)	0.152
LDL-C (mg/dL)	91.0 (34.00)	92.0 (25.25)	91.0 (40.00)	0.648	90.0 (28.00)[a]	96.0 (59.00)b	129.0 (108.75)[c]	**0.029** c>a
Trigliserid (mg/dL)	109.0 (54.00)	116.0 (46.00)	102.0 (63.50)	0.044	102.0 (41.00)	104.0 (57.00)	122.0 (100.25)	0.251
HOMA-IR	2.7 (2.26)	2.7 (2.21)	2.7 (2.14)	0.722	3.4 (2.97)[a]	2.8 (2.43)[b]	2.4 (7.75)[c]	**0.003** a>b, a>c
ALT (U/L)	19.0 (16.00)	21.0 (16.00)	19.0 (11.50)	0.163	17.0 (26.00)	18.0 (16.00)	23.0 (32.25)	0.285
Anthropometric measurements and body composition								
Body weight (kg)	71.5±21.91	70.6± 23.56	71.6± 20.5	0.942	79.6±18.59	68.1±23.01	60.2±19.08	0.001
Height z score	0.7±1.22	0.9±1.13	0.7±1.25	0.271	0.8±1.23[a]	0.5±1.18[b]	1.4±1.22[c]	**0.030** c<b
BMI z score	2.7±0.74	2.8±0.79	2.7±0.73	0.304	2.8±0.86	2.7±0.63	2.7±0.78	0.650
Neck circumference (cm)	35.8±3.44	35.7±3.25	35.5±3.28	0.298	36.7±3.30[a]	35.2±3.17[b]	35.2±4.31[c]	**0.023** a>b
Waist circumference (cm)	94.0±12.69	94.1 ±12.76	93.2 ±12.00	0.269	98.9±11.78[a]	91.8±12.29[b]	87.3±12.12[c]	**<0.001** a>b, a>c
Hip circumference (cm)	105.5±14.21	104.6 ±13.45	105.4±14.81	0.914	110.7±11.45[a]	103.6±14.44[b]	96.7±15.73[c]	**<0.001** a>b, a>c
Waist /hip ratio	0.8±0.86	0.8± 0.64	0.8± 0.10	0.190	0.8±0.06	0.8±0.07	0.9±0.15	0.535
Waist /height ratio	0.6±0.58	0.6±0.54	0.6±0.57	0.095	0.6±0.06	0.6±0.05	0.5±0.05	0.131
Body fat (%)	36.2 (10.40)	36.9 (10.40)	35.1 (10.40)	0.339	36.9 (11.40)	34.6 (9.48)	36.3 (9.35)	0.317

The bold values are indicates significant at p < 0.05. Each variable was identified with a different letter (a, b, c). [1]Difference between groups was obtained using Student test or Mann Whitney test. [2]Difference between groups was obtained using ANOVA or Kruskal–Wallis test.
Abbreviations: *C: Cholesterol, BMI: Body mass index. HOMA-IR, homeostatic model assessment for insulin resistance;*

Table 4. Distribution of cardiometabolic risk factors according to DII and MD adherence groups of participants

	cDII groups			Adherence to the MD		
	Low cDII	High cDII	p	Low	Moderate/High	p
	n (%)	n (%)		n (%)	n (%)	
Total Cholesterol						
Normal (Total Cholesterol <200)	62 (83.8)	57 (78.1)	0.379	50 (87.7)	69 (76.7)	0.131
High (Total Cholesterol ≥200)	12 (16.2)	16 (21.9)		7 (12.3)	21 (23.3)	
Fasting Glucose						
Normal (Fasting glucose <100)	70 (93.3)	69 (92.0)	0.754	53 (91.4)	86 (93.5)	0.631
High (Fasting glucose ≥100)	5 (6.7)	6 (8.0)		5 (8.6)	6 (6.5)	
LDL Cholesterol						
Normal (<130)	64 (86.5)	59 (81.9)	0.451	52 (91.2)	71 (79.8)	0.101
High (≥130)	10 (13.5)	13 (18.1)		5 (8.8)	18 (20.2)	
Triglyceride						
Normal	36 (48.6)	44 (60.3)	0.157	35 (61.4)	45 (50.0)	0.176
High	38 (51.4)	29 (39.7)		22 (38.6)	45 (50.0)	
HDL Cholesterol						
Normal (≥40 mg/dL)	52 (71.2)	60 (83.3)	0.082	42 (73.7)	70 (79.5)	0.411
Low (<40 mg/dL)	21 (28.8)	12 (16.7)		15 (26.3)	18 (20.5)	

Table 4. Distribution of cardiometabolic risk factors according to DII and MD adherence groups of participants (continued from Table 4)						
	cDII groups			Adherence to the MD		
	Low cDII	High cDII	p	Low	Moderate/High	p
	n (%)	n (%)		n (%)	n (%)	
Serum Insulin level						
Normal (<15 µU/mL)	43 (57.3)	46 (61.3)	0.618	27 (46.6)	62 (67.4)	**0.011**
High (≥15 µU/mL)	32 (42.7)	29 (38.7)		31 (53.4)	30 (32.6)	
Insulin Resistance						
Yes	42 (56.0)	43 (57.3)	0.869	27 (46.6)	58 (63.0)	**0.047**
No	33 (44.0)	32 (42.7)		31 (53.4)	34 (37.0)	

The bold values are indicates significant at p < 0.05. aDifference between groups was obtained using the Chi-Square test
Abbreviations: *cDII: children's dietary inflamatory index; MD: Mediterranean diet.*

Table 5. Association between serum insulin levels and AMD and cDII scores									
	Factors associated with high serum insulin levels					Factors associated with insulin resistance			
	B	OR	%95 CI	p value		B	OR	%95 CI	p value
Moderate/high adherence to the MD	-					-			
Low adherence to the MD	0.720	2.055	1.009-4.186	0.047		0.543	1.720	0.853-3.471	0.130
cDII score	-0.142	0.867	0.602-1.238	0.433		-0.116	0.891	0.629-1.263	0.516
Constant	-1.060	0.347	-	0.268		-0.642	0.526		0.492
Hosmer and Lemeshow test	χ^2=8.851; p=0.355					Hosmer and Lemeshow test	χ^2=10.846; p=0.211		

Age, gender, and physical activity level were controlled in both models. Participants with moderate/high adherence to MD were used as the reference. OR, odds ratio; CI, confidence interval.

Diet contributes significantly to the development of type 2 diabetes and other diseases associated with insulin resistance and inflammation (21, 22). Previous studies showed that proinflammatory diets are associated with increased inflammatory and oxidative biomarkers, the incidence of cardiovascular disease, certain cancers, and measures of adiposity in childhood (9, 23). A study of Brazilian adolescents found a moderately pro-inflammatory diet positively correlated with high HOMA-IR among girls and high total cholesterol in boys (20). Seremet et al. (24) reported that a higher DII score is associated with an increased risk of metabolic syndrome in adolescents and some metabolic syndrome components. Conversely, Carvalho et al. (25) demonstrated that there is no relationship between DII and metabolic syndrome and insulin resistance in young Brazilian adults. Similarly, no significant relationship was found between cDII groups and cardiometabolic risk factors in this study. The failure to show that cDII is linked to MetS and insulin resistance may be related to the fact that risk factors for chronic diseases act over a long period until they result in the development of the disease. Therefore, it's likely that the pro-inflammatory diet's effect on boosting these outcomes hasn't yet had a chance to show. Moreover, this result can be explained by the fact that cardiometabolic disorders are influenced not only by diet, but also by other factors such as lifestyle, environmental, psychological, and genetic factors (3). The present study did not examine the relationship between these other factors and cardiometabolic risk.

It has been reported that high AMD may be effective in maintaining metabolic health in adolescents with obesity (2). However, the results of studies evaluating the effects of the MD on the lipid profile are inconsistent. While it was found that the lipid profile improved after 16 weeks of the MD intervention in children and adolescents with obesity (26), in another study was found no significant change in lipid profile after 12 weeks of MD intervention in adolescents with obesity (27). Kim et al. (7) showed that adolescents with higher AMD have higher HDL

cholesterol compared to those with low AMD, but no relationship between AMD and MetS, triglyceride, total and LDL cholesterol. The present study showed that there is no significant relationship between MD adherence and lipid profile. This result is in line with results that no association between cDII and metabolic control parameters and can be explained by the fact that risk factors for chronic diseases act for a long time until they result in the development of the disease. To understand the relationship between AMD and lipid profile, prospective studies in which dietary factors and many variables that have the potential to affect lipid profile are evaluated together are needed.

In this study, participants with low AMD were 2.055 times (95% CI 1.009-4.186, OR=2.055) more likely to have high insulin levels than participants with high AMD. In addition, the proportion of patients with insulin resistance was found to be higher in the group with low AMD than in the group with moderate/high adherence. Similar to these results, the patients with low AMD possessed a metabolic profile characterized by higher HOMA-IR, triglyceride, and lower HDL (28). A meta-analysis study revealed that all MetS components are positively impacted by high AMD, and long-term AMD can reduce cardiometabolic risk factors (29). In a study of children aged 6-17 years, HOMA-IR decreased as AMD increased (18). Various mechanisms may explain the inverse relationship between AMD and insulin levels and insulin resistance: The MD can have a positive effect on the glycemic response, thanks to the many nutrients and bioactive components it contains. Whole grain foods, especially abundant in the MD, contain micronutrients that act as cofactors for enzymes that play a role in insulin secretion and glucose metabolism (6, 7). MUFA and PUFA from olive oil and nuts have been reported to have positive effects on insulin sensitivity by improving the inflammatory responses of adipose tissue. Polyphenols, which are important bioactive components of the MD, affect glucose metabolism by promoting glucose uptake in tissues and thus increasing insulin sensitivity (18).

This study has some limitations. First, the causality of the relationship remains unclear, as the study was designed as cross-sectional. Another limitation is that data were gathered by self-report, which may result in false reporting and recall bias. To address recall bias participants were requested to keep food diaries at home for three days, according to thorough written instructions. However, the present study also has the following strengths: A three-day record of food consumption provided more reliable results in calculating dietary intake and cDII. To the best of our knowledge, this is the first study to evaluate the associations between cDII, AMD, and cardiometabolic risk factors in children with obesity.

CONCLUSION

This study showed that low AMD was associated with high insulin levels, but cDII was not associated with cardiometabolic risk factors in children with overweight and obesity. These results support that AMD might be beneficial in maintaining metabolic health among adolescents with obesity.

DECLARATIONS

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Conflicts of interest/Competing interests

The authors declare that there are no conflicts of interest.

Ethics approval

For this study, the Ethics Committee Approval (IRB number: 0391 and date 22.09.2022) was obtained from the Non- Interventional Clinical Trials Ethics Committee of İzmir Katip Çelebi University. Study procedures were performed according to the principles of the Declaration of Helsinki and written informed consent was obtained from all participants and parents.

Availability of data and material

The datasets used for the present study will be provided by the corresponding author upon reasonable request.

Authors' contributions

GYD: Study conception and design, data analysis and interpretation, and writing orginal draft. CG: Data collection, and data analysis. AK: Data collection, critical revision.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nutrition and Dietetics / Beslenme ve Diyetetik

Mindful Eating is More Effective to Beat Emotional Eating than Nutrition Education and Diet: A Randomized Controlled Study

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ABSTRACT

Purpose: Mindful eating (ME) may have a potential improving problematic eating behaviors and lead to healthier food consumption. In this study, a randomized controlled trial that incorporated both mindful eating, including nutritional education with an energy-restricted diet. The aim is to contribute to the literature by revealing the comparative effectiveness of these approaches in alleviating problematic eating behaviors.

Methods: This prospective randomized controlled study was conducted between January-April 2021 with 70 participants without chronic disease. Interventions were conducted with an online platform in the groups as diet and education groups, also with control group. In the pre-test application first weekof the interventions, a questionnaire form including demographic data, Mindful Eating Questionnaire (MEQ-30), Turkish Emotional Appetite Questionnaire (EMAQ) were applied, and only anthropometric information and scales were used in the fifth week as post-test. Anthropometric information was collected based on declaration.

Results: Mean age of our participants was 33.40±12.27 years. Participant who had the ME education compared to the diet and control groups, had higher scores in physical activity ($p<0.01$), emotional appetite ($p<0.001$), MEQ-30 and its sub-factors ($p<0.01$). Disinhibition and Eating Discipline scores had correlations with EMAQ ($p<0.05$).

Conclusion: In summary, mindful eating can enhance the impact of individualized nutrition plans prepared by dietitians, as well as boost the effectiveness of nutritional guidance provided to clients in terms of managing weight and improving eating habits.

Keywords: eating behavior, mindfulness, body mass index, nutritional management.

Yeme Farkındalığı, Duygusal Yemeyi Yenmede Beslenme Eğitimi ve Diyetten Daha Etkindir: Randomize Kontrollü Bir Çalışma

ÖZET

Amaç: Yeme farkındalığı, problemli yeme davranışlarını iyileştirme ve besin tüketiminde sağlıklı seçimlere yönlendirmede faydalı olabilmektedir. Bu çalışma, katılımcılara beslenme eğitimiyle birlikte uygulanan enerji kısıtlı diyet ile yeme farkındalığı eğitiminin etkinliğini karşılaştırdığımız randomize kontrollü bir çalışmadır. Amaç, problemli yeme davranışlarını iyileştirmede bu yaklaşımların karşılaştırmalı etkinliğini ortaya çıkararak literature katkıda bulunmaktır.

Gereç ve Yöntem: Bu prospektif randomize kontrollü çalışma Ocak-Nisan 2021 tarihleri arasında kronik hastalığı olmayan 70 katılımcı ile yapılmıştır. Müdahaleler diyet ve eğitim grubu olarak gruplarda, ayrıca kontrol grubuyla birlikte yapılmış olup, çevrimiçi yöntemle eğitimler verilmiştir. Müdahalelerin ilk hafta ön test uygulamasında demografik verileri de içeren anket formu ile Yeme Farkındalığı Ölçeği (YFÖ-30), Türkçe Duygusal İştah Ölçeği (DİA) uygulanmış olup, beşinci hafta son testte yalnızca antropometrik bilgiler ve ölçekler kullanılmıştır. Antropometrik bilgiler katılımcıların beyanına dayalı olarak alınmıştır.

Bulgular: Katılımcıların yaş ortalaması 33.40±12.27 olarak bulunmuştur. Yeme farkındalığı eğitimi alan katılımcıların, diyet ve kontrol grubuna göre fiziksel aktivite ($p<0.01$), duygusal iştah ($p<0.001$), YFÖ-30 ve alt faktörlerinde ($p<0.01$) daha yüksek puan aldığı görülmüştür. Disinhibisyon ve Yeme Disiplini puanları ise DİA ile korelasyon göstermiştir ($p<0.05$).

Sonuç: Yeme farkındalığı uygulamaları, diyetisyenler tarafından hazırlanan bireyselleştirilmiş beslenme planlarının etkisini artırabileceği gibi, vücut ağırlığı yönetimi ve yeme alışkanlıklarının iyileştirmesi açısından danışanlara sağlanan beslenme rehberliğinin etkinliğini de artırabilir.

Anahtar Kelimeler: yeme davranışı, bilinçli farkındalık, beden kütle indeksi, beslenme yönetimi.

Mindfulness-based approaches are particularly effective in addressing binge eating, emotional eating, and leading to eat external cues. However, the evidence for using mindfulness for weight management is not strong with inconsistent results (1). Mindfulness Based Interventions (MBIs) for weight loss and overeating-related behaviors may have the potential to enhance lifestyle interventions, although their impact on short-term weight loss remains uncertain (2). The popular MBIs are mindful eating approach and MB-EAT (mindfulness-based eating awareness training). Mindful eating has proven effective in addressing various patterns associated with emotional eating and susceptibility to external cues. Moreover, MB-EAT contributes to positive outcomes like less problematic behaviors including overeating and restricted eating behaviors in weight loss, increased self-efficacy in relation to diet, and reduction in stress (3,4). Mindful eating interventions encompass practices like paying attention to physical hunger and fullness cues, and managing cravings and emotional triggers (5). This approach focuses on cultivating a healthier relationship with food rather than solely emphasizing food restriction (6).

Conventional weight loss methods that involve restricting energy intake and food choices often struggle to achieve sustainable results (5). Mindful eating, an emerging alternative approach to weight management, has gained attention. However, existing systematic reviews on mindful and intuitive eating have presented conflicting findings (7,8). Despite duration and application limitations, mindful eating can show promise as a practical method for individualized weight control (3). Mindful eating involves accepting the present moment without judgment while consuming food as understanding one's physical hunger and fullness cues, making informed decisions about what and how much to eat, prioritizing nutritious and enjoyable foods, avoiding distractions during meals, and acknowledging the consequences of mindless eating (9).

Mindfulness and mindful eating show promise in problematic eating behaviors and addressing the difficulties many encounters in managing food intake (7). Encouraging the adoption of a mindful eating approach could be a positive inclusion in general weight management guidance for the public interventions (1,4). Nutritional intervention and education combined program can serve larger populations with an ease in individualized applications as hunger and satiety awareness, craving, making healthier choices and behavior change (10). In the present study, mindful eating included nutritional education and energy restricted diet were applied randomized controlled trial to determine which one is more effective on problematic eating behaviors.

Materials and Methods

Participants

The prospective randomized controlled study was conducted on individuals aged 19-64 years with a Body Mass Index (BMI) of 25 kg/m^2 and above, between the dates of January and April 2021. Cohen's effect size for the study calculated as r=0.788. Using the effect size, the results of the Power Analysis are given as an appendix to the study. In the study, R v3.6.1 software was utilized for conducting the power analysis with an alpha error of 5% and a beta error of 20%. Taking into consideration the evaluation of the study across three groups and anticipating the presence of differences among variables after the process, it was calculated that a minimum of 15 samples per group would be sufficient (11). Based on the results of the power analysis, having a sample size of 15 in each group ensures an 80% reliability of the study. A total of 70 participants, including 30 in the control group, 20 in the energy restricted diet group, and 20 in the nutritional education group, were included in this study. The research obtained Ethical Committee Approval with a decision number as 2021/01-03, from the Medical Research Ethics Committee of the Acibadem Mehmet Ali Aydinlar University.

Data Collection

Individuals were examined in three groups as control group, diet group and education group. A questionnaire consisting of socio-demographic data form and scales of physical activity level, mindful eating, emotional eating and emotional appetite was applied to the groups before the intervention. Participants were invited through an online method, and the study conducted with those who accepted the invitation. Informed consent forms were obtained from participants and an online survey method was used.

Anthropometric information was collected based on declaration. Interventions were conducted in the groups other than the control group (diet and education groups). The energy-restricted diet group, which is abbreviated as the diet group, was given a specially prepared energy-restricted diet (500 kcal deficit from the daily requirement, 12), and the education group was given mindful eating included nutritional education three times a month as two hours included answers and questions. Additionally, physical activity recommendations for adults (at least 150-300

minutes of moderate physical activity) in compliance with World Health Organization (13) were provided to the intervened groups. The education sessions were conducted verbally through the Zoom application. After these interventions, including the control group, the same questionnaire was administered to all groups again, and the results were recorded. Following this process, the collected data was analyzed. The study determined mindful eating included nutritional education's impact on weight management and levels of physical activity, mindful eating, emotional appetite in individuals whose BMI were more than 24.9 kg/m^2.

Randomized Groups

Education Group: Participants included in the education group were provided with mindful eating included nutritional education, delivered through three modules in a month. Module ingredients were provided from MB-EAT program (4).

The education contents given are as follows:

MODULE 1	MODULE 2	MODULE 3
• Definition and Importance of Nutrition • Nutrients • Eat my Plate (14)	• Eating Behavior • Appetite and Eating	• Mindful Eating • Hunger-Fulness Scale • Questions & Answers

Figure 1. *Module contents given to the participants in the education group*

Diet Group: The daily energy requirements of participants in the energy-restricted diet group were calculated using the Harris-Benedict equation as part of the study. In diets prepared in accordance with the energy needs of individuals followed an energy-restricted diet (–500 kcal) and received in addition one of the educations of nutrition (module 1 of education group). During the implementation of the diets, online interviews were planned 2 times a month as two hours.

Socio-demographic Data Form

In this section of the administered questionnaire, participants were asked about their full name, gender, age, occupation, marital status, employment status, education level, living arrangements, body weight, height, and dietary intake record.

International Physical Activity Questionnaire (IPAQ)

International Physical Activity Questionnaire (IPAQ) is interpreted uniformly across all countries. IPAQ consists of 7 questions, including inquiries about time spent sitting, time spent in vigorous and moderate-intensity activities, and walking. Respondents are asked to provide answers. The calculation of the total score for the short form includes the frequency (days) and duration (minutes) of walking, vigorous, and moderate-intensity activities (15).

Mindful Eating Questionnaire (MEQ-30)

The relationship with eating, evaluated within the scope of mindful awareness, is assessed through the Mindful Eating Questionnaire (MEQ), developed by Framson, et al (16), with the purpose of measuring mindful eating. The Turkish validity and reliability study of the scale was published as the Mindful Eating Questionnaire (MEQ-30) (17). The scale, consisting of 30 questions, was administered using a 5-point Likert scale (1: never, 2: rarely, 3: sometimes, 4: often, 5: always). The scale comprises 7 sub-dimensions: Disinhibition (DI), Emotional Eating (EE), Eating Control (EC), MN: Mindfulness (MN), Eating Discipline (ED), Conscious Nutrition (CN), Interference (IN). The sub-dimensions of MEQ-30 and the contents within these dimensions are as follows: Emotional Eating (5 items): eating for satisfaction, feeling good and emotional hunger; Disinhibition (5 items): time and quantity control, restraint, mindless eating; Mindfulness (5 items): taking a break from other thoughts and activities while eating, focusing on the taste of the food itself; Eating Control (4 items): controlling the eating function, adjusting the eating speed; Eating discipline (4 items): plan, prepare, balance, keep, time, order; Conscious Nutrition (5 items): information of calorie and nutritional value, physical satiety-hunger awareness, habit awareness, healthy nutrition knowledge; Interference (2 items): sound, image, smell, etc. Ability to deal with distractors such as sensory factors, invitations, advertisements, or food variety. The responses given to the questions in the scale are evaluated and scored to reach a conclusion. Questions 1, 7, 9, 11, 13, 15, 18, 24, 25 and 27 are scored directly, while the remaining questions are reverse scored as 1=5, 2=4, 3=3, 4=2, 5=1. In the evaluation of the scale, arithmetic mean is taken for scoring. Accordingly, if the result is 3 or more, this result means that the individual's mindful eating level is high. The maximum score for the MEQ-30 is 150, and the minimum score is 30.

Turkish Emotional Appetite Questionnaire (EMAQ)

The Emotional Appetite Questionnaire (EMAQ), developed by Nolan, et al (18), was adapted into Turkish (19). The scale, consisting of 22 items and interpreted using a 9-point Likert-type scoring system, is originally named as Emotional Appetite Questionnaire. The EMAQ aims to assess an individual's emotional eating status. The statements in each item are rated on a scale of less influence (1-4), same influence (5), and more influence (6-9) on the individual's appetite. The presence of emotional eating is evaluated in negative/positive situations (8 items) and negative/positive emotions (14 items). By summing up the scores related to positive situations and positive emotions, the EMAQ Positive Total Score is determined. Similarly, by summing up the scores related to negative situations and negative emotions, the EMAQ Negative Total Score is determined. There is no specific cutoff point for emotional eating in the scale. The purpose of the scale is to demonstrate in which emotions and situations emotional appetite may particularly exist.

Statistical Analysis

Descriptive statistics including frequency and percentage were presented for categorical variables (demographic characteristics). The normality assumption of numerical variables was assessed using the Shapiro-Wilk Test. The descriptive statistics of numerical variables are given as mean standard deviation ($\dot{X}\pm SS$) for normally distributed data, and median (min-max) values for non-normally distributed data. One-Way ANOVA Test was used for comparing independent multiple groups when the data followed a normal distribution, and the Kruskal-Wallis H Test was used for comparing independent multiple groups when the data did not follow a normal distribution. The outcomes of the multiple comparison tests were presented using a lettered notation alongside means and medians. To investigate the relationships between the scales, Spearman's Rank Difference Correlation Coefficient was utilized for determination. Interpreting the correlation coefficient: The following criteria were employed: if the correlation coefficient is < 0.2, it represents a very weak correlation; between 0.2 and 0.4, a weak correlation; within the range of 0.4 to 0.6, a moderate correlation; between 0.6 and 0.8, a high correlation; and if the correlation coefficient is > 0.8, a very high correlation (20).

In all calculations and interpretations, statistical significance levels of $p < 0.05$, $p < 0.01$, and $p < 0.001$ were considered, and hypotheses were formulated as two-tailed. The statistical analysis of the data was performed using the SPSS v26 software package (IBM Inc., Chicago, IL, USA).

RESULTS

According to the descriptive statistics, 55.7% of the participants were women. Participants' mean age was 33.40±12.27 years, more than half of them were single, mostly have a higher education level according to their educational status, mostly resided with family or relatives (Table 1). There was a statistically significant difference only in marital status between the education, diet and control groups in the study ($p<0.05$).

Table 2 presents the mean and standard deviation values of pre-test and post-test scores for participants according to their respective groups. In table 3 it was shown as differences in a detailed way.

Table 3 evaluates the statistical differences in the changes between pre-test and post-test scores of participants according to education, diet, and control groups. As presented in the table, significant differences were observed in the education group's changes compared to the diet and control groups, had higher scores in physical activity ($p<0.01$), emotional appetite ($p<0.001$), mindful eating scale, and its sub-factors ($p<0.01$).

When the correlations between the scales were examined, Disinhibition sub-factor of MEQ-30 score and the EMAQ Positive sub-factor scores had a significant positive moderate ($s=0.513$; $p<0.05$) and the EMAQ Negative sub-factor scores were significant positive moderate ($s=0.570$; $p<0.01$) correlation was found. Also, it was shown that there was a significant positive moderate correlation ($n=0.486$; $p<0.05$) between MEQ-30's Eating Discipline sub-factor and EMAQ Negative sub-factor scores. Again, a significant positive moderate correlation was resulted between MEQ-30 Total score and EMAQ Negative sub-factor scores ($s=0.472$; $p<0.05$) (Table 4). There were no correlations between IPAQ scores and other scales.

Table 1. Descriptive statistics of demographic variables of participants according to education, diet and control groups

	Education Group		Diet Group		Control Group		F-χ^2	p	Total	
	n	%	n	%	n	%			n	%
Sex										
Female	11	55.0	16	80.0	12	40.0	1.719	0.190	39	55.7
Male	9	45.0	4	20.0	18	60.0			31	44.3
Age (X̄±SS)	31.05±9.62		38.25±13.00		31.73±12.80		2.290	0.109	33.40±12.27	
Marital Status										
Married	7	35.0	13	65.0	9	30.0	**6.526**	**0.038***	29	41.4
Single	13	65.0	7	35.0	21	70.0			41	58.6
Employment Status										
Working	11	55.0	7	35.0	16	53.3	11.199	0.082	34	48.6
Not working	9	45.0	13	65.0	14	46.7			36	51.4
Occupation										
Housewife	0	0.0	1	5.0	2	6.7	0.003	0.954	3	4.3
Worker	5	25.0	1	5.0	4	13.3			10	14.3
Civil servant	1	5.0	3	15.0	1	3.3			5	7.1
Healthcare-worker	3	15.0	0	0.0	5	16.7			8	11.4
Teacher	1	5.0	2	10.0	1	3.3			4	5.7
Self-Employed	1	5.0	1	5.0	5	16.7			7	10.0
Retired	0	0.0	3	15.0	1	3.3			4	5.7
Not working	9	45.0	9	45.0	11	36.7			29	41.4
Educational Status										
Highschool or below	4	20.0	6	30.0	5	16.7	0.157	0.692	15	21.4
Bachelor's or above	16	80.0	14	70.0	25	83.3			55	78.6
Residence										
Family / Relative	11	55.0	17	85.0	21	70.0	0.024	0.877	49	70.0
Friend	6	30.0	0	0.0	2	6.7			8	11.4
Alone	3	15.0	3	15.0	7	23.3			13	18.6

F: One-Way ANOVA Test; χ^2: Chi-Square Test
**p<0.05*

Table 2. Pre-test and post-test according to education, diet and control groups

	Education Group	Diet Group	Control Group
Scales and BMI	**Ẋ±SS**	**Ẋ±SS**	**Ẋ±SS**
IPAQ -PRE	1294.20±532.42	671.78±570.37	922.35±594.07
IPAQ - POST	2812.75±1275.31	2431.05±3016.11	1474.75±1168.84
EMAQ Positive Total -PRE	69.10±17.47	44.65±12.92	45.80±15.74
EMAQ Positive Total - POST	49.40±7.11	38.00±10.45	41.57±15.75
EMAQ Negative Total - PRE	109.70±19.64	71.20±28.72	59.07±28.08
EMAQ Negative Total - POST	77.20±11.55	59.45±21.95	64.47±27.73
MEQ-30 Total - PRE	2.23±0.50	2.78±0.53	2.76±0.59
MEQ-30 Total - POST	3.24±0.27	3.20±0.47	2.79±0.59
Disinhibition - PRE	1.56±0.63	2.41±0.77	2.33±1.01
Disinhibition - POST	2.93±0.43	3.04±0.77	2.43±1.10
Emotional Eating - PRE	1.60±0.58	2.25±1.13	2.51±1.20
Emotional Eating - POST	2.99±0.50	3.07±1.08	2.61±1.24
Eating Control - PRE	2.15±0.85	2.94±1.08	2.78±1.14
Eating Control - POST	3.30±0.52	3.32±0.61	2.71±1.07
Mindfulness - PRE	2.82±0.47	3.12±0.49	3.12±0.42
Mindfulness - POST	3.35±0.22	3.04±0.38	3.08±0.33
Eating Discipline - PRE	2.81±0.85	2.99±0.88	2.93±0.62
Eating Discipline - POST	3.59±0.64	3.48±0.76	2.83±0.58
Conscious Nutrition - PRE	2.73±0.71	2.78±0.52	2.85±0.68
Conscious Nutrition - POST	3.41±0.40	3.11±0.64	3.02±0.61
Interference - PRE	1.95±0.69	2.95±1.05	2.77±1.06
Interference - POST	3.10±0.60	3.35±0.86	2.82±1.13
BMI- PRE (Ẋ±SS)	28.92±3.39	31.67±3.52	29.35±4.85
BMI - POST (Ẋ±SS)	28.24±2.98	30.63±4.22	29.43±4.92

IPAQ: International Physical Activity Questionnaire, EMAQ: Turkish Emotional Appetite Questionnaire, MEQ-30: Mindful Eating Questionnaire, BMI: Body Mass Index.

Table 3. Comparison of pre-test/post-test scale difference scores among participants in the education, diet, and control groups

	Education Group	Diet Group	Control Group		
Scales	**Ẋ±SS**	**Ẋ±SS**	**Ẋ±SS**	**F-*H***	**p**
IPAQ	1518.55±1234.35	1459.28±3151.07	552.40±1010.38	**10.147**	**0.006****
EMAQ Positive	19.70±16.08	6.65±11.31	4.23±8.46	**14.436**	**0.001****
EMAQ Negative	32.50±16.22	11.75±22.48	5.40±14.95	**33.643**	**<0.001*****
MEQ-30 Total	1.01±0.33	0.42±0.56	0.03±0.26	**38.526**	**<0.001*****
Disinhibition	1.37±0.50	0.63±0.99	0.10±0.56	**32.478**	**<0.001*****
Emotional Eating	1.39±0.40	0.82±1.23	0.10±0.68	**31.975**	**<0.001*****
Eating Control	1.15±0.56[b]	0.39±0.89[ab]	-0.07±0.50[a]	**21.100**	**<0.001*****
Mindfulness	0.53±0.49[b]	-0.08±0.43[a]	-0.04±0.40[a]	**12.964**	**<0.001*****
Eating Discipline	0.77±0.65	0.49±1.15	-0.10±0.46	**17.945**	**<0.001*****
Conscious Nutrition	0.68±0.61	0.33±0.72	0.17±0.38	**9.489**	**0.009****
Interference	1.15±0.73	0.40±0.95	0.05±0.44	**22.806**	**<0.001*****
BMI	-0.68±0,41	1.04±0.7	-0.1±0.1	1.580	0.213

*IPAQ: International Physical Activity Questionnaire, EMAQ: EMAQ: Turkish Emotional Appetite Questionnaire, MEQ-30: Mindful Eating Questionnaire, BMI: Body Mass Index, F: One-Way ANOVA Test; H: Kruskal-Wallis H Test **p<0.01; ***p<0.001*
a. b: The difference between medians that do not have a common letter is significant

Table 4. Correlation coefficients between IPAQ, EMAQ and MEQ-30 total and sub-factor scores

		DI	EE	EC	MN	ED	CN	IN	MEQ-30
IPAQ	**s**	-0.009	-0.055	0.105	0.373	-0.319	-0.253	-0.047	-0.045
	p	0.971	0.818	0.660	0.105	0.171	0.281	0.844	0.852
EMAQ-P	**s**	0.513	0.058	0.387	0.248	0.388	0.335	-0.214	0.327
	p	0.021*	0.808	0.092	0.292	0.091	0.149	0.364	0.159
EMAQ-N	**s**	0.570	0.133	0.340	0.323	0.486	0.329	-0.007	0.472
	p	0.009**	0.577	0.143	0.165	0.030*	0.157	0.978	0.036*

DI: Disinhibition, EE: Emotional Eating, EC: Eating Control, MN: Mindfulness, ED: Eating Discipline, CN: Conscious Nutrition, IN: Interference, MEQ-30: Mindful Eating Questionnaire Total, IPAQ: International Physical Activity Questionnaire, EMAQ-P: Positive Emotions; EMAQ-N: Negative Emotions;
s: Spearman's rank difference correlation coefficient
**p<0,05, **p<0.01*

Discussion

Nutritional interventions applied to the participants were discussed within the framework of demographic characteristics and scales of mindful eating, physical activity, emotional eating and emotional appetite results. In this interventional study, pre-test and post-test scores of the participants according to the education, diet and control groups, the education group had higher scores than diet and control groups in physical activity, emotional appetite (EMAQ), mindful eating (MEQ) and all sub-factors as disinhibition, emotional eating, eating control, conscious nutrition, eating discipline and interference. It was unexpected to see physical activity increase due to suggestions of 150 minutes per week. Moreover, education group had higher scale scores in emotional eating was revealing. In a similar study which examined the impact of combining mindful eating education with moderate energy restriction (diet) on weight loss in women with obesity, there was no significant difference in weight loss between them. But the mindful eating group exhibited a greater reduction in uncontrolled eating compared to the diet group, and a similar reduction in emotional eating was observed in both groups, surpassing the diet group (21). Consistent with the literature, mindful eating education and applications may have an effect on problematic eating behaviors mostly emotional eating.

In the present study, increasing eating discipline by internally through mindful eating, made participants not to deal with negative emotions by eating. A fourteen-week program combining mindful eating and nutrition education resulted in healthier eating patterns to reduce emotional eating and overeating (9). And similar to this present study in a one-month MB-EAT program with overweight or obese participants which generally focused on mindfulness practices resulted in weight loss and less problematic eating behaviors such as emotional eating, disinhibition, binge eating frequency (4). In addition, in an interventional MB-EAT study about diabetes self-management, researchers found that both groups showed positive changes in terms of enhanced self-efficacy in nutrition and eating, and better cognitive control over eating behaviors (22). In a randomized controlled study, Mindfulness-Based Interventions (MBIs) were found to be more effective than control conditions in increasing mindfulness scores and there were no differences in reducing body weight (3). Besides, meta-analysis indicated that MBIs were more effective than control groups in increasing mindfulness scores and reducing emotional eating related symptoms from pre-to post-treatment. Again, MBIs did not show a greater efficacy than control groups in reducing body mass, which could be influenced by the duration of interventions (2). Mindful eating application in the present study showed a decrease in emotional eating scores. Consistent with the literature we found that emotional appetite can be defeated by mindful eating.

Education groups gained internal cues resulted as disinhibition and positive and negative emotions correlated positively. Beshara, et al (23) revealed that individuals with higher levels of everyday mindfulness tended to be more mindful eaters, and they reported consuming smaller serving sizes of energy-dense foods. Furthermore, in a mindful eating study, intervention group had significant increases overall MEQ scores, disinhibition, and eating with awareness scores and as a result researchers suggested including healthcare professionals from various disciplines for further studies (24). Notably, aspects of mindful eating related to emotions and disinhibited eating were particularly influential in determining serving size.

In another study, mind-body practitioners had higher healthy eating index scores compared to non-practitioners. The study suggests that practicing mindfulness is linked to better diet quality, and this relationship is influenced by practitioners' internal cue abilities and self-determined approaches to regulating their eating behaviors (25).

In the present study, diet and education groups were examined separately and compared with the control group, positive results in eating behaviors were discussed. After the educational intervention, the probability of individuals to make sustainability can increase. In the literature a meta-analysis about mindful eating stated that considering intervention duration revealed that shorter interventions (e.g., six weeks) led to greater reductions in body mass compared to longer interventions (e.g., twenty-four weeks) (2). As a strength of this study, 70 participants were randomized by sex with an appropriate distribution, including 30 in the control group, 20 in the diet group, and 20 in the education group. The limitations of the study were the insufficient distribution of participants due to the limited four-week duration of the study, the inability of some individuals in the energy-restricted diet group to fully comply with the program prepared for them and also lack of mindfulness practices.

Conclusion

As a conclusion, it was found that including mindful eating applications to nutritional interventions had an impact on eating behaviors more than diet group. Individualized nutrition programs and educations prepared by dietitians can be more effective on weight management and eating behaviors.

Declarations

Funding

This study received no specific funding.

Conflicts of Interest

No potential conflict of interest was reported by the authors.

Ethics Approval

The protocol of the study was approved by the Ethical Committee of the Acibadem Mehmet Ali Aydinlar University with the number of 2021-01/03.

Availability of Data and Material

All authors accept that data and material is available on SPSS document.

Authors' Contribution

All authors contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nutrition and Dietetics / Beslenme ve Diyetetik

Food Related Behaviors and Sleep Quality in University Students: A Descriptive Study

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ABSTRACT

Purpose: The purpose of this study was to evaluate the relationship between food addiction, night eating status and sleep quality in students studying at different faculties or departments of various universities in Turkey.

Methods: A total of 1044 students from 11 different departments/faculties were included. Night Eating Questionnaire, Yale Food Addiction Scale and Pittsburgh Sleep Quality Scale were applied to the students. Also, the dietary habits (main meal and snack consumptions, the meal they skipped and the reasons, duration of meals, consumption of tea and coffee etc.) of the students were questioned.

Results: Significant relationships were found between BMIs, faculties/departments, use of antidepressants, skipping breakfast status and tea/coffee consumption of students. Moreover, there were significant differences between both food addiction status ($p<0.001$), night eating syndrome ($p<0.001$) and sleep quality. Students with poor sleep quality had more frequent night eating behavior and food selectivity.

Conclusion: These findings suggest that for managing students' eating problems like night eating and food addiction, their sleep quality should be improved, and vice versa.

Keywords: Sleep quality, Food addiction, Night eating syndrome, University students

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Üniversite Öğrencilerinde Besin İlişkili Davranışlar ve Uyku Kalitesi: Tanımlayıcı Bir Çalışma

ÖZET

Amaç: Bu çalışmanın amacı, Türkiye'deki çeşitli üniversitelerin farklı fakülte veya bölümlerinde okuyan öğrencilerde gıda bağımlılığı, gece yeme durumu ve uyku kalitesi arasındaki ilişkiyi değerlendirmektir.

Yöntem: Çalışmaya 11 farklı bölüm/fakülteden toplam 1044 öğrenci dahil edildi. Öğrencilere Gece Yeme Anketi, Yale Gıda Bağımlılığı Ölçeği ve Pittsburgh Uyku Kalitesi Ölçeği uygulandı. Ayrıca öğrencilerin beslenme alışkanlıkları (ana öğün ve ara öğün tüketimleri, atladıkları öğün ve nedenleri, öğün süreleri, çay/kahve tüketimleri vb.) sorgulanmıştır.

Bulgular: Öğrencilerin BKİ'leri, fakülte/bölümleri, antidepresan kullanımı, kahvaltıyı atlama durumu ve çay/kahve tüketimi arasında anlamlı ilişkiler bulunmuştur. Ayrıca, hem gıda bağımlılık durumu ($p<0.001$) hem de gece yeme sendromu ($p<0.001$) ile uyku kalitesi arasında anlamlı fark saptanmıştır. Düşük uyku kalitesine sahip öğrenciler, daha sık gece yeme davranışına ve besin seçiciliğine sahip bulunmuştur.

Sonuç: Bu bulgular, öğrencilerin gece yeme ve gıda bağımlılığı gibi yeme problemlerini yönetmek için uyku kalitelerinin iyileştirilmesi gerektiğini ve bunun tersinin de geçerli olduğunu göstermektedir.

Anahtar Kelimeler: Uyku kalitesi; Gıda bağımlılığı; Gece yeme sendromu; Üniversite öğrencileri

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Nutrition is necessary to suppress hunger and met nutrient needs. Changes in living conditions and changes in diet affect people's lifestyle (1). Among Turkish university students' obesity and eating disorders are increasing, possibly associated in part with factors such as leaving their homes and families, different eating patterns, lack of nutritional information, and lack of money (2). Eating behaviors that are frequently seen especially among university students include night eating behavior and compulsions towards certain foods, which some researchers call "food addiction". At the same time, many students experience changes in sleep patterns, duration, and quality (3). Basically "food addiction" is characterized by a persistent or repeated desire to eat and some behavioral disorders in order to feel the pleasurable effects of food which occurs when the food eaten or to avoid the discomfort that occurs when the person does not eat the food (4). Night eating syndrome (NES) was first described by Stunkard et al. in 1955 as a disorder characterized by anorexia in the morning, hyperphagia and insomnia in the evening in obese patients who are resistant to weight loss (5). It has been suggested that one of the most common disorders in recent years is night eating syndrome (6). Individuals with NES get most of their total energy after dinner, wake up more frequently during the night, and are more likely to eat while awake (7, 8). Sleep is a basic physiological need to remain both physical and psychological health (9). Sleep quality refers to the sustainability of sleep and the individual's feeling of being rested enough (10). There are many environmental, psychological and physiological factors that affect sleep quality, and one of them is nutrition. Disruptions in sleep duration and quality can cause physiological and behavioral changes that may lead to eating disorders. Sleep disorders play an important role in the occurrence of night eating syndrome, and some people with night eating syndrome are reported to have low sleep quality (3).

In literature, it is revealed that people who have short sleep duration increased their food consumption the next day (11). Also, night eating is associated with both food addiction and poor sleep quality (12).

It is thought that both food addiction, night eating and sleep quality are interrelated. The aim of this study is to examine whether other factors (prolonged study duration, use of antidepressant, etc.) as well as night eating and food addiction have an effect on sleep quality of Turkish students.

Materials and Methods

This cross-sectional descriptive study was carried out between January and May 2021 with students attending to private and state universities in Turkey. The students who participated in the study have been given detailed information about the study and given an informed volunteer consent form. The study was approved ethically by the Marmara University Faculty of Health Sciences Ethics Committee for Non-Invasive Clinical Studies with the protocol no: 30.12.2020/86, and the research was conducted following the principles stated in the Helsinki Declaration.

Study Population

The subjects were university students studying at faculties of health sciences, law, medicine, dentistry, pharmacy, engineering and architecture throughout Turkey (N=664.231). The selected faculties differ in terms of criteria such as course load, project preparation, course intensity, study and time allocated to preparation. For this reason, the sample was chosen considering that the students studying in these faculties may differ in terms of night eating syndrome, sleep quality and food addiction.

The sample size was calculated using the EpiInfo program. In this calculation, the sample size was determined as 768 when the incidence of the event was 50%, the error level was 5%, and the pattern effect was taken as 2. It was planned to take 845 students into the sample due to the losses (approximately 10%) that may arise during the research process. Stratified sampling was made according to faculties.

Data Collection

General Features

This part included general information such as age, gender, department of faculty, time spent daily study, presence of diagnosed disease, use of antidepressant medication and vitamin supplements, physical activity level, whether they worked in any job, and anthropometric measurements.

Dietary Habits

Number of main meals and snacks consumed by the participant during the day, with whom they usually consumed meals, whether they skipped any meals and if so which meal/meals they skipped and the reasons for skipping meals, whether they were busy with other tasks while consuming meals, whether changes in their mood affect their appetite, their eating speed, time of their

evening meal and tea/coffee consumption during the day were assessed.

The Night Eating Questionnaire (NEQ)

The NEQ is a 16-question questionnaire developed by Allison and colleagues. Except for the 7th question, the questions were scored between 0-4 with a five-point Likert type measurement. In the 7th question, people's mood changes during the day were questioned and those who did not experience changes during the day received 0 points. Questions number 1, 4 and 14 were reverse scored. The total score range of the scale varied between 0-52. A value above 25 points was accepted as "there was a NES" and a value below 25 points is considered as "no NES" (13, 14).

The Pittsburgh Sleep Quality Index (PSQI)

The PSQI consisted of a total of 24 questions. The 18 questions of the scale consisted of 7 components. Each question in the questionnaire was evaluated between 0-3 points. The total score of these seven components gave the total scale score. The total score was between 0-21. A total score greater than or equal to 5 indicated poor sleep quality, and less than 5 indicated good sleep quality (15, 16).

The Yale Food Addiction Scale (YFAS)

The YFAS is a 27-item scale used to determine addictive-like eating behaviors in the last twelve months. While the scale was being evaluated, the 17th, 18th and 23rd questions were not taken in the scoring. All questions were collected under all addiction criteria (tolerance, deprivation, clinical symptoms, etc.). Score equaled to 1 and above, this criterion had been met and the score was taken as 1; scores equal to 0, it meant that this criterion had not been met. If the score was 1, there was food addiction (17).

Statistical Analysis

The data were evaluated statistically using the SPSS (Statistical Package for the Social Sciences) 26.0 package program. Frequency distributions were used for descriptive characteristics of the individuals including their general health status, use of vitamin supplements and antidepressants, physical activity status, and their dietary habits. Median, maximum and minimum values were used for descriptive statistics. The Kolmogorov Smirnov test was used to determine whether the mean scores of the scale were compatible with the normal distribution. Comparisons between groups were made using non-parametric Mann Whitney U and Kruskal Wallis tests. Comparisons between groups in categorical variables (expressions as numbers and percentages) were examined with the chi-square test. Spearman correlation test was used to determine the correlations between variables. Statistical significance was accepted as $p<0.05$ in all analyzes.

Results

Table 1 provides the general characteristics of the students participating in the study. Among the participants, 69% were female and 31% were male, 96% did not use antidepressants and 68% had a normal body mass index (BMI).

Table 1. General characteristics of students (n=1044)

	n	%
Gender		
Female	717	69
Male	327	31
Study duration per day		
< 1 hour	57	6
1-2 hours	317	30
3-4 hours	344	33
> 4 hours	326	31
Use of antidepressant		
Yes	45	4
No	999	96
BMI		
Underweight	133	13
Normal	708	68
Overweight	159	15
Obese	44	4

Table 2 describes the sleep quality according to the characteristics of those included in the study, of which with poor sleep quality (n=703), 67% were female; with good sleep quality (n=341), 71% were female.

A significant relationship was found between BMI and sleep quality (p=0.03) of students. Accordingly, the sleep quality score of overweight students (median:7.0 – min.:1.0; max.:14.0) was significantly higher (p=0.005) than the score of students with normal BMI (median:6.0 – min:0.0; 18.0). In addition, when the sleep quality scores of obese students (median:8.0 – min.: 1.0; max.:14.0) were compared to students with normal BMI (median:6 – min:0.0; 18.0); obese students had higher scores (p=0.002) (not shown in the table). It was determined that 65% of the participants with poor sleep quality had BMIs within normal limits, 14% were underweight, 16% were overweight and 5% were obese.

Among the participants included in the study, 83% of those with good sleep quality stated that they did not skip the morning meal, while 34% of those with poor sleep quality did so. A significant relationship was found between skipping the morning meal and sleep quality (p<0.001). When the daily study durations were examined, it was seen that 33% of all students study for 3-4 hours a day, but there was no significant relationship between study duration and sleep quality (p>0.05).

There was a significant difference between students' daily tea-coffee consumption and sleep quality (p=0.002). Daily tea and coffee consumption of individuals with poor sleep quality (median: 350 ml, min-max: 0-3050 mL) was found to be higher than those with good sleep quality (median: 300 ml, min-max: 0-2400 mL) (not shown in table).

Table 2. Comparison of descriptive features and sleep qualities

	Poor sleep quality (n=703)		Good sleep quality (n=341)		Total (n=1044)		
	n	%	n	%	n	%	*p*
Gender							
Female	474	67	243	71	717	69	0.210
Male	229	33	98	29	327	31	
BMI							
Underweight	98	14	35	10	133	13	**0.030**
Normal	456	65	252	74	708	68	
Overweight	115	16	44	13	159	15	
Obese	34	5	10	3	44	4	
Use of antidepressant							
Yes	41	6	4	1	45	4	**<0.001**
No	662	94	337	99	999	96	
Skipping breakfast							
Yes	240	34	57	17	297	28	**<0.001**
No	463	66	284	83	747	72	
Study duration per day							
< 1 hour	43	6	14	4	57	6	0.418
1-2 hours	205	29	112	33	317	30	
3-4 hours	234	33	110	32	344	33	
> 4 hours	221	32	105	31	326	31	
Chi-square							

Table 3 shows food addiction status and night eating syndrome of students by sleep quality. There were significant differences between both food addiction status (p<0.001), night eating syndrome (p<0.001) and sleep quality. Among students with poor sleep quality, 26% of them had food addiction and 16% of them had night eating syndrome.

Table 3. Relationship between sleep quality and night eating syndrome and food addiction

	Poor sleep quality (n=703)		Good sleep quality (n=341)		p
	n	%	n	%	
Food Addiction					
Yes (n=224)	184	26	40	12	**<0.001**
No (n=820)	519	74	301	88	
Night Eating Syndrome					
Yes (n=123)	110	16	13	4	**<0.001**
No (n=921)	593	84	328	96	
Chi-square					

Students with poor sleep quality had a higher NEQ score (18.0) than students with good sleep quality (14.0). A weak positive correlation was found between The PSQI score and the NEQ score (r=0.440; p<0.001). As sleep quality of students decreased, the risk of night eating syndrome increased. The YFAS score of students with poor sleep quality (3.0) was found to be higher than the students with good sleep quality (2.0). A weak positive correlation was found between the PSQI score and the YFAS score (r=0.278; p<0.001). As sleep quality of students decreased, food addiction increased (not shown in table).

Discussion

Of the 1044 students studied, 67% reported poor sleep quality, a finding similar to that in other studies of Turkish students. Those with higher BMI, using antidepressants and with food addiction and night eating syndrome were more likely to have poorer sleep quality.

In studies with Turkish university students found the rates of poor sleep quality within the rage of 46-59% (18, 19) and these findings were similar with our study. Although the effect of gender on sleep has not been fully determined in the literature, in our study, it was found that

67.4% of those with poor sleep quality were female and 32.6% were male. However, the relationship between gender and sleep quality was not statistically significant (p>0.05).

In two different studies conducted to determine sleep quality, women experience more sleep problems than men (9, 20). Although there was no statistically significant result, the majority (67%) of those with poor sleep quality in our study were female students, similar to other studies.

Some claim that sleep quality is associated with a high BMI (21). Although some of the studies in the literature found that anthropometric measurements differed according to sleep quality but these were not statistically significant (22, 23). In addition, it was seen that insufficient sleep was associated with many metabolic diseases as well as obesity (24). On the other hand, those who slept for a long time were also more likely to be overweight or obese (25). In our study, there was a significant difference between sleep quality and BMI (p=0.03), and the majority of participants with good sleep quality (74%) were in the normal BMI range. In addition, overweight (p=0.005) and obese individuals (p=0.002) had statistically worse sleep quality than individuals with normal BMI.

In a study, university students had poor sleep quality with the reasons for this; factors such as exam periods, long study periods, delays in classes in certain periods and, on the other hand, more intense work in certain periods have been shown (26). Although there was no significant difference between study duration and sleep quality in our study (p>0.05); it was determined that 33% of those with poor sleep quality studied for 3-4 hours a day and only 6% studies for less than 1 hour a day.

One study reported that consuming beverages containing caffeine such as tea and coffee did not have any effect on sleep quality (18). However, in a study of university students, when the relationship between caffeinated beverage consumption and sleep quality was evaluated, there was a significant relationship between caffeinated beverage consumption and sleep quality scores (9). In another study conducted on medical school students, sleep quality of individuals who took caffeinated beverages was significantly worse than those who did not (27). In a study conducted in Taiwan, drinking tea more than three times a week was associated with poor sleep quality, but coffee drinking was not (28). In our study as the daily tea and coffee consumption of the students increased, the sleep quality decreased significantly (p=0.002), in parallel with the results of similar studies in the literature.

Short sleep duration and poor quality can affect the food preferences, meal consumption and eating attitudes of individuals. Eating attitude disorders also cause sleep-related problems, reduce the duration of sleep, and cause problems in the initiation and continuity of sleep. In our study, a significant relationship was found between food addiction and sleep quality (p<0.001). While food addiction was 26% in students with poor sleep quality, it was 12% in students with good sleep quality. Moreover, as sleep quality decreased, food addiction increased (r=0.278; p<0.001). In a study conducted with 536 undergraduate nursing students those with food addiction had worse sleep quality (29).

Night eating syndrome affects the sleep pattern and quality of the individual, insomnia is frequently mentioned in the diagnostic criteria. Nocturnal eating attacks occur during N-REM sleep (non-rapid eye movement – also known as quiescent sleep) and this situation negatively affects sleep quality. Those with night eating syndrome have a deterioration in sleep and eating patterns and shifts in the biological clock of eating. In addition, it was noted that there was a significant improvement in sleep quality in individuals whose night eating complaints were controlled (30). In our study, a significant relationship was found between night eating syndrome and sleep quality (p<0.001). Night eating syndrome is seen in 16% of participants with poor sleep quality. Ninety-six percent of the participants did not have night eating syndrome and had good sleep quality.

One of the strengths of our study is that our sample size was quite sufficient. Thus, it makes it possible to obtain information about sleep quality, night eating habits and food addictions among different universities in Turkey. On the other hand, one of the limitations of our study might be the time of administering the questionnaires to the students. If the same study had been done in 2 different times, both during the semester and during the exam week, the difference in sleep quality depending on the time devoted to study could have been observed better.

Conclusion

In conclusion, the sleep quality of students with food addiction and/or night eating syndrome may be poorer. While night eating syndrome can negatively affect sleep quality, poor sleep quality can also increase the risks of night eating syndrome and food addiction. In this context, students' having healthy eating behaviors, gaining awareness of food addiction and night eating syndrome can affect the sleep quality of the students positively.

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Declarations

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Conflict of interest

The authors declare that there is no conflict of interest.

Ethical approval

This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human participants were approved by the Marmara University Faculty of Health Sciences Non-Invasive Clinical Studies Ethics Committee; 30.12.2020/86.

Availability of data and material

Available upon request.

Author contributions

A.H.I. and G.S. performed all literature review, statistical analyses and contributed to writing the manuscript, all authors reviewed and commented on subsequent drafts of the manuscript.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nutrition and Dietetics / Beslenme ve Diyetetik

The Effect of Anxiety of Catching Coronavirus on Adherence of Mediterrenian Diet and Sleep Quality in Female National Basketball Players of Different Age Groups

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ABSTRACT

Purpose: This study's objective is to look at how the anxiety of catching coronavirus affected the food and sleep habits of female Turkish national basketball players.

Methods: 54 basketball players from the U16, U18, and U20 age divisions of the Turkish women's national team took part in this research. The Athlete's Anxiety to Catch the Novel Coronavirus (Covid-19) Scale (AACNCS), the Mediterranean Diet Adherence Scale, and the Pittsburgh Sleep Quality Index are all included in the questionnaire.

Results: The participants' average age was 16.48±1.50, with a range of 14 to 20. It was determined that 51.9% (n=28) of the participants were not compatible with the Mediterranean diet, and 75.9% (n=41) had good sleep quality. Although there was no association between the athletes' overall anxiety level and their diet quality, there was a statistically significant but small positive correlation between the AACNCS sub-dimension of "Socialization Anxiety" and diet quality (r=0.344; p=0.011; p<0.05). The athletes' sleep quality and the total AACNCS sub-dimensions showed a weak but significant positive connection (r=0.358; p=0.008; p<0.05).

Conclusion: The athletes who are taking part in the trial to catch Covid-19 may have poorer sleep and better diets as their anxiety levels rise. On this subject, more research is required.

Keywords: Anxiety, Athlete, Covid-19, Diet Quality, Sleep Quality

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Farklı Yaş Gruplarındaki Kadın Milli Basketbolcularında Koronavirüse Yakalanma Kaygısının Akdeniz Diyetine Uyum ve Uyku Kalitesine Etkisi

ÖZET

Amaç: Bu çalışmanın amacı; kadın Türk milli basketbolcuların koronavirüse yakalanma kaygılarının diyet ve uyku kalitesine etkisini incelemektir.

Gereç ve Yöntem: Çalışma U16, U18 ve U20 Türk kadın milli takım basketbolcusu olan 54 birey ile yürütülmüştür. Onam formunu okuyarak çalışmaya gönüllü katılım sağlayan sporculara anket formları araştırmacı tarafından yüz yüze uygulanmıştır. Anket; demografik bilgileri, Akdeniz Diyeti Bağlılık Ölçeği'ni, Sporcuların Yeni Tip Koronavirüse (Covid-19) Yakalanma Kaygısı Ölçeği'ni (SYTKYKÖ) ve Pittsburgh Uyku Kalitesi İndeksi'ni içermektedir.

Bulgular: Katılımcıların yaşları 14 ile 20 arasında değişmekte olup ortalaması 16,48±1,50'dir. Katılımcıların %51,9'unun (n=28) Akdeniz diyetine uyumlu olmadığı, %75,9'unun (n=41) uyku kalitesinin iyi olduğu saptanmıştır. Sporcuların toplam kaygı düzeyiyle diyet kalitesi arasında ilişki saptanmamasına karşın; SYTKYKÖ alt boyutu olan "Sosyalleşme Kaygısı" ile diyet kalitesi arasında zayıf ancak istatiksel olarak anlamlı ilişkiye ulaşılmıştır (r=0,344; p=0,011; p<0,05). Sporcuların uyku kalitesi ile SYTKYKÖ alt boyutları toplamları arasında zayıf ancak istatiksel olarak anlamlı ilişkiye ulaşılmıştır (r=0,358; p=0,008; p<0,05).

Sonuç: Çalışmaya katılan sporcuların Covid-19'a yakalanma kaygısı arttıkça uyku kalitesi azalabilmekte ve diyet kaliteleri artabilmektedir. Bu konuyla ilgili daha kapsamlı ileri çalışmalara ihtiyaç bulunmaktadır.

Anahtar kelimeler: Covid-19, Diyet Kalitesi, Kaygı, Uyku Kalitesi, Sporcu

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The Covid-19 pandemic had an impact on the world of sports as it has on all other fields due to the postponing of scheduled sporting events (1). It was announced shortly after that Turkey's sporting events would be played without spectators for a period that all handball, volleyball, basketball, football, and other leagues would be postponed as part of the steps taken to combat the pandemic. Even though the Covid-19 severe pandemic has stopped because to increased vaccination rates and its impacts have lessened, endemic cases and the sporadic use of masks persist, and the pandemic's social repercussions are still felt today.

It has been found that the unpredictability of the pandemic, the cancellation of leagues, the economy, and changes in training regimens have an impact on elite, semi-elite, and recreational athletes' psychological and physical well-being (2). The athletes are reportedly under strain and their physical and emotional recuperation is slowed by taking a break from the leagues for a period before restarting them quickly (3). A consensus statement from the International Olympic Committee (IOC) highlighted the prevalence of mental health issues, such as eating disorders among professional athletes, anxiety, and depression, and the necessity of taking these issues seriously (4). Also noticed is the fact that female athletes report higher levels of anxiousness than male athletes (5). A more sophisticated comprehension of psychology particular to female athletes will be crucial as more women participate in sports at all levels of skill and competitiveness to support their athletic success, injury recovery, and general health and wellness. The social, physical, and mental challenges brought on by the pandemic may put more pressure on athletes, and significant changes to lifestyle, particularly in eating and sleeping patterns, may have an impact on both their health and performance.

In the development, progression, and treatment of mental diseases, nutrition, exercise, and sleep are thought to play a significant influence (6). There are studies showing that insufficient sleep duration and sleep quality are associated with anxiety in athletes, but it has been stated that more comprehensive studies are needed due to the bidirectional relationship (7). However, although there is no study directly examining the effects of the Mediterranean diet on athlete anxiety, it was shown in a systematic review that unhealthy diet negatively affects mental health (8); in another review, increased adherence to the Mediterranean diet improved sleep quality; it has been shown to reduce depression and anxiety (9). While there are studies in the literature examining the effects of adherence to the Mediterranean diet on mental health and sleep quality in the general population, to our knowledge, there is no study examining the effects of catching coronavirus or any type of anxiety on Mediterranean diet adherence and sleep quality.

This study sought to ascertain the impact of national female athletes' worries about catching the novel coronavirus (Covid-19) during the ongoing pandemic on diet and sleep quality, which are directly related to the athletes' performance output.

METHODS

Turkish women's basketball players from the U16, U18, and U21 age groups make up the research's population. Necessary information was given to the participants about the research, and as a result, 57 female national basketball players were voluntarily included in the research. 54 female national basketball players made up the study's sample, but 3 participants were dropped from it since they didn't entirely fill out the questionnaires.

The "Athlete's Anxiety to Catch the Novel Coronavirus (Covid-19) Scale (AACNCS)" created by Demir et al. (10) was utilized to measure the athletes' levels of anxiety 16 questions on the scale are related to socialization anxiety (SA) and individual anxiety (IA). The lowest possible score on the AACNCS scale, which measures the total score, is 16, and the maximum possible score is 80. The scale is a five-point likert kind with 16 components.

The "Mediterranean Diet Adherence Scale" (MEDAS), which was created by H. Schröder et al. (11) and validated in Turkish by Pehlivanoglu et al. (12) in 2020, was used. A survey called the MEDAS asks 14 questions about the participants' use of foods. The survey's findings reveal whether the respondent practices a Mediterranean-style diet.

The athletes' sleep quality was assessed using the "Pittsburgh Sleep Quality Index" (PSQI). PSQI is a index which has been developed by Buysse., et al. (13) and validated in Turkish by Ağargün et al. (14). A 19-item self-report index called the PSQI measures how much and how well a person sleeps over the course of a month. Each element is scored between 0 and 3. The overall score is between 0 and 21. "Poor sleep quality" is indicated by a total score higher than 5.

Analysis of Datas

The statistical analysis was performed using the NCSS (Number Cruncher Statistical System) 2007. The following statistical tests were applied: Shapiro-Wilk, Mann-Whitney U, Kruskal-Wallis, and Pearson correlation analysis. The threshold for statistical significance was set at 0.05.

RESULTS

Table 1 shows the relationships between the AACNCS scores and age and BMI. A statistically significant weak correlation was found between the "Individual Anxiety" sub-dimension scores of the participants in the AACNCS and BMI measurements (r=0.314; p=0.021; p<0.05).

Table 1. The relationship between the AACNCS and age and BMI

		AACNCS		
		Individual Anxiety	Socialization Anxiety	Total
Age	r	-0,096	0,066	-0,046
	p	0,490	0,637	0,740
BMI	r	0,314	0,349	0,349
	p	0,021*	0,010*	0,010*

r: Pearson Correlation Test
**p<0,05*

Table 2 shows the relationship between PSQI and age and BMI. A statistically significant moderate correlation was found between the PSQI and BMI values, with a positive direction (r=0.425; p=0.001; p<0.05). This shows that as BMI increases, sleep quality decreases.

Table 2. The relationship between PSQI and age and BMI

		PSQI
Age	r	-0,248
	p	0,070
BMI	r	0,425
	p	0,001*

r: Pearson Correlation Test
**p<0,05*

Table 3 shows the relationships between AACNCS, MEDAS and PSQI. A statistically significant, very weak correlation was found between the MEDAS and the "Socialization Anxiety", which is the sub-dimension of the AACNCS (r=0.344; p=0.011; p<0.05).

Table 3. The relationship between AACNCS, MEDAS and PSQI

		AACNCS		
		Individual Anxiety	Socialization Anxiety	Anxiety Scale Total Score
MEDAS	r	-0,077	0,344	-0,176
	p	0,582	0,011*	0,202
PSQI	r	0,324	0,351	0,358
	p	0,017*	0,009*	0,008*

There was a weak positive correlation between PSQI and "Individual Anxiety", which is the sub-dimension of AACNCS (r=0.324; p=0.017; p<0.05). A statistically significant weak positive correlation was found between the PSQI and "Socialization Anxiety", which is the sub-dimension of the AACNCS (r=0.351; p =0.009; p<0.05).

A statistically significant weak correlation was found between the totals of the PSQI and the AACNCS sub-dimensions (r=0.358; p=0.008; p<0.05). Therefore, the increase in the anxiety of the athletes about catching the coronavirus deteriorates the sleep quality.

DISCUSSION AND CONCLUSION

It is evident that the most recent Covid-19 quarantine period has negative effects on people's mental health and behavior in addition to their physical health (15). Although prior studies has revealed that a large disaster's longer-lasting psychological effects outweigh its physical effects on people, spending on mental health has often lagged behind (16). Our study is the first to look at the connection between athletes' anxiety about catching coronavirus and the quality of their diet and sleep, despite the fact that there have been recent studies on anxiety, sleep disorders/quality, and dietary practices induced by the Covid-19 pandemic. In our study, we found that as athletes' anxiety about catching coronavirus increased, sleep quality deteriorated, but it was not in a significant relationship with diet quality. In terms of anxiety level and sleep quality, these findings are consistent with the initial premise we put forth.

The majority of athletes exhibit higher symptoms of anxiety, stress, and depression, according to studies conducted during the pandemic. This could be explained by the athletes' shorter and less frequent training sessions during the pandemic. Excessive training load reduction may have negative effects on psychosocial engagement, according to studies (17). Studies also suggest that the combination of social isolation and loneliness with this drop in physical activity can result in an aggravation of depressive symptoms (18). In a study that looked at how the Covid-19 pandemic affected athletes' mental health, it was discovered that athletes had fewer symptoms of anxiety and depression than the non-athlete control group (19). Another study indicated that while adolescent athletes' depression levels were greater, their levels of anxiety and post-traumatic stress disorder were much lower than those of the non-athlete controls (20). Curfews and the delay of sporting events necessitate social withdrawal, but sports organizations and coaches should concentrate on preserving the training schedule and developing possibilities to safeguard mental health, even if they must do so from a distance.

In one of the research evaluating the association between age and the pandemic's anxiety problems, it was found that adolescents in the 12- to 18-year-old age range are more likely to admit to having anxiety and depressive symptoms (21). Another study found that individuals under the age of 18 had a higher risk of psychological discomfort compared to participants in other age groups (22). The AACNCS "Individual Anxiety," "Socialization Anxiety," sub-dimension scores, and the total scores from the scale do not demonstrate a statistically significant link with the age of the athletes taking part in our study ($p>0.05$). Since the age range was narrow in our study (14-20 years), the relationship between age and anxiety about catching coronavirus may not have been significant and should be supported by studies with wide age ranges.

For athletes to maintain their mental health, increase physical performance, and prevent overtraining, they need to get enough sleep—enough sleep that is adequate in terms of duration, timing, and quality. Numerous studies have assessed how much weariness and sleeplessness athletes experience during the pandemic, and they have all found that these issues have risen (23-27). According to Pillay L. et al., female athletes more frequently express a lack of motivation and energy than male athletes (25). Similar to our study, in Mon-Lopez et al.'s study, athletes' sleep quality suffers throughout the pandemic time. (23). In our study, when the relationship between "Socialization Anxiety" and "Individual Anxiety", which are the sub-dimensions of the AACNCS, and sleep quality is examined, when both anxiety levels of the athletes increase, their sleep quality decreases significantly ($r=0.351$; $p= 0.009$; $p<0.05$). In contrast, despite the fact that Facer-Childs E.R. et al. demonstrated a rise in the amount of time spent in bed and total sleep time during the pandemic, the athletes also reported feeling sleepy all day (24). The delay in going to bed during the pandemic process had a negative impact on the athletes' mental health, according to the same study. All of these data point to the urgent need to take into account how Covid-19 and other quarantines may affect athletes and to create plans for improving sleep in this group.

People's eating habits have been impacted by the Covid-19 pandemic. People consumed more calories during quarantine than they did before, and the quality of the items they ate decreased, according to a study done with university students in Spain (28). Interestingly, some adolescents shown a trend toward a healthier diet with quarantine and a notable increase in the frequency of consuming vegetables, fruits, and legumes (29). However, there was no statistically significant correlation between athletes' anxiety levels regarding catching coronavirus and their diet quality in our study. The pandemic's lack of research on dietary habits in athletes limits the elaboration of the discussion.

As a result, it was found in this study that athletes' sleep quality may suffer and their dietary quality may worsen as their anxiety of catching the coronavirus grows. It should be taken into account that in Covid-19 and related pandemics, athletes' mental health may suffer in line with the findings of this study. In addition to maintaining mental health, it may be recommended to get counseling from experts for sleep and diet quality, and to follow the athletes closely by their families, trainers and health team in this process.

DECLARATIONS

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Conflict of Interest

No potential conflict of interest was reported by the author(s).

Ethics Approval

The study was approved by Acibadem University and Acibadem Healthcare Institutions Medical Research Ethics Committee, report number of 2022-17/03 (11 November 2022).

Availability of Data and Material

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

Author Contributions

Study design: DS, EÖ; Data collection: YAE; Data analysis: DS; manuscript preparation: EÖ, YAE.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nutrition and Dietetics / Beslenme ve Diyetetik

Time Spent on Social Media During The COVID-19 Pandemic is Associated with A Healthy Eating Obsession and Anxiety Symptoms: A Cross-Sectional Study of 525 Adults in Semi-Quarantine

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ABSTRACT

Purpose: The increase in social media exposure during the COVID-19 pandemic may cause an increase in the obsession of healthy eating and anxiety symptoms. The interaction between social media, obsessive healthy eating and anxiety symptoms was evaluated.

Methods: An online questionnaire was applied to individuals in COVID-19 semi-quarantine (n=525) using Google forms. Orthorexia and anxiety symptoms were evaluated using the ORTO-11 and Generalised Anxiety Disorder questionnaires, respectively.

Results: The time spent on social media to follow the COVID-19, health, and nutrition news was closely associated with higher orthorexic symptoms in both sexes, and higher anxiety symptoms in women (r=-0.638 in men; r=-0.560 in women, p<0.001). High rates of anxiety (62.4% in men; 95.4% in women) and an unhealthy obsession with healthy eating (67% in men, 83.2% in women) were detected in individuals in the COVID-19 pandemic.

Conclusion: While the COVID-19 pandemic causes negative effects on both eating behaviour and anxiety disorders, the use of social media to follow healthy nutrition news can also exacerbate these problems. Therefore, it is important to increase awareness about the use of social media during the pandemic, to detect healthy eating obsessions and anxiety symptoms earlier, and to prevent the harmful consequences of these problems in the long term.

Keywords: healthy eating obsession, COVID-19, social media, supplements and functional foods, anxiety disorders

COVID-19 Salgını Sırasında Sosyal Medyada Geçirilen Süre, Sağlıklı Beslenme Takıntısı Ve Kaygı Belirtileriyle İlişkilidir: Yarı Karantinadaki 525 Yetişkin Üzerinde Yapılan Kesitsel Bir Çalışma

ÖZET

Amaç: COVID-19 pandemisinde sosyal medya maruziyetinin artması, bireylerde sağlıklı beslenme takıntısının artmasına ve kaygı belirtilerine neden olabilmektedir. Bu çalışmada, sosyal medya, sağlıklı beslenme ve anksiyete belirtileri arasındaki etkileşimi değerlendirilmiştir.

Yöntemler: Google forms kullanılarak COVID-19 sürecinde yarı karantinadaki bireylere (n=525) çevrimiçi anket uygulandı. Ortoreksiya ve anksiyete belirtileri sırasıyla ORTO-11 ve Yaygın Anksiyete Bozukluğu anketleri kullanılarak değerlendirildi.

Bulgular: COVID-19, sağlık ve beslenme haberlerini takip etmek için sosyal medyada geçirilen süre, her iki cinsiyette daha yüksek ortoreksik semptomlar ve kadınlarda daha yüksek anksiyete semptomları ile yakından ilişkiliydi (erkek: r=-0.638; kadın: r=-0.560, p<0.001). COVID-19 pandemisinde bireylerde yüksek oranda kaygı (erkeklerde %62,4; kadınlarda %95,4) ve sağlıklı beslenme konusunda takıntı (erkeklerde %67, kadınlarda %83,2) tespit edildi.

Sonuç: COVID-19 pandemisi hem yeme davranışı hem de kaygı bozuklukları üzerinde olumsuz etkilere neden olurken, sosyal medyanın sağlıklı beslenme haberlerini takip etmek için kullanılması da bu sorunları şiddetlendirebilmektedir. Bu nedenle pandemi sürecinde sosyal medya kullanımına yönelik farkındalığın artırılması, sağlıklı beslenme takıntılarının ve kaygı belirtilerinin daha erken saptanması ve bu sorunların uzun vadede zararlı sonuçlarının önlenmesi açısından oldukça önemlidir.

Anahtar Kelimeler: sağlıklı beslenme takıntısı, COVID-19, sosyal media, supleman ve fonksiyonel gıdalar, kaygı

The whole world has been faced with the COVID-19 pandemic, which has caused the death of approximately 5 million people, affected more than 200 million people, and has long-lasting detrimental consequences (1). In order to prevent the spread of the coronavirus, people in Turkey had to stay in semi-quarantine after the government and the Ministry of Health called for "stay at home to stay safe" (2). However, prolonged stay at home, combined with the fear of contracting the virus, can affect the psychological well-being of people in quarantine and increase symptoms of anxiety (3).

As nutrition may have positive effects on supporting the immune system and reducing the risk of infection, there has been increased interest in a healthy and balanced diet rich in antioxidants and vitamins in the fight against COVID-19 to strengthen immune functions (4). Although dietary guidelines in COVID-19 direct individuals to strengthen immunity naturally (5), there has been a lot of misleading news on social media about the use of nutritional supplements as immune boosters during the COVID-19 pandemic (6). To our knowledge, the effect of nutritional advice stated on social media on individuals in semi-quarantine and the tendency of individuals to use nutritional supplements has not been investigated.

With the COVID-19 pandemic, social media has become a fundamental communication tool to provide all types of information about COVID-19 can be delivered very quickly(7). In addition, it is possible that the time spent on social media may increase during the COVID-19 pandemic, due to the increased time spent at home with semi or full quarantine administrations. Constant exposure to COVID-19 news on social media and increased virus spread can affect both mood and eating behaviors (4). In a cross-sectional study, it was suggested that the symptoms of Orthorexia Nervosa (ON), known as healthy eating obsession, increased significantly with following healthy nutrition news on social media (8). However, to date, no research has been conducted on how the time individuals spend on social media affects their eating behavior during the COVID-19 pandemic.

In this study, we aimed to evaluate the presence of obsessive eating behaviours and general anxiety disorders, and the interaction between time spent on social media and healthy eating obsession and anxiety symptoms in individuals in semi-quarantine during the COVID-19 pandemic. In addition, we also investigated the effect of orthorexic behaviours on nutritional supplement use during the pandemic. We hypothesised that (1) general anxiety symptoms may be related to healthy eating obsession; (2) time spent on social media may be positively related to orthorexic behaviours and anxiety; and (3) there may be a potential positive correlation between orthorexic behaviours and the nutritional supplement use during semi-quarantine of the COVID-19 pandemic. We tested our hypotheses by classifying them according to sex to detect differences between sexes.

METHODS

Study Design

This study was a cross-sectional study conducted during the first wave of COVID-19 (between 01-21 April 2020) during the government-imposed lockdown due to the COVID-19 outbreak.

Data Collection

This lockdown included weekend curfews, everyone except cargo and food workers worked from home, and the obligation to wear masks everywhere. Data was collected using a digital platform (Google forms) due to the eliminate the risk of face-to-face interviews. Participants were recruited through both personal and faculty social networks (Facebook, Instagram, Twitter, WhatsApp), of the researchers. The researchers created an invitation post including the research details, inclusion/exclusion criteria and a link to the research questionnaire form. Participants who want to participate in the research fill out the research questionnaire online. The use of an online survey enabled data to be collected from all over the country. No incentives were used in this cross-sectional study. All individuals over the age of 18 were allowed to participate in this study. Participation ended when the first 525 people ((1-β): 85%) who met the inclusion criteria were reached. Body mass index (BMI) was calculated using the following formula; [weight (kg).(height)$^{-2}$ (m^2)]. BMI that less than 18.5 is classified as underweight range, between 18.5 to < 25, as healthy range, between 25 to < 30, as overweight range, higher than 30 as obese range (9).

Questionnaire

The questionnaire consisted of 41 questions and three parts detailed below. The first part included the sociodemographic characteristics: age, sex, education level, smoking status, presence of any chronic disease, marital status, dietary practice. The second part included questions about the use of social media and supplements during semi-quarantine. Questions aimed to collect self-reported information about the use of nutritional supplements

before and after COVID-19, whose recommendation and why they need to use them. There were also questions regarding the time spent using social media, the applications they use, and how long they follow the news on COVID-19, health and nutrition on a daily basis. The last part dealt with the determination of orthorexia and general anxiety disorders using the following scales described in detail.

ORTO-11 Scale

ORTO-11 scale was used to detect healthy eating obsession in individuals. The ORTO-11 scale consists of 11 multiple-choice questions that are rated using a four-point Likert scale. The scale, which was originally created with 15 items by Donini et al.(10), which has been adapted in Turkish as 11-item by Arusoğlu et al (11). The ORTO-11 scale cut-off value is 27, and individuals with lower scores are thought to have more orthorexic symptoms (10,11). We calculated Cronbach's α internal consistency coefficient of the scale as 0.81.

Generalized Anxiety Disorder-7 Scale

The scale consists of seven questions rated using a four-point Likert scale. With a maximum score of 21, cut-off points of 5, 10 and 15 were interpreted as representing mild, moderate and severe anxiety levels in GAD-7 (12,13). Cronbach's α internal consistency coefficient of the scale was computed as 0.87 in this study.

Statistical Analyses

Sample Size Calculation

The power analysis was calculated based on the study conducted by Turner et al. (8), which was stated the rate of orthorexia nervosa in individuals using social media was 49%, and the estimation of this ratio for our study as 55%. At least 435 adults were needed to be included into the study according to the G power software (14), based on a power of 80% and a reliability of 95%. At the end of the data collection, a total of 525 participants were enrolled to the study (achieved power (1-β): 85%).

Statistical analyses were performed using the SPSS Software version 21. The variables were tested using visual (histogram, probability plot) and analytic (Kolmogorov-Smirnov/ Shapiro-Wilk's test) methods to determine if they are normally distributed. Descriptive results were presented as mean and standard deviation. In order to compare the differences between the sexes, the independent two sample t-test or the Mann-Whitney test was used, where appropriate. The Chi-square test or Fisher's exact test (when chi-square test assumptions do not hold due to low expected cell counts), where appropriate, was used to compare the proportions of education, occupation, presence of chronic diseases, and diet applied between sexes. The Wilcoxon test was used to verify differences in supplement use between before and the current pandemic period. As both ORTO-11 and time spent on per day using social media to read information related to the COVID-19, health and nutrition were normally distributed, the correlation coefficients and their significance were calculated using Pearson test. However, Spearman test was applied to calculate the correlation between GAD-7 scores and time spent on social media to read information related to the COVID-19, health and nutrition as GAD-7 scores were not normally distributed. A multiple linear regression model was used to identify the impact of orthorexic behaviors on starting the supplement use during the COVID-19. A 5% type-1 error level was applied to infer statistical significance.

Results

Demographics

Descriptive characteristics of the participants were presented in Table 1. No differences were observed in age between sexes. Most of the participants were omnivorous (98.9% of men; 98.0% of women), highly educated, actively working and had no known chronic diseases.

Healthy Eating Obsession Risk

With significant differences across sex, 67.0% (n = 120) of men and 83.2% (n = 288) of women were at risk for healthy eating obsession (Table 1).

Presence of General Anxiety Disorder

Higher general anxiety symptoms ranging from mild to severe were detected in both sexes (62.4% of men; 95.4% of women) (Table 1). Women had higher general anxiety symptoms compared to men, with predominantly moderate levels (40.5%) ($p<0.001$).

Association between healthy eating obsession and general anxiety disorder

Lower ORTO-11 scores were significantly associated with higher GAD-7 scores in both sexes ($r=-0.4$ in men; $r=-0.2$ in women; $p<0.05$) (data not shown).

Social Media Use

Table 1 represents the information about social media use according to sexes. With an average time of 53.9 $min.day^{-1}$ for men and 51.2 $min.day^{-1}$ for women, participants spent time on social media apps to seek for information related to COVID-19, health and nutrition.

Table 1. General characteristics of the subjects (n= 525)			
[a] Mean ± SD (Min-Max) [b] Median (IQR) [c] n (%)			
	Men (n=179)	**Women (n=346)**	***p***
Age	31.0 ± 11.4 [a] (19-67)	30.8 ± 9.8 [a] (20-63)	0.416①
Weight (kg)	77.8 ± 12.2 [a] (70-120)	61.7 ± 10.7 [a] (53-98)	0.001①
Height (cm)	176.0 ± 14.5 [a] (163-193)	164.2 ± 5.9 [a] (150-181)	0.001①
BMI (kg/m^2)	24.9 ± 3.6 [a] (16-40.5)	22.9 ± 3.8 [a] (16.1-36.7)	0.001①
ORTO-11	26.0 ± 4.9 [a] (14-41)	23.6 ± 4.1 [a] (14-37)	0.002*①
Orthorexia presence			
Yes	120 (67.0 %) [c]	288 (83.2 %) [c]	0.001*①
No	59 (33.0 %) [c]	58 (16.8 %) [c]	
GAD-7	7.0 (4.0- 11.0) [b]	8.0 (3.0- 13.0) [b]	0.001*①②
No	67 (37.4 %) [c]	16 (4.6 %) [c]	
Mild	47 (26.3 %) [c]	140 (40.5 %) [c]	
Moderate	37 (20.7 %) [c]	119 (34.4 %) [c]	
Severe	28 (15.6 %) [c]	71 (20.5 %) [c]	
Education			
< High school	16 (9.0 %) [c]	33 (5.0 %) [c]	0.635①②③
≥ High school	163 (91.0 %) [c]	313 (95.0 %) [c]	
Occupation			
Not working	0 (0.0 %) [c]	27 (7.8 %) [c]	0.001*①②③
Student	18 (10.1 %) [c]	83 (24.0 %) [c]	
Working	150 (89.0 %) [c]	235 (67.9 %) [c]	
Retired	11 (6.1 %) [c]	1 (0.3 %) [c]	
Presence of any chronic diseases			
Yes	12 (6.7 %) [c]	35 (10.0 %) [c]	0.008①②③
No	167 (93.3 %) [c]	311 (89.0 %) [c]	
Diet			
Omnivore	177 (98.9 %) [c]	339 (98.0 %) [c]	0.725①②③④
Vegetarian	2 (1.1 %) [c]	7 (2.0 %) [c]	
Number of social media apps	3.0 (2.0- 3.0) [b]	3.0 (2.0- 4.0) [b]	0.795①②
Time subjects spent on social media apps to track information about COVID-19, health and nutrition (min)	53.9 ± 10.9 [a]	51.2 ± 13.4 [a]	0.725①
< 15	48 (26.8 %) [c]	72 (20.8 %) [c]	0.423①②③
15-30	64 (35.8 %) [c]	112 (32.4 %)[c]	
30-60	31 (17.3 %) [c]	93 (26.9 %) [c]	
> 60	36 (20.1 %) [c]	69 (19.9 %) [c]	
Percentage of using the apps daily[¶]			
Instagram	131 (73.2 %) [c]	311 (89.9 %) [c]	0.001①②③*
Facebook	101 (56.4 %) [c]	131 (37.9 %) [a]	0.001①②③*
Twitter	92 (51.4 %) [c]	179 (51.7 %) [c]	0.942①②③
LinkedIn	37 (20.7 %) [c]	52 (15.0 %) [c]	0.123①②③
①*Independent two-sample t-test.* ①②*Mann–Whitney U test.* ①②③*Pearson chi-squared test.* ①②③④*Fisher's exact test.*			
**p<0.001. **p<0.05.* [¶] *multiple answers allowed.*			

Effect of social media use on healthy eating obsession and general anxiety disorder

The potential effects of social media on orthorexia and general anxiety symptoms were shown in Table 2. The average time participants spent on social media apps to track information about COVID-19, health and nutrition were negatively correlated with ORTO-11 scores in both sexes. On the other hand, GAD-7 scores of women were found to be positively linked with the time spent on social media to check for health and nutrition solutions for COVID-19.

Determination of nutritional supplement use after COVID-19: Figure 1 represents the data regarding nutritional supplement use before and after COVID-19 according to sex. The use of vitamin C, Beta-glucan (ß-glucan), and *Pelargonium sidoides* were increased after the COVID-19 outbreak in both sexes ($p<0.05$). The utilisation rate of multivitamins, zinc, black elderberry and propolis in women, and the use of Vitamin D in men were elevated after COVID-19 ($p<0.05$).

Most of the participants started using nutritional supplements with a "belief effect" (52.6 % of men; 50.3 % of women) (Figure 2). Participants predominantly preferred to use nutritional supplements to improve their immunity (24.0 % of men; 32.9 % of women) (Figure 3).

Tendency to supplement use according to the presence of healthy eating obsession

Table 3 shows the multiple linear regression analysis of supplement utilisation and orthorexia symptoms taking the ORTO-11 score as the dependent variable. The regression analysis showed that as the ORTO-11 scores decreased, multivitamin (R^2=0.377 in men; 0.055 in women) and ß-glucan (R^2=0.379 in men; 0.199 in women) utilisation rates were slightly increased in participants regardless of sex. However, since the R^2 values were observed below 40%, the findings can be interpreted as a low level of correlation.

Table 2. Correlation between time spending social media, and orthorexia and general anxiety disorders status

	Average time subjects spent on social media apps to track information about COVID-19, health and nutrition			
	Men (n=179)		Women (n=346)	
	r	*p*	r	*p*
ORTO-11	-0.638	0.001[a]*	-0.560	0.001*
GAD-7	0.746	0.909[b]	0.444	0.001*

*[a] Pearson correlation. [b] Spearman' rho correlation. *p<0.001.*

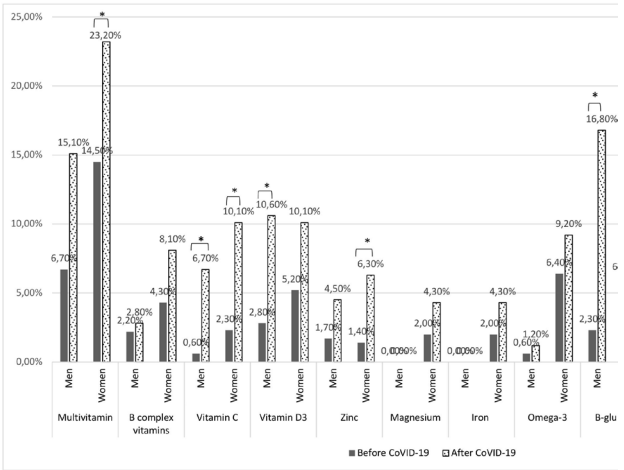

Figure 1. *Data regarding nutritional supplement use before and during COVID-19 semi-quarantine*

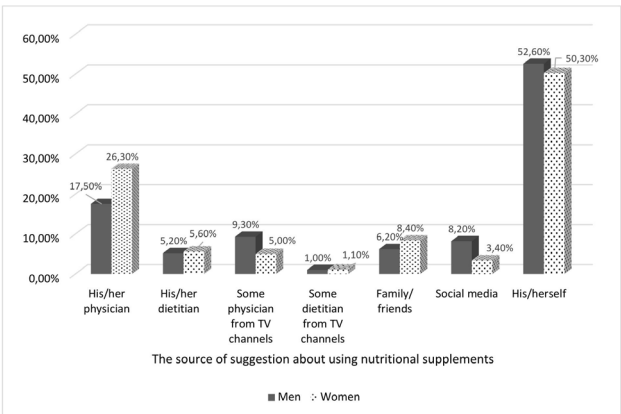

Figure 2. *The source of suggestion about using nutritional supplements before and after COVID-19 semi-quarantine*

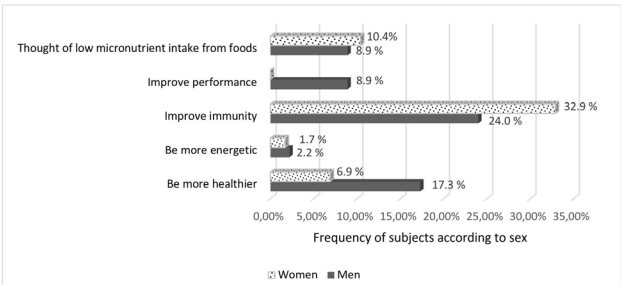

Figure 3. *Main reason for the use of nutritional supplements in subjects according to sex p<0.05*

Table 3. Linear regression analysis taking the ORTO-11 score as the dependent variable					
Food Supplement (Pre COVID-19/ during COVID-19)	**Sex**	**B**	**SE**	**Confidence Interval (95%)**	**R^2**
Multivitamin					
No/Yes	Men	**-0.557***	0.201	(-1.005)- (-0.109)	**0.377**
No/Yes	Women	**-0.243***	0.135	(-0.518)- (0.031)	0.055
B group vitamins					
No/Yes	Men	-	-	-	-
No/Yes	Women	-0.200	0.216	(-0.698)- (0.298)	-0.016
Vitamin C					
No/Yes	Men	-0.432	0.313	(-1.154)- (0.289)	0.092
No/Yes	Women	**-0.435***	0.189	(-0.823)- (-0.047)	0.142
Vitamin D					
No/Yes	Men	-0.320	0.298	(-0.976)- (0.337)	0.012
No/Yes	Women	**-0.319***	0.147	(-0.633)- (-0.005)	0.199
Zn					
No/Yes	Men	-0.380	0.232	(-1.117)- (0.357)	0.297
No/Yes	Women	-0.164	0.192	(-0.573)- (0.245)	-0.017
Mg					
No/Yes	Men	-	-	-	-
No/Yes	Women	-0.398	0.251	(-1.042)- (0.247)	0.202
Fe					
No/Yes	Men	-	-	-	-
No/Yes	Women	-0.372	0.223	(-0.919)- (0.174)	0.203
Omega-3					
No/Yes	Men	-	-	-	-
No/Yes	Women	-0.347	0.214	(-0.890)- (-0.214)	0.152
ß-glucan					
No/Yes	Men	**-0.405****	0.127	(-0.678)- (-0.132)	**0.379**
No/Yes	Women	**-0.508****	0.183	(-0.883)- (-0.132)	0.199
Black Elderberry					
No/Yes	Men	-0.384	0.230	(-0.929)- (0.160)	0.182
No/Yes	Women	-0.265	0.154	(-0.586)- (0.056)	0.081
Pelargonium Sidoides					
No/Yes	Men	-0.333	0.253	(-0.983)- (0.317)	0.110
No/Yes	Women	**-0.347***	0.147	(-0.653)- (-0.041)	0.172
Propolis					
No/Yes	Men	-0.324	0.640	(-3.076)- (2.428)	-0.329
No/Yes	Women	-0.437	0.197	(-0.844)- (-0.030)	0.130
p<0.05.p<0.001.*					

DISCUSSION

The main purpose of the study is to investigate the interaction between time spent social media, and orthorexia and general anxiety symptoms during the semi-quarantine period due to the COVID-19 pandemic. We achieved five main conclusions: (1) A positive association was found between orthorexia and anxiety disorder symptoms; (2) Individuals in semi-quarantine spent an average of 52 minutes on social media seeking information about COVID-19, health and nutrition; (3) A significant positive link was observed between social media use and unhealthy eating obsession in both sexes; (4) A positive interaction was obtained between general anxiety disorder symptoms and social media use in women; (5) Most people in semi-quarantine (an average of 51.6 %) decided to take supplements believing they support their immunity, and a low level of positive interaction was observed between the increase in healthy eating obsessions and the use of multivitamins and ß-glucans in both sexes.

Our results show that there is a high risk of healthy eating obsession (67.0% in men and 83.2% in women) and general anxiety disorder (62.6% in men and 95.4% in women) for individuals in the COVID-19 pandemic. The unexpected coronavirus pandemic has made considerable changes in physical and psychological health by being isolated from almost everyone and creating fear of contracting the disease (15). Although the COVID-19 lockdown provides better protection to prevent catching the virus, its impact on mental health has been reported to drive individuals into depression, anxiety, stress, and even suicide (16,17). Our study revealed a higher percentage of anxiety compared to the world anxiety prevalence (3.6%) (18), and previous studies using the same GAD-7 questionnaire in China (22.6%) (17), Brazil (23.3%) (19), Ireland (20.0%) (20) and Turkey (52% (21) - 71.4% (22)). Higher anxiety may also be due to economic instability, as noted by Puccinelli et al (19). As higher anxiety levels have highly compromised mental health and closely related to eating disorders (17), early detection and underlying problems need to be deeply considered.

As it is claimed that mental distress such as loneliness and boredom trigger eating problems and the COVID-19 pandemic also prompts this mood (23), a series of studies have been conducted to investigate the potential effect of COVID-19 on eating disorders (23-25). Previous research has indicated that individuals with psychological distress tend to eat more, leading to emotional and binge eating symptoms (24,25). A recent review by Rodgers et al. (26) noted that orthorexic symptoms may increase due to the rise in concerns about healthy eating during the COVID-19 outbreak. The current study indicated a high risk of healthy eating obsession (67.0% in men and 83.2% in women). In accordance with the present study, another study investigating the efficacy of the early onset of the COVID-19 pandemic on eating behaviors in 3533 Italians indicated that 15% of subjects started to buy their foods from farmers or organic fruits and vegetables (27). Thus, although orthorexia is not classified as an eating disorder, the increased risk of healthy eating obsession may trigger other eating-related disorders. We conducted the survey at the beginning of the COVID-19 pandemic (i.e., approximately one month after the semi-quarantine announcement by the Ministry of Health), when the fear of getting the disease and the unknowns about the disease are most intense, revealing that people had experienced orthorexia symptoms even at the beginning of the COVID-19 pandemic.

Constant exposure to social media during the COVID-19 may have paramount effects on psychological state (17). Turner and Lefevre (8) reported that a significant interaction between orthorexia and social media use, and Instagram is the most commonly used application to follow a healthy eating environment. Similar results were obtained from our study indicating that Instagram was the most frequently used application for both sexes (73.2% in men, 89.9% in women). In this study, the significant interaction between social media use and orthorexia symptoms may be due to the higher exposure time to Instagram. Following or interacting with like-minded individuals using social media can lead to an echo chamber effect, which reinforces the correctness of their point of view regarding eating behaviors by constantly underlining common views (28). In addition, the restrictions of nearly all outdoor activities and daily schedules during the pandemic led to intense exposure to news about COVID-19 and healthy eating on social media (23), thus increasing fears of contracting COVID-19, and rising the obsession about healthy eating.

We revealed that the main reason why individuals in COVID-19 pandemic chose to take nutritional supplements was to support their immunity. Rising concerns about healthy eating during the pandemic (29) may drive individuals to take these supplements to improve adaptive immunity to minimize the risk of contracting COVID-19. In addition, one of the major reasons why individuals increase their use of nutritional supplements without consulting any healthcare professional during the COVID-19 pandemic may also be the echo effect of social media.

Studies of orthorexia and dietary supplement use have revealed conflicting results (30,31). Although the general belief is that dietary supplement use is significantly higher in people with orthorexia symptoms (30),most of the studies have indicated no significant interaction between dietary supplement use and orthorexia symptomatology (10,30,31). In contrast to most studies (10,30,31), we found a low level of positive association between multivitamin and ß-glucan use and orthorexia symptoms in both sexes, indicating that individuals with orthorexia symptoms may tend to use multivitamins (R2=0.377 in men; 0.055 in women) and ß-glucan (R2=0.379 in men; 0.199 in women) to support their immunity and become healthier during the COVID-19 pandemic. Although the main purpose of supplement use is to support immunity, it should be kept in mind that it may affect the body in the opposite direction, especially in the case of COVID-19 (32). Although there is no evidence-based consensus regarding recommendation of nutritional supplements during COVID-19, social media and the supplement industry are strongly recommending various dietary supplements to improve immunity, and, thereby, prevent COVID-19 infection (32). Therefore, randomize-controlled clinical trials are needed to better understand the impact of nutritional supplements on the body defense. In addition, checking the national dietary guidelines before recommending any nutritional supplements during the COVID-19 pandemic is also a great strategy to eliminate misutilization of these supplements.

Our study has several strengths and limitations to consider. To our knowledge, this is the first study to compare healthy eating obsession and anxiety in relation with the use of social media and nutritional supplements. We implemented the ORTO-11, the valid and reliable version of ORTO-15 in our country as it eliminates the false prediction of the disorder. It is crucial to apply a valid questionnaire since we are aware that one of the main reasons why orthorexia is not included in DSM-V is the several limitations of the ORTO-15 questionnaire including lack of cultural adaptation, internal validity, and reliability.

Since there are no specific diagnostic criteria for orthorexia in DSM-5 (33) and we cannot independently be confirmed the presence of eating disorders, we did not ask if they had been diagnosed with orthorexia or any eating disorders before. However, previous eating disorder history may elevate the exaggerated obsession about food and orthorexic behaviors during the COVID-19 pandemic.

In summary, social media use is positively associated with healthy eating obsession in both sexes. A meaningful interaction was observed between healthy eating obsession and anxiety. We found a low level of positive correlation between orthorexia and the use of multivitamins and ß-glucans in both sexes. More than half of the participants applied nutritional supplements to improve the immune response. Overall, these findings suggest that orthorexia and anxiety symptoms could be closely related to each other, and health, nutrition and COVID-19-related news on social media may trigger these symptoms. Therefore, individuals who are concerned or obsessed with healthy eating should be encouraged to consult a healthcare professional so that any potential psychological problems can be detected early before they cause long-term detrimental consequences.

DECLARATIONS

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Conflict of Interest

The authors declare no conflict of interest.

Ethics Approval

The study protocol was approved by the Istanbul Medeniyet University Institutional Review Board Human Subjects Committee (0806/2020; date: 27.03.2020) and all participants consented to participating in the study.

Authors' Contributions

ADL was the main writer of the paper, assisted with data interpretation, and gave final approval of this version to be published. HKBG conducted the data analysis, critically reviewed the paper, and gave final approval of this version to be published.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Nurses' Journey in the Pandemic: Fear of COVID-19 and Work Stress

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ABSTRACT

Purpose: During the pandemic, nurses have played an important role in the treatment and care of individuals with COVID-19. Fear of COVID-19 was added to the work stress experienced by nurses for various reasons before the pandemic. Revealing the processes that affect nurses' mental health during the pandemic is an important public health priority in terms of evaluating nurses' health and managing the effective delivery of nursing services. The aim of this study is to investigate the relationship between fear of COVID-19 and work stress in nurses working in hospitals.

Material and Methods: This descriptive-correlational study was conducted between February and April 2022 with 270 volunteer nurses in a university hospital located in the Eastern Anatolia Region of Turkey. Data were collected using a Socio-demographic Characteristics Form, the Fear of COVID-19 Scale, and the Nurse Stress Scale by the face-to-face interview method. Descriptive statistical methods (counts, percentages, min-max, mean, and standard deviation values) and Pearson correlation analysis were employed to analyze the data.

Results: Participants' mean scores were 14.59±6.23 on the Fear of COVID-19 Scale and 62.46±11.44 on the Nurse Stress Scale. A statistically significant, positive, and low-level correlation was found between fear of COVID-19 and work stress (r=0.145, p<0.017).

Conclusion: Nurses' fear of COVID-19 and work stress was below a moderate level. As their fear of COVID-19 increased, their work stress increased, as well. Measures to be taken to reduce nurses' fear of COVID-19 can contribute positively to the reduction of their work stress and therefore to their health.

Keywords: COVID-19; fear, hospitals, nurses; stress.

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Serap AÇIKGÖZ

Pandemide Hemşirelerin Yolculuğu: COVID-19 Korkusu ve İş Stresi

ÖZET

Amaç: Pandemi sürecinde hemşireler, COVID-19 tanısı almış bireylerin tedavi ve bakımında önemli bir rol oynamıştır. Pandemi öncesinde hemşirelerin çeşitli nedenlerle yaşadığı iş stresine COVID-19 korkusu eklenmiştir. Bu süreçte hemşirelerin ruh sağlığını etkileyen faktörlerin belirlenmesi, hemşirelerin sağlığının değerlendirilmesi ve hemşirelik hizmetlerinin etkin sunumunun yönetilmesi açısından önemli bir halk sağlığı önceliğidir. Bu çalışmanın amacı; hastanede çalışan hemşirelerde COVID-19 korkusu ve iş stresi ilişkisini incelemektir.

Gereç ve Yöntemler: Tanımlayıcı-ilişki arayıcı tipte planlanan çalışma Şubat-Nisan 2022 tarihleri arasında Türkiye'nin Doğu Anadolu Bölgesi'nde bulunan bir üniversite hastanesinde çalışan gönüllü 270 hemşire ile yürütülmüştür. Veri; Sosyo-demografik Özellikler Formu, COVID-19 Korkusu Ölçeği ve Hemşire Stres Ölçeği kullanılarak yüz yüze görüşme yöntemiyle toplanmıştır. Tanımlayıcı istatistiksel metotlar (sayı, yüzde, min-maks değerleri, ortalama ve standart sapma) ve Pearson korelasyon analizi aracılığıyla veri değerlendirilmiştir.

Bulgular: Katılımcıların COVID-19 Korkusu Ölçeği puan ortalaması 14.59±6.23, Hemşire Stres Ölçeği puan ortalaması 62.46±11.44'tür. COVID-19 korkusu ve iş stresi arasında istatistiksel olarak anlamlı, pozitif yönlü ve düşük düzeyli bir ilişki saptanmıştır (r=0.145, p<0,017).

Sonuç: Hemşirelerin COVID-19 korkusu ve iş stresi orta düzeyin altındadır. Hemşirelerde COVID-19 korkusu arttıkça iş stresi artmaktadır. Hemşirelerin COVID-19 korkusunu azaltmaya yönelik alınacak önlemler iş stresinin azalmasına, dolayısıyla hemşirelerin sağlığına pozitif katkı sağlayabilir.

Anahtar kelimeler: COVID-19; Hastane, Hemşire; Korku; Stres.

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The human population has had to fight epidemics, such as Severe Acute Respiratory Syndrome, Middle East Respiratory Syndrome, from past to present, and the impact of these diseases on the human population has been devastating (1,2). The recent pandemic that humanity has to fight has been COVID-19 (3). Although three years have passed since the first cases were detected and two years since the development of an effective vaccine, COVID-19 still affects people's health and well-being (4). More than 762 million confirmed cases and 6.5 million deaths in the world and more than 17 million confirmed cases and one hundred thousand deaths in Turkey have been reported (3). COVID-19 disease has not only caused the risk of death after transmission but also created significant psychological problems (5). Both as members of society and professionals who play important roles in the treatment and care of individuals diagnosed with COVID-19, nurses have faced these problems, too (6).

The International Council of Nurses has reported that the COVID-19 pandemic exacerbates stress and anxiety in nurses and noted that approximately 80% of nurses who have been in close contact with COVID-19 patients have had mental health problems (7). Problems, such as uncertainty brought about by the COVID-19 disease, inadequate number of experienced personnel who can provide care for critical patients, and difficulty in the supply of personal protective equipment, have increased nurses' stress levels (8). The fact that nurses are in direct contact with a deadly and highly contagious virus has also become a source of stress and fear for the health of their families (9). During the pandemic process, one of the important sources of stress for nurses (10), who already had work stress for various reasons before the pandemic, has been the fear of COVID-19 (11).

Fear of the pandemic may cause psychological problems due to an increase in anxiety and stress levels in healthy individuals and an increase in the severity of existing symptoms in individuals who already have mental disorders (12,13). The fear experienced by nurses due to the pandemic may result in an increase in psychological distress and intention to quit and deterioration in health perceptions (14,15). Determination of nurses' fear of COVID-19 and stress levels can guide mental health protection studies and the design of psychological support programs. Therefore, this study was planned based on the following question: *"What is the relationship between fear of COVID-19 and work stress in nurses working in hospitals?"*

MATERIAL AND METHODS

Design and Sample

The population of this descriptive-correlational study consisted of nurses working in a university hospital located in the Eastern Anatolia Region of Turkey. The inclusion criteria of the study were working as a nurse in the hospital where the research was conducted and volunteering to participate in the research. The simple random sampling method, which is accepted as one of the probability sampling methods, was used for sample selection. The following formula was employed for calculating the sample: $n=N \times t2 \times p \times q / d2 (N-1) + t2 \times p \times q$. The calculation was based on a theoretical t-value of 1.96, a confidence interval of 95%, and a sampling error of 0.05 (16). When the research data were formulated based on these values and using the formula mentioned above, the sample size representing a population of 800 individuals was found to be at least 259 subjects. The study was completed with 270 nurses.

Data Collection Tools

The Socio-Demographic Characteristics Form: This form was prepared by the researcher following a review of the literature. It includes questions about nurses, such as age, marital status, gender, level of education, department, and status of working shifts.

The Fear of COVID-19 Scale: This scale was developed by Ahorsu et al. (12) and adapted into Turkish by Bakioğlu, Korkmaz, and Ercan (17). The scale is uni-dimensional and its items (e.g., "I am most afraid of coronavirus-19") are responded to on a five-point Likert type scale from 1 (strongly disagree) to 5 (strongly agree). It has seven items. There is no reverse and cut-off point in the scale. The total score obtained from all items of the scale shows the COVID-19 fear level experienced by the individual. The lowest score that can be obtained from the scale is 7, and the highest is 35. A high score on the scale indicates a high level of fear of COVID-19. Cronbach's α reliability coefficient of the scale is 0.84. In the present study, this value was calculated as 0.906.

Nurse Stress Scale (NSS): This scale was developed by Gray-Toft and Anderson (18) and adapted into Turkish by Mert, Aydin, and Baydemir (19). The scale consists of 34 items and 7 sub-dimensions, namely "uncertainty about treatment", "workload", "death of a patient", "conflict with a physician", "conflict with other nurses", "inadequate support", and "suffering patient". Each item on the scale is scored on a four-point Likert-type scale. Total scores on

the scale vary between 34 and 136. A high score shows that nurses experience stress more frequently in relation to individual stress problems in the physical medium, psychological medium, and physical environment. The lowest and highest scores that can be obtained from the scale sub-dimensions; 8-32 for "uncertainty about treatment" sub-dimension, 6-24 for "workload" sub-dimension, 5-20 for "death of a patient" sub-dimension, 5-20 for "conflict with a physician" sub-dimension, 5-20 for "conflict" with other nurses" sub-dimension, 3-12 for the "inadequate support" sub-dimension, and 2-8 for the "suffering patient" sub-dimension. Cronbach's α reliability coefficient of the total scale is 0.89 and this value varies between 0.65 and 0.80 for the sub-dimensions. In the current study, Cronbach's α reliability coefficient of the total scale is 0.906 and this value varies between 0.683 and 0.825 for the sub-dimensions.

Data Collection Process

We visited the nurses in their clinics in the hospital where the research was planned to be conducted between February and April 2022. Data were collected by the face-to-face interview method from nurses who were informed about the study and wanted to participate voluntarily.

Data Analysis

Data were analyzed on the Statistical Package for Social Science for Windows 22.0. Descriptive statistical methods (counts, percentages, min-max, mean, and standard deviation values) were used. The conformity of the variables to the normal distribution was examined using visual (histogram and probability graphs) and analytical methods (skewness and kurtosis values). Pearson correlation analysis was employed to examine the relationship between the two scales. The statistical significance level was accepted as $p<0.05$.

RESULTS

The mean age of the nurses of the participants in the study was 30.51±7.50 years, the mean work experience was 9.19±7.90 years, 82.2% of the nurses were female, 46.3% worked in inpatient services, 44.1% gave care to patients diagnosed with COVID-19, and the workplace of 35.9% had changed during the pandemic process. Also, 77% of the nurses stated that their stress levels increased and 37.4% stated that their sleep patterns were badly affected during the pandemic (Table 1).

Participants' mean scores were 14.59±6.23 on the Fear of COVID-19 Scale and 62.46±11.44 on the NSS. The lowest mean score was obtained from the suffering patient sub-dimension (4.58±1.42) and the highest from the uncertainty about treatment sub-dimension of the NSS (15.64±3.58) (Table 2).

A statistically significant, positive, and low-level correlation was determined between the total scores of Fear of COVID-19 Scale and the NSS (r=0.145, p=0.017). As the total Fear of COVID-19 Scale score increased, the total NSS score increased, as well (Table 3).

DISCUSSION

In this study, participants' mean score on the Fear of COVID-19 Scale was 14.59±6.23. Considering that the minimum score that can be obtained from the scale is 7 and the maximum score is 35, it can be said that nurses' fear of COVID-19 was below the medium level. Unlike the findings of this study, some studies have shown that the level of fear of COVID-19 is high in nurses. For example, Labrague & de Los Santos (15) determined the level of fear of COVID-19 in nurses providing care for COVID-19 patients as 19.92±6.15. Ünver and Yeniğün (20) determined it as 25.09±7.29 in nurses who worked in pandemic and surgical units and provided care for suspected or infected COVID-19 cases. This difference between the findings was probably because 44.1% of the participants were involved in the care of patients diagnosed with COVID-19, the uncertainty about COVID-19 decreased in the later stages of the pandemic, the knowledge and experience of nurses about COVID-19 increased, and the hospitalization and death rates fell as a result of increased immunity thanks to the vaccination of both nurses and the community with the introduction of the COVID-19 vaccine.

Seventy-seven percent of the participants stated that their stress levels increased during the pandemic process. However, the participants' mean score on the total NSS was 62.46±11.44. Considering that the minimum score that can be obtained from the scale is 34 and the maximum score is 136, it can be said that nurses' work stress was below the medium level. Unlike the findings of this study, some studies have shown a high level of work stress among nurses (21,22). The International Council of Nurses has reported that the COVID-19 pandemic exacerbates stress and anxiety in nurses and noted that approximately 80% of nurses who have been in close contact with COVID-19 patients have had mental health problems (7).

Table 1. Descriptive characteristics of the nurses participating in the study (n=270)

Variables	n	Min.	Max.	Mean	SD
Age	270	21.00	57.00	30.51	7.50
Number of children	270	0.00	4.00	0.84	1.04
Total work experience (year)	270	1.00	40.00	9.19	7.90
Weekly working hours	270	20.00	64.00	40.12	2.68

Variables		n	%
Gender	Male	48	17.8
	Female	222	82.2
Marital status	Married	169	62.6
	Single	101	37.4
Level of education	High school	45	16.7
	Associate degree	59	21.9
	Undergraduate degree	143	53.0
	Graduate degree	23	8.5
Department	Inpatient services	125	46.3
	Outpatient services *	16	5.9
	Special services**	119	44.1
	Management units	10	3.7
Working hours	08:00-16:00	162	60.0
	16:00-08:00	21	7.8
	16:00-24:00	5	1.9
	Alternating shift	82	30.4
Level of income	Income>expenses	39	14.4
	Income=expenses	122	45.2
	Income<expenses	109	40.4
Smoking status	Yes	97	35.9
	No	173	64.1
Alcohol consumption	Yes	17	6.3
	No	253	93.7
Chronic diseases	Yes	30	11.1
	No	240	88.9
Providing care for an individual diagnosed with COVID-19	Yes	119	44.1
	No	151	55.9
Change of duty during the pandemic process	Yes	97	35.9
	No	173	64.1
Getting a diagnosis of COVID-19	Yes	195	72.2
	No	75	27.8
Family relations during the pandemic process	Good	13	4.8
	Moderate	96	35.6
	Poor	91	33.7
	No change	70	25.9
Friendship relations during the pandemic process	Good	20	7.4
	Moderate	113	41.9
	Poor	63	23.3
	No change	74	27.4
Stress level during the pandemic process	Increased	208	77.0
	Decreased	10	3.7
	No change	52	19.3
Sleep habits during the pandemic	Good	6	2.2
	Moderate	91	33.7
	Poor	101	37.4
	No change	72	26.7
Total		270	100.0

** Outpatient clinics, endoscopy unit, etc.*
*** Intensive care, emergency room, etc.*

Table 2. Distribution of the participants' scores on the Fear of COVID-19 Scale and the NSS and its sub-dimensions (n=270)

Scales and sub-dimensions	Min.	Max.	Mean	SD
Fear of COVID-19 Scale	7,00	35.00	14.59	6.23
NSS	30	103	62.46	11.44
Uncertainty about treatment	8	28	15.64	3.58
Workload	6	24	15.39	3.68
Death of a patient	5	20	10.44	2.70
Conflict with a physician	5	20	10.44	2.90
Conflict with other nurses	5	20	10,19	2.99
Inadequate support	3	12	6.23	1.95
Suffering patient	2	8	4.58	1.42

Problems, such as uncertainty brought about by the COVID-19 disease, inadequate number of experienced personnel who can provide care for critical patients, and difficulty in the supply of personal protective equipment, have increased nurses' stress levels (8). This difference between the findings was probably because when the study was conducted, restrictions such as quarantine measures against the pandemic had been lifted and a significant part of the society had been vaccinated against COVID-19. In addition, the rate of participants involved in the care of patients diagnosed with COVID-19 was 44.1%.

Table 3. The correlation between participants' scores on the Fear of COVID-19 Scale and NSS

Scales and sub-dimensions		Fear of COVID-19 Scale
NSS	r	0.145
	p	**0.017***
	n	270
Uncertainty about treatment	r	0.189
	p	**0.002***
	n	270
Workload	r	0.109
	p	0.074
	n	270
Death of a patient	r	0.022
	p	0.718
	n	270
Conflict with a physician	r	0,145
	p	**0.017***
	n	270
Conflict with other nurses	r	0.064
	p	0.293
	n	270
Inadequate support	r	0.142
	p	**0.020***
	n	270
Suffering patient	r	0.037
	p	0.541
	n	270
*$p<0.05$		

There was a statistically significant, positive, and low-level relationship between the participants' mean scores on the total Fear of COVID-19 Scale and NSS ($r=0.145$, $p<0.017$). This finding was important in that it indicated that as nurses' fear of COVID-19 increased, their work stress increased, as well. Similar to the findings of this study, some studies have revealed that the fear of COVID-19 is a psychological factor that increases stress levels in nurses (11, 23). Fear of the pandemic may cause psychological problems due to an increase in anxiety and stress levels in healthy individuals and the severity of existing symptoms in individuals with mental disorders (12,13). The fear experienced by nurses due to the pandemic may result in an increase in psychological distress, deterioration in health perceptions, and an increase in intention to quit (14,15). As in the COVID-19 pandemic, nurses will continue to fulfill their responsibilities for patients in pandemics that are likely to occur in the future. In this context, to reduce the negative psychological effects of the pandemic process, nurses' health can be protected through mental health protection activities to be organized in the hospital environment, thereby increasing their work efficiency.

CONCLUSION

In this study, conducted to determine the relationship between fear of COVID-19 and work stress in nurses working in hospitals, participants' fear of COVID-19 and work stress were below the moderate level and these two characteristics showed a statistically significant, positive, and low-level correlation. The increase in nurses' fear of COVID-19 increased their work stress. Understanding the fear of COVID-19 in nurses is important to minimize their exposure to work-related stress and to develop approaches to protect their mental health. Measures to be taken to reduce nurses' fear of COVID-19 can contribute positively to the reduction of work stress and therefore to their health.

DECLARATIONS

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None.

Conflict of interest

The authors have stated explicitly that there are no conflicts of interest in connection with this article.

Ethical considerations

At the outset, the approval of the ethics committee of a university in Turkey (Date: 07.02.2022, No: 24), the COVID-19 research permission of the Ministry of Health (date: 07.02.2022), and the institutional permission of the hospital management where the research was conducted were obtained. The permission of the authors of the scales to be used in the study was obtained via e-mail. Verbal and written consent was obtained from nurses who volunteered to participate in the study. A copy of the written consent form was given to the participants.

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Authors contributions

Conception: SG, SA. Design: SG, SA. Supervision: SA. Materials: SG, SA. Data collection: SG. Analysis: SG, SA. Literature review: SG, SA. Writing: SG, SA. Critical review: SG, SA.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Evaluation of the Fear of Covid-19 and Well-being of Patients with Cancer and Caregivers

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ABSTRACT

Purpose: The effects of Covid-19 pandemic on physical health are the focus of attention around the world but the effects on psychological health shouldn't be ignored. It's known that patients with cancer are concerned due to being more susceptible to infections. The difficulties experienced by patients and caregivers during the pandemic put also their well-being at risk. Therefore, this study aimed to determine the impacts of Covid-19 pandemic on fear and well-being of patients with cancer and caregivers.

Methods: This descriptive study was carried out with 136 cancer patients and 142 caregivers at three university hospitals. Participant Information Form, the Fear of Covid-19 Scale and the Flourishing Scale were used for data collection.

Results: The mean score of the Fear of Covid-19 Scale of patients and caregivers were 19.6 ± 6.6, and 20.8 ± 6.9 respectively. The mean score of the Flourishing Scale were 42.1 ± 9.9 and 42.1 ± 9.5 respectively. It was determined that caregivers who are female and have lower income had higher fear of Covid-19. The well-being of patients with cancer who were single, had higher income, and had higher education level were higher. The well-being of caregivers who were unemployed was lower.

Conclusions: The psychosocial support given to patients and caregivers, whose importance has increased in the pandemic, shouldn't be considered separately from medical treatment. In particular, the support given to people who are more affected by the negative consequences of the pandemic should be increased.

Keywords: caregivers, COVID-19, fear, mental health, patients, psychological well-being.

Kanser Hastalarının ve Bakım Verenlerin Covid-19 Korkusu ve İyilik Halinin Değerlendirilmesi

ÖZET

Amaç: Covid-19 pandemisinin fiziksel sağlık üzerindeki etkileri tüm dünyada ilgi odağı olmakla birlikte mental sağlık üzerindeki etkileri de göz ardı edilmemelidir. Kanser hastalarının enfeksiyonlara karşı daha duyarlı olmaları nedeniyle endişe duydukları bilinmektedir. Pandemi sürecinde hasta ve bakım verenlerin yaşadığı zorluklar, iyilik hallerini riske atmaktadır. Bu nedenle bu çalışmada Covid-19 pandemisinin, kanserli hastaların ve bakım verenlerin korku ve iyilik hali üzerindeki etkilerinin belirlenmesi amaçlandı.

Yöntem: Tanımlayıcı tipte olan bu çalışma, üç üniversite hastanesinde 136 kanser hastası ve 142 bakım veren ile gerçekleştirildi. Veri toplama aracı olarak Katılımcı Bilgi Formu, Covid-19 Korku Ölçeği ve İyilik Hali Ölçeği kullanıldı.

Bulgular: Hasta ve bakım verenlerin Covid-19 Korkusu Ölçeği puan ortalaması sırasıyla 19,6 ± 6,6 ve 20,8 ± 6,9 idi. İyilik Hali Ölçeği puan ortalaması sırasıyla 42,1 ± 9,9 ve 42,1 ± 9,5 idi. Kadın ve düşük gelirli bakım verenlerin Covid-19 korkusunun daha yüksek olduğu belirlendi. Bekar, gelir düzeyi ve eğitim düzeyi yüksek olan kanser hastalarının iyilik hali daha yüksekti. Bakım verenler içerisinde çalışmayanların iyilik hali daha düşüktü.

Sonuç: Pandemi sürecinde önemi artan, hasta ve bakım verenlere verilen psikososyal destek tıbbi tedaviden ayrı düşünülmemelidir. Özellikle pandeminin olumsuz sonuçlarından daha fazla etkilenen kişilere verilen destek artırılmalıdır.

Anahtar Kelimeler: bakım verenler, COVID-19, hastalar, korku, psikososyal iyilik hali, ruh sağlığı.

The coronavirus disease of 2019 (Covid-19), which has been affecting all aspects of human society, is primarily considered a viral respiratory and vascular disease cause of its causative agent SARS-CoV-2 mainly targets the respiratory and vascular systems (1). Since being declared as a pandemic by the World Health Organisation (WHO), nearly 760 million cases and more than six million deaths confirmed as of March 2023 (2).

While the effects of the outbreak on physical health are the focus of attention around the world, the effects of the outbreak on psychological health shouldn't be ignored. The rapid transmission of Covid-19, the emergence of fatal results and various precautions taken pose a risk in terms of adversely affecting psychosocial health (3). The pandemic might have effect on psychosocial health due to uncertainty, public restrictions, social distance and changes in our daily lives. Previous studies showed that psychological burdens such as distress, anxiety, social isolation and depression increase during the pandemic, also quarantine created psychological burden for those who cannot or are not allowed to participate in social life (4,5).

Patients with cancer are often more susceptible to infections due to malignancy itself, immunosuppressive agents or chemotherapy (6). It's reported that this situation increases the incidence and prevalence of Covid-19 infection in patients with cancer compared to the general population and the presence of comorbidities also increases the risk of Covid-19 complications (7,8). The concerns of cancer patients about the pandemic have increased with the rapid increase in the number of Covid-19 cases (9). In a study conducted at the beginning of the pandemic, it was found that 66% of patients with cancer, 72.8% of caregivers had fear of Covid-19 and caregivers were more fearful than patients about how Covid-19 might affect patients' treatment (10). Fear is a characteristic feature of infectious diseases and is directly related to the rate and environment of transmission, as well as morbidity and mortality. It's stated that individuals cannot think healthily while reacting against Covid-19 with high level of fear (11). In addition, health professionals have redesigned the treatment process to reduce the negative effects of the Covid-19 pandemic on patients undergoing cancer treatment (12). Another circumstance that worried patients is the limitation of social support, which is very important part of the treatment process within the scope of social distance measures (13). This caused anxiety, depression and feelings of loneliness for patients with cancer who pay more attention to social distance compared to the general population even before the pandemic (5,6).

The difficulties experienced by patients with cancer during the pandemic put their well-being at risk (14,15). Psychological well-being is defined as managing responses to existential challenges in life (such as pursuing meaningful goals, and establishing relationships with others) (16). Kelly et al. (17) reported that patients with low well-being reported higher feelings of tension, anxiety, and insecurity. It's known that in order to manage the long-term effect of cancer treatment, well-being of people living with disease should be supported as well as the surveillance and treatment of the disease (18). In a study conducted with the participation of adults living in Türkiye showed that there was negative relationship between the fear of Covid-19 and well-being and an increase in perceptions of the participants about fear of Covid-19 decreased their wellbeing (11).

This study aims;

1) to determine the fear of Covid-19 and wellbeing of patients with cancer and caregivers, and 2) to determine the associated factors with fear of Covid-19 and wellbeing of patients with cancer and caregivers.

MATERIAL AND METHOD

Study Design and Sample

This descriptive study was conducted between January 2021- June 2021 at outpatient chemotherapy units of three university hospitals in Istanbul and Ankara, Türkiye. Third wave of pandemic was occurred in Türkiye when this study was conducted.

Inclusion criteria for patients are being older than 18 years old, diagnosed with cancer, receiving chemotherapy, able to understand Turkish and volunteered to participate. Inclusion criteria for caregivers are being older than 18 years old, being caregivers of patients with cancer receiving chemotherapy, able to understand Turkish and volunteered to participate. There is no mutual dependence between patients and caregivers. The caregivers of the patients whose patients could not participate or didn't agree to participate were able to participate in the study.

Sample size was calculated based on power analyses using the formula at https://sample-size.net/correlation-sample-size/. Given $\alpha = 0.05$, power $(1-\beta) = 0.90$, 95% confidence interval and predicting that there would be a significant correlation ($r=0.30$) between Covid-19 fear and well-being scale scores sample size was calculated as 113. This study was completed with 136 patients with cancer and 142 caregivers.

Measures

Participant Information Form; this was developed by the researchers in the line with the literature (13,19,20). This form consists of 21 questions for patients and 20 questions for caregivers regarding sociodemographic, medical characteristics (age, gender, education level, marital status, patient's cancer type and stage, caregivers' relationship with the patient etc.) and Covid-19 experiences and expectations from health professionals.

Fear of Covid-19 Scale

The Fear of Covid-19 Scale was developed by Ahorsu et al. (21) to determine the psychological impact of the Covid-19 pandemic on people. The scale is a 5-point Likert type and consists of 7 items. The total score from the scale ranges from 7 to 35. An increase in the score of scale means an increase in the fear of Covid-19 pandemic. The scale includes items such as "I am most afraid of coronavirus", "It makes me uncomfortable to think about coronavirus" and "I am afraid of dying due to coronavirus". Turkish validity and reliability of the Fear of Covid-19 Scale was conducted by Satıcı et al. (3) and Cronbach's alpha was found 0.84. In this study, it was found 0.89.

Flourishing Scale

The Flourishing Scale, developed by Diener et al. (22) is a measurement tool that evaluates people's perceptions of well-being. The scale is a 7-point Likert type and consists of 8 items. The total point ranges from 8 to 56 with high scores indicate that participants view themselves positively in important areas of functionality. The scale includes items such as "My social relationships are supportive and rewarding", "I am engaged and interested in my daily activities" and "I am a good person and live a good life". The validity and reliability study of Turkish form of the scale was performed by Fidan and Usta (23) and the Cronbach alpha was found 0.83. In this study, it was found 0.90.

Data Collection

Before the data collection, participants were informed about the study, and written and verbal consent was obtained from participants. Data were collected face-to-face and it lasted average of 15-20 minutes for each participant.

Data Analysis

Nominal and ordinal variables were defined as n and %, and continues variables were defined as mean and standard deviation. Kolmogorov Smirnov test was used to determine the normality distribution of the scale scores. While Fear of Covid-19 Scale score was normally distributed, Flourishing Scale score wasn't normally distributed. Thus, Independent Sample T-Test and One-Way ANOVA were used for comparison of Fear of Covid-19 Scale score with participant characteristics. Mann Whitney U test and Kruskal Wallis Test were used for comparison of Flourishing Scale score with participant characteristics. Spearman's rho correlation analysis was used to determine the relationship between Fear of Covid-19 Scale and Flourishing Scale scores. Multiple regression analysis was performed in order to determine the associated factors with Fear of Covid-19 and well-being scores. In the analyzes, the median value of scales was taken as the cut-off point (Table 3). Evaluation was made in two categories as "0" for values lower than the median value and "1" for higher values. Variables with $p \leq 0.15$ in univariate analyzes were included in the regression analysis (24). SPSS 26 for windows program was used for analyses with 95% confidence interval. $p<0.05$ was accepted as an indicator of statistical significance.

RESULTS

Participant' Characteristics

The mean ages of patients and caregivers were 56.6±12.8 and 46.2 ± 14.6 respectively. Half of the patients and more than half of the caregivers (63.4%) were women. Most of the patients (75.7%) and caregivers (71.1%) were married, and lived with their family (patient: 91.9%; caregivers: 95.8%). The mean diagnosis duration of patients was 20.5 ± 29.2 months. The mean duration of caregiving was 17.2 ± 22.2 months. Characteristics of the participants are shown in Table 1.

Based on the data regarding participants Covid-19 infection experiences, it was found that 7.4% of patients and 4.9% of caregivers were diagnosed with Covid-19 positive. It was found that most of the patients (90.4%) didn't experience any disruption in the treatment caused by the pandemic, and more than half of the patients (61.1%) and caregivers (64.1%) were informed about the pandemic by healthcare professionals (Table 2).

Although not shown in the table, when participants were asked regarding their expectations from healthcare professional during the Covid-19 outbreak, patients indicated that they want to be informed about the process (16.4%) and be complied with the Covid-19 precautions (7.8%). Of the caregivers 14.6% indicated that they want health professionals to take care of them more and 7.8% of them want to comply with the Covid-19 precautions.

Almost half of the patients' stated that they were afraid of being infected during the pandemic and one-third of them stated that they needed to socialize. One-fourth of the caregivers stated that they want the restrictions to be lifted and they were afraid of their relatives getting infected.

Table 1: Characteristics of the participants

Characteristics	Patients (n=136)	Caregivers (n=142)
Age, mean ± sd (range)	56.6±12.8 (21-89)	46.2±14.6 (18-98)
	n (%)	**n (%)**
Gender		
Female	68 (50 %)	90 (63.4%)
Male	68 (50%)	52 (36.6%)
Marital Status		
Single	33 (24.3%)	41 (28.9%)
Married	103 (75.7%)	101 (71.1%)
Income Status		
Income lower than expenses	43 (32.1%)	39 (27.7%)
Income equal to expenses	65 (47%)	75 (52.5%)
Income higher than expenses	28 (20.9%)	28 (19.9%)
Living Place		
City center	86 (63%)	92 (64.8%)
District	47 (34.8%)	44 (31%)
Village	3 (2.2%)	5 (3.5%)
Other	-	1 (0.7%)
Who do you live with?		
Family	125 (91.9%)	136 (95.8%)
Alone	10 (7.4%)	6 (4.2%)
Friends	1 (0.7%)	-
Employment Status		
Employed	26 (19.1%)	59 (41.5%)
Unemployed	42 (30.9%)	49 (34.5%)
Retired	68 (50%)	34 (23.9%)
Educational Status		
Illiterate	1 (0.7%)	3 (2.1%)
Literate	4 (2.9%)	-
Primary education	40 (29.4%)	31 (21.8%)
High school	44 (32.4%)	35 (24.6%)
Undergraduate	43 (31.6%)	57 (40.1%)
Graduate	4 (2.9%)	16 (11.3%)
Having Health Insurance		
Yes	132 (97.1%)	-
No	4 (2.9%)	-
Duration of the disease mean ± sd (months) (range)	20.5±29.2 (1-204)	-
Duration of caregiving mean ± sd (months) (range)	-	17.2±22.2 (1-96)
Having Chronic Disease		
Yes	52 (38.5%)	37 (26.1%)
No	84 (61.5%)	105 (73.9%)
Cancer Type (for caregivers, cancer type of the person they care for)		
Breast Cancer	33 (24.3%)	27 (19%)
Lung Cancer	30 (22.1%)	25 (17.6%)
Gastrointestinal System Cancers	38 (27.9%)	40 (28.2%)
Genitourinary System Cancers	23 (16.9%)	30 (21.1%)
Others	12 (8.8%)	20 (14.1%)
Stage of Cancer		
Stage I	13 (9.5%)	-
Stage II	20 (14.7%)	-
Stage III	30 (22.1%)	-
Stage IV	43 (31.6%)	-
Missing	30 (22.1%)	
The person who caregivers care for		
Spouse	-	46 (32.4%)
Mother or father	-	59 (41.5%)
Sibling	-	15 (10.6%)
Son/ Daughter	-	14 (9.9%)
Other	-	8 (5.6%)
Is there someone helping you in your treatment / your patients' treatment process?		
Yes	127 (93.4%)	96 (67.6%)
No	9 (6.6%)	46 (32.4%)

sd: standard deviation

Relationship Between Fear of Covid-19 and Well-Being

The mean score of Fear of Covid-19 Scale of patients and caregivers were 19.6 ± 6.6, and 20.8 ± 6.9 respectively. The mean score of Flourishing Scale of patients and caregivers were 42.1 ± 9.9 and 42.1 ± 9.5 respectively (Table 3). There was no significant relationship between scales' score both for patients (rs=-0.13; p=0.12), and caregivers (rs=-0.11; p=0.18).

Comparison of Fear of Covid-19 and Well-Being Scores by Participants' Socio-Demographic Characteristics

The Flourishing Scale score of patients was significantly differ by marital status (Z=-3.1; p=0.001), income status (X^2=9.32; p=0.009), employment status (X^2=7.60; p=0.02)

and educational status (X^2=11.87; p=0.03). There was no significant differences in Fear of Covid-19 Scale score by patients' other characteristics (p>0.05). For caregivers, Fear of Covid-19 score was significantly differ by gender (t=2.89; p=0.004) and income status (F=9.32; p=0.02); Flourishing Scale score significantly differ by employment status (X^2=7.11; p=0.02) (Table 4). Also there was significant positive relationship between the Fear of Covid-19 scale mean score and age of patients (r=0.21; p=0.01).

Table 2: Covid-19 infection experiences of the participant

Characteristics	Patients (n=136) n (%)	Caregivers (n=142) n (%)
Being tested positive for Covid-19		
Yes	10 (7.4%)	7 (4.9%)
No	126 (92.6%)	135 (95.1%)
Having family member who tested positive for Covid-19		
Yes	31 (22.8%)	37 (26.2%)
No	105 (77.2%)	104 (73.8%)
Disruption in treatment during the Covid-19 pandemic (for caregivers, disruption in treatment of the person who they care for)		
Yes	13 (9.6%)	9 (6.5%)
No	123 (90.4%)	133 (93.5%)
Being informed by the healthcare professional regarding the Covid-19 pandemic		
Yes	83 (61.1%)	91 (64.1%)
No	53 (38.9%)	51 (35.9%)

Multivariate analysis of patients and caregivers' fear of Covid-19 and well-being

Results of the multiple regression analysis showed that patients who were female (OR: 0.11, p=0.01) and had a disruption in treatment during the pandemic (OR: 0.05, p=0.01) had lower well-being. Caregivers who had high income compared to low income had higher well-being (OR: 3.80, p=0.03) and those caring for a patient with breast cancer (OR: 0.18, p=0.01) compared to lung cancer had lower well-being. In addition, female caregivers had lower fear of Covid-19 compared to males (OR:0.34, p=0.01). Other variables included in the model weren't statistically significant (p>0.05) (Table 5).

DISCUSSION

Covid-19 pandemic has been one of the most important health concerns for all the world. During the Covid-19 pandemic, some patients with cancer were faced with the postponement of treatments in order not to be infected by Covid-19 (19). In our study that was done in later period of the pandemic, 9.6% of patients experienced disruption in their treatment due to the outbreak. At the early periods of the pandemic, in a study conducted by the Cancer Action Network of the American Cancer Society (20), the rate of change, delay or disruption in the treatment of cancer patients was determined as 55%. Similarly, Gultekin et al. (25) found that 32.6% of cancer patients had their treatment or follow-up changed due to the pandemic. The reasons for the low rate of disruption in treatment in our study may be that only 7.5% of the patients were infected with Covid-19 and the time period of the study was done. Another reason can be the resources of the hospitals where this study was conducted. Since the hospitals are the big university hospitals located in big cities in Türkiye, oncology departments were able to serve without any disruption in treatment.

In this study, we found that the fear of Covid-19 of both the patients and caregiver was moderate. Unlike our results, in a study conducted with patients with cancer, caregivers and health care workers in Singapore, patients and caregivers were found extremely fearful about Covid-19. Also caregivers had more fear than patients related to how Covid-19 might affect the patients' cancer treatment (10). Akbarpour et al. (26) used Fear of Covid-19 Scale, same tool as ours, in general Iranian population found that the mean score was 19.70 ± 5.08 which is very close to our findings. We found that caregivers with higher income had lower fear of Covid-19 and female caregivers had almost 3 times less fear of Covid-19 compared to males (1/OR=2.94, OR:0.34, p=0.01). Differently from our results, Karacin et al. (27) determined that female patients with cancer who didn't come to their appointments due to fear of Covid-19 had higher fear. Also, Akbarpour et al (26) found that fear of Covid-19 was higher among female participants. Participants with lower income are more afraid in our study may be associated with increasing unemployment and changing economic conditions in the current pandemic. Differences in fear levels of other studies during the pandemic may be related to different situation that participants have.

Table 3: Distribution of participants' Fear of Covid-19 Scale and Flourishing Scale scores							
		n	Ẋ	±sd	median	min	maks
Patients	Fear of Covid-19 Scale	136	19.6	6.6	20	7	35
	Flourishing Scale	136	42.1	9.9	46	8	56
Caregivers	Fear of Covid-19 Scale	142	20.8	6.9	21	7	35
	Flourishing Scale	142	42.1	9.5	45	8	56
Ẋ: mean, sd: standard deviation							

Table 4: The comparison the participants' Fear of Covid-19 and Flourishing Scale mean scores by participants' characteristics				
Characteristics	Cancer Patients		Caregivers	
	Fear of Covid-19 mean ± sd	Well-Being mean ± sd	Fear of Covid-19 mean ± sd	Well-Being mean ± sd
Gender				
Female	19.7 ± 6.4	43.7 ± 8.8	22.1 ± 7.1	41.8 ± 9.7
Male	19.9 ± 7.4	40.5 ± 10.8	18.7 ± 6.05	42.8 ± 9.1
p	0.89	**0.07**	**0.004**	0.51
t/Z	0.12[a]	-1.75[b]	2.89[a]	-0.65[b]
Marital Status				
Single	18.9 ± 7.8	46.3 ± 6.7	21.4 ± 7.1	42.1 ± 9.3
Married	20.1 ± 6.6	40.7 ± 10.4	19.3 ± 6.01	42.4 ± 9.9
p	0.49	**0.001**	0.10	0.46
t/Z	0.68[a]	-3.1[b]	1.63[a]	-0.73[b]
Income Status				
Income lower than expenses	20.9 ± 7.5	38.8 ± 10.1	22.9 ± 7.3	39.2 ± 11.5
Income equal to expenses	19.9 ± 6.2	42.9 ± 10.2	20.4 ± 6.2	42.8 ± 8.4
Income higher than expenses	17.7 ± 7.1	45.3 ± 7.4	18.5 ± 7.02	44.4 ± 8.2
p	0.16	**0.009**	**0.02**	0.10
F/X²	1.84[c]	9.32[d]	3.68[c]	4.51[d]
Where do you live?/ Living Place				
City center	20.05 ± 7.2	41.5 ± 10.7	20.4 ± 6.6	42.5 ± 8.7
District	19.4 ± 6.8	43.4 ± 8.5	22.2 ± 6.8	42.4 ± 9.2
Village	20.3 ± 1.1	37.3 ± 7.5	16.8 ± 10.8	34 ± 21.1
Other	-	-	17	44
p	0.87	0.35	0.23	0.94
F/X²	0.13[c]	2.08[d]	1.43[c]	0.39[d]
Who do you live with?				
Family	19.5 ± 6.6	41.7 ± 10.2	20.7 ± 6.9	42.05 ± 9.4
Alone	23.1 ± 9.7	46.7 ± 3.7	23.3 ± 6.08	45.5 ± 10.9
Friends	22	52	-	-
P	0.29	0.11	0.37	0.11
F/X²	1.25[c]	4.29[d]	0.79[c]	2.44[d]
Employment Status				
Employed	18.07 ± 7.7	45.03 ± 9.7	19.2 ± 6.6	44.1 ± 7.8
Unemployed	20.02 ± 6.6	43.2 ± 9.6	21.8 ± 7.5	39 ± 11.3
Retired	20.3 ± 6.8	40.3 ± 10.05	22.3 ± 5.9	43.5 ± 8.2
P	0.34	**0.02**	0.05	**0.02**
F/X²	1.06[c]	7.60[d]	2.93[c]	7.11[d]
a=Independet T test *c= One way ANOVA test* *b=Mann Whitney U test* *d=Kruskal Wallis test*				

Table 4 continued

Characteristics	Cancer Patients		Caregivers	
	Fear of Covid-19 mean ± sd	Well-Being mean ± sd	Fear of Covid-19 mean ± sd	Well-Being mean ± sd
Educational Status				
Illiterate	23	32	23 ± 12.2	38 ± 17.3
Literate	19.2 ± 2.3	34.2 ± 10.3	-	-
Primary education	21.5 ± 6.3	39.6 ± 10.1	23.2 ± 7.6	40.7 ± 11.4
High school	20.04 ± 6.7	43.9 ± 8.2	19.4 ± 6.7	41.4 ± 11.2
Undergraduate	18 ±7.8	43.4 ± 11.2	20.2 ± 6.4	42.7 ± 7.3
Graduate	20.5 ± 5.5	44 ± 5.7	20.8 ± 5.7	45.6 ± 5.7
p	0.35	**0.03**	0.21	0.90
F/X²	1.12[c]	11.87[d]	1.46[c]	1.02[d]
Having Health Insurance				
Yes	19.9 ± 7.02	42.3 ± 9.7	-	-
No	16.7 ± 3.8	34.5 ± 16.4	-	-
p	0.37	0.25	-	-
t/Z	0.88[a]	-1.13[b]	-	-
Cancer Type (for caregivers cancer type of the person they care)				
Breast Cancer	19.4 ± 6.4	43.4 ± 9.6	21.2 ± 6.9	42.2 ± 6.07
Lung Cancer	22.5 ± 7.9	38.6 ± 10.6	20.08 ± 7.05	45.4 ± 5.7
Gastrointestinal System Cancers	19.1 ± 6.3	41.5 ± 10.2	21.1 ± 6.3	42.6 ± 8.8
Genitourinary System Cancers	19.6 ± 6.7	43.4 ± 10.4	21 ±7.3	37.7 ± 12.7
Others	16.9 ± 7.08	46.9 ± 2.8	20.5 ± 7.6	43.8 ± 10.9
p	0.13	0.11	0.97	0.12
F/X²	1.80[c]	7.46[d]	0.12[c]	7.29[d]
Stage of Cancer				
Stage I	21.3 ± 8.08	36.3 ± 12.6	-	-
Stage II	20.5 ± 6.2	41.5 ± 11.7	-	-
Stage III	19.5 ± 7.5	40.1 ± 9.4	-	-
Stage IV	18.7 ± 7.7	44.02 ± 10.3	-	-
p	0.66	0.07	-	-
F/X²	0.52[c]	6.86[d]	-	-
The person who caregivers care for				
Spouse	-	-	22.6 ± 6.4	42.5 ± 7.1
Mother or father	-	-	18.1 ± 6.7	41.3 ± 11.2
Sibling	-	-	21.9 ± 7.5	43.8 ± 8.5
Son/Daughter	-	-	21.07 ± 8.7	37.2 ± 15.3
Other	-	-	20.4 ± 6.1	43.7 ± 7.7
p	-	-	0.08	0.83
F/X²	-	-	2.12[c]	1.45[d]
Chronic Disease				
Yes	20.8 ± 5.7	41.9 ± 10.2	22.05 ± 6.7	43.3 ± 9.4
No	19.2 ± 7.6	42.2 ± 9.8	20.4 ± 6.9	41.8 ± 9.5
p	0.11	0.62	0.22	0.24
t/Z	1.59[a]	-0.48[b]	1.21[a]	-1.17[b]

a=Independet T test c= One way ANOVA test b=Mann Whitney U test d=Kruskal Wallis test

Table 4 continued

Characteristics	Cancer Patients		Caregivers	
	Fear of Covid-19 mean ± sd	Well-Being mean ± sd	Fear of Covid-19 mean ± sd	Well-Being mean ± sd
Is there someone helping you in your treatment / your patients' treatment process?				
Yes	19.9 ± 6.9	42.3 ± 9.7	20.3 ± 7.01	42.5 ± 8.4
No	18.3 ± 7.6	38.8 ± 13.02	22.02 ± 6.6	41.4 ± 11.6
p	0.54	0.60	0.18	0.90
t/Z	0.61[a]	-0.51[b]	-1.32[a]	-0.11[b]
The status of being diagnosed as Covid-19 positive				
Yes	19.8 ± 9.7	44.9 ± 5.4	21.8 ± 8.4	39.4 ± 11.8
No	19.8 ± 6.7	41.7 ± 10.1	20.8 ± 6.8	42.2 ± 9.4
p	0.96	0.51	0.72	0.67
t/Z	0.44[a]	-0.65[b]	0.36[a]	-0.41[b]
The status of a family member being diagnosed as Covid-19 positive				
Yes	18.3 ± 5.7	41.1 ± 11.5	22.08 ± 6.08	41.2 ± 9.8
No	20.2 ± 7.2	42.4 ± 9.5	20.5 ± 7.1	42.4 ± 9.4
p	0.20	0.50	0.24	0.57
t/Z	-1.27[a]	-0.66[b]	1.17[a]	-0.56[b]
Disruption in treatment during the Covid-19 pandemic period (for caregivers, disruption in treatment of the person they care for)				
Yes	19.8 ± 7.3	47.6 ± 4.02	17.8 ± 8.7	35.7 ± 11.6
No	19.8 ± 6.9	41.5 ± 10.2	21.1 ± 6.7	42.5 ± 9.3
p	0.91	0.03	0.17	0.05
t/Z	0.10[a]	-2.14[b]	-1.37[a]	-1.92[b]
The status of being informed by the healthcare professional regarding the Covid-19 pandemic process				
Yes	19.7 ± 7.03	43.6 ± 8.06	21.1 ± 6.6	43.05 ± 9.4
No	19.9 ± 6.9	39.3 ± 12.03	20.4 ± 7.2	40.3 ± 9.6
p	0.67	0.11	0.56	0.05
t/Z	-0.42[a]	-1.57[b]	0.57[a]	-1.94[b]

a=Independet T test c= One way ANOVA test b=Mann Whitney U test d=Kruskal Wallis test

Table 5: Result of multiple regression models of patients and caregivers' fear of Covid-19 and well-being

Characteristics	Cancer Patients						Caregivers					
	Fear of Covid-19			Well-Being			Fear of Covid-19			Well-Being		
	OR	CI 95% Lower -Upper	p	OR	CI 95% Lower -Upper	p	OR	CI 95% Lower -Upper	p	OR	CI 95% Lower -Upper	p
Gender												
Male[a] Female	-	-	-	0.11	0.23-0.60	**0.01**	0.34	0.14-0.83	**0.01**			
Marital Status	-	-	-			0.16			0.05	-	-	-
Income Status	-	-	-			0.28			0.26			
Income lower than expenses[a]	-	-	-	-	-	-	-	-	-			
Income equal to expenses	-	-	-	-	-	-	-	-	-	2.27	0.88-5.84	0.08
Income higher than expenses	-	-	-	-	-	-	-	-	-	3.80	1.06-13.53	**0.03**
Employment Status	-	-	-			0.89			0.66			0.43
Educational Status	-	-	-			0.13	-	-	-	-	-	-
Who do you live with?	-	-	-			0.37	-	-	-			0.17
Stage of Cancer						0.39						
Cancer Type						0.07						
Lung Cancer[a]	-	-	-	-	-	-	-	-	-			
Breast Cancer	-	-	-	-	-	-	-	-	-	0.18	0.04-0.74	**0.01**
Gastrointestinal System Cancers	-	-	-	-	-	-	-	-	-	0.51	0.14-1.88	0.31
Genitourinary System Cancers	-	-	-	-	-	-	-	-	-	0.27	0.07-1.05	0.06
Others	-	-	-	-	-	-	-	-	-	0.52	0.12-2.25	0.38
Disruption in treatment during the Covid-19 pandemic												
Yes[a] No	-	-	-	0.05	0.005-0.60	**0.01**	-	-	-			0.09
Being informed by the healthcare professional regarding the Covid-19 pandemic	-	-	-			0.11	-	-	-			0.18
The person who caregivers care for	-	-	-	-	-	-			0.91	-	-	-
Chronic Disease			0.55	-	-	-	-	-	-	-	-	-
Age			0.42	-	-	-	-	-	-	-	-	-
Fear of Covid-19	-	-	-			0.80	-	-	-	-	-	-
Well-Being			0.43	-	-	-	-	-	-	-	-	-

OR: Odss Ratio, a= Reference value
Note: OR and CI 95% Lower -Upper values were given only for the variables were significant in the model.

Patients and caregivers' well-being was found high in this study. In a nationwide survey conducted in China, it was found that the onset of pandemic caused to 74% decline in emotional well-being (28). In another study, different scale used than ours, cancer patients' well-being were in low range (29). In a study conducted among caregivers, 15% of them stated that they noticed a change in their psychological well-being (30). On the other hand, Ripamonti et al. (31) determined that the psychological well-being of patients with cancer is higher than in the general population during the pandemic. The difference between studies' results shows different responses and adaptation to the circumstance by various populations. The reason for the high well-being of patients with cancer, as in our study, maybe because they are used to coping with uncertainty and anxiety with the awareness of having a chronic and fatal disease.

Zomerdijk et al. (32) showed that one in four hematological cancer patients indicated they had lost income as a result of the pandemic and in terms of financial well-being 29% of them stated that their financial worries had been worse compared to before. In this study, it was found that those having a higher income in caregivers had 3.8 times increased well-being compared to those with lower income. Supporting the results of our study, there are couple of studies in which decreased income is associated with low well-being (28,33). Lehto et al. (34) reported that the psychological well-being of patients with prostate cancer who lived with partner and had high level of education was better. Similar to the higher well-being of single patients with cancer in our study, another study found that married individuals experienced larger decline in emotional well-being than unmarried during the pandemic (28). It can be considered as an expected situation for married individuals to have lower well-being than singles, as they may be have more responsibilities due to marriage.

The results of this study shows that there is no significant relationship between patients' and caregivers' fear of Covid-19 and well-being. Differently from our results, in a study comparing patients with cancer and general population in Italy, it was found that mental well-being score was associated with lower fear of Covid-19 (31). Bell et al. (35) showed also that increased Covid-19 stressors were associated with reduced mental well-being. In another study conducted among medically vulnerable patients in Singapore, it was found that Covid-19 generally had moderately low impact on well-being of patients (36). All of studies mentioned above was completed before our study. The difference between our study and other studies' results may be because of dissimilar responses of populations to the pandemic or different periods in which the studies were conducted.

Limitations

This study has some limitations. Majority of our participants were financially secure, high educated and had supportive relatives. Also, their cancer treatment were generally not delayed due to the pandemic. So the result of the study cannot be generalize. On the other hand, the scales used to investigate the fears of Covid-19 and well-being of the participants may also be restrictive in terms of comprehensive evaluation since they are unidimensional. Therefore, further research, using comprehensive scales or a qualitative desing including participants with different socioeconomic, is recommended.

Clinical implications

To our findings, there were patients with cancer and caregivers who stated that they wanted to be informed about the process of ongoing Covid-19 pandemic and be taken care of them more by health professionals. Therefore, psychosocial support given to patients and their caregivers shouldn't be considered separately from medical treatment. In particular, patients and caregivers who may be more affected by negative consequences of the pandemic (such as low income, unemployment) deserves attention and support of healthcare professionals. Besides, maintaining the well-being of patients with cancer and caregivers, who have chronic course and long treatment process, is very considerable for the effectiveness of treatment. The results of the study can help healthcare professionals better understand the fears and needs of cancer patients and caregivers and plan their care accordingly, especially during this health crisis.

CONCLUSION

In this study, we found that the fear of Covid-19 of the participants were moderate, their well-being levels were high, and there was no significant relationship between the two conditions. While age was a significant variable for fear of Covid-19 in patients with cancer, it was determined that married, low-income, retired and low-educational patients had lower well-being. Evaluating the caregivers, it was found that women and those with low income levels had a higher fear of Covid-19 and those who did not work had a lower well-being.

Consequently, during the Covid-19 pandemic, the importance of psychosocial support to patients with cancer and caregivers has increased in order to increase their well-being and to cope with their fears about the pandemic. We recommend further studies focusing on the long-term effect of the pandemic on patients with cancer and caregivers. On the other hand, action plans should be prepared by healthcare professionals for similar situations in the future, covering the needs of patients and caregivers, and preventing problems such as delays in treatment and care. Importance should be requried on making these plans to include people of various socioeconomic and educational levels.

Declarations

Conflict of Interest

The authors declare no conflicts of interest, financial or otherwise.

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Availability of Data

Available upon request.

Ethics approval

This study was approved by Ethics Committee of the Koc University, Istanbul, Türkiye (Approval No. 2020. 450. IRB 3.177).

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Determination of Digital Addiction and Digital Detox Awareness in Nursing Students

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ABSTRACT

Aim: This study aims to determine the level of digital addiction, associated factors, and digital detox awareness of nursing students.

Methods: The study population of the descriptive-correlational type research consisted of students studying in the nursing department of a state university. The study data were collected online, between April 28th and May 20th, 2021. "Personal Information Form" and "Digital Addiction Scale" were used for data collection. Research data were evaluated by numbers, percentiles, multiple regression, and logistic regression analysis.

Results: Of the students, 64.5% was female, 27.5% was sophomore, and 72% was active social media users. Students' Internet usage time was 4.4±2.3 hours/day and social media usage time was 2.1±1.5 hours/day. It was found that 50.7% of the students did not know the concept of digital detox, and after this concept was explained, 50.9% did not want to perform digital detox in the next 6 months. The digital dependence of the students was determined as intermediate level (2.6±1.0). A maternal education level of secondary school and below, high income level, and poor academic achievement were found to be the predictors of digital addiction score, and not being a senior student, a paternal education level of high school and below, and not being aware of the concept of digital detox were found to be the risk factors for not being ready for a digital detox.

Conclusion: Nursing students were found to have a moderate level of addiction according to their digital addiction score. The most remarkable finding for the concept of digital detox is that about half of students do not aware of this concept. Therefore, it seems that their awareness of an important measure of self-control in combating addiction is low.

Keywords: Adiction, nursing students, digital addiction, digital detox.

Hemşirelik Öğrencilerinde Dijital Bağımlılık ve Dijital Detoks Farkındalığının Belirlenmesi

ÖZET

Amaç: Bu çalışma hemşirelik öğrencilerinin dijital bağımlılık düzeyi, ilişkili faktörler ve dijital detoks farkındalığının belirlenmesi amacıyla gerçekleştirilmiştir.

Gereç ve Yöntem: Tanımlayıcı-ilişkisel olarak tasarlanan araştırmanın evrenini, bir devlet üniversitesinin hemşirelik bölümünde öğrenim gören öğrenciler oluşturmuştur. Araştırmanın verileri 28 Nisan-20 Mayıs 2021 tarihleri arasında çevrimiçi olarak toplanmıştır. Veri toplama aracı olarak "Kişisel Bilgi Formu" ve "Dijital Bağımlılık Ölçeği" kullanılmıştır. Araştırma verileri sayı, yüzde, çoklu regresyon ve lojistik regresyon analizi ile değerlendirilmiştir.

Bulgular: Öğrencilerin %64.5'inin kadın, %27.5'inin 2. sınıfta öğrenim gördüğü ve %72'sinin aktif sosyal medya kullanıcısı olduğu belirlenmiştir. Öğrencilerin internet kullanım süresi 4.4±2.3 saat/gün ve sosyal medya kullanım süresi 2.1±1.5 saat/gündür. Öğrencilerin %50.7'sinin dijital detoks kavramını bilmediği ve bu kavram açıklandıktan sonra %50.9'unun gelecek 6 ay içinde dijital detoks yapmak istemediği bulunmuştur. Öğrencilerin dijital bağımlılığı orta düzey (2.6±1.0) olarak belirlenmiştir. Anne eğitiminin ortaokul ve altında olması, yüksek gelir düzeyi, kötü akademik başarı dijital bağımlılık puanının belirleyicisi ve son sınıf olmama, baba eğitiminin lise ve altında olması, dijital detoks kavramını duymama ise dijital detoksa hazır olmama için risk faktörü olarak saptanmıştır.

Sonuç: Hemşirelik öğrencilerinin dijital bağımlılık puanlarına göre orta düzeyde bağımlılığa sahip oldukları belirlendi. Dijital detoks kavramına ilişkin en dikkat çekici bulgu ise öğrencilerin yaklaşık yarısının bu kavramdan haberdar olmamasıdır. Dolayısıyla bağımlılıkla mücadelede öz kontrolün önemli bir ölçüsü olduğuna ilişkin farkındalıklarının düşük olduğu görülmektedir.

Anahtar Kelimeler: Bağımlılık, hemşirelik öğrencileri, dijital bağımlılık, dijital detoks.

Many changes have occurred in human life with the advances in technology, widespread Internet access, and the ease and dissemination of access to digital tools (1,2). Although technological developments, digital tools, and the Internet becomes indispensable in our lives over time, wrong and incorrect usage has led to addictions, such as smartphone, computer, and Internet addictions (3,4).

Digital addictions are based on human-machine interaction and are also divided into subcategories depending on the addiction to tools such as phones, tablets, computers, or different platforms such as the Internet, social media, Facebook (5). These addictions were referred as Internet addiction in the years 1990-2000, when Internet usage became popular, but with the widespread use of social networking and social media in the following years in line with the advances in the technology, addictions such as phone, Internet, social media, and social networking addictions were defined and grouped under the heading "digital addictions" (5).

Various causes such as Individuals' desire to prove themselves, the fear of missing out, the desire to seek attention and affection in digital environments, various psychiatric disorders, depression, age, loneliness, violence, neglect, and abuse lead to digital addiction (6,7). In addition, the search for identity, hormonal changes, the desire to avoid existing problems are also among the causes of digital addiction in adolescents (8). Digital addiction brings many adverse situations, especially difficulty in concentration, loss of time management, decrease in productivity, loss of productivity, reduced academic achievement, deterioration in social relationships, deterioration in sleep pattern, and changes in sleep duration (9,10).

Different methods such as drug therapy, cognitive-behavioral therapies, support groups, and family therapy are used in the treatment of digital addiction (4,11). In order to prevent digital addiction, it is recommended to restrict the time spent with digital tools and social networks, to raise awareness of their use instead of completely removing the Internet and technological devices from our lives, and to make their proper and purposeful use a way of life (12).

Since digital addiction is rapidly becoming widespread today, it has been reported that users are trying to prevent digital addiction, control their Internet use, and minimize time spent in digital tools. This awareness, called 'digital detox', has emerged with practices to prevent digital addiction (13). Detox is used in the sense of purification, and digital detox is used in the sense of purification from digital environments (14). Digital detox, considered an international concept, is an approach focused on living without media and screens, which has been discussed for the last 10 years due to technological advances and the increase in digital addictions (15). In line with the increase in the use of technological devices, decrease in the age of their use, and increase in digital addictions, awareness of users started to increase, they started to control their usage, and the concept of digital detox has become more common thanks to the approaches towards awareness, such as news, TV shows, blogs, and web sites about digital addiction. Practices such as digital detox resorts, weekends without Internet, dining tables without Internet connection have started in countries such as Australia, the UK, and the US (14,15).

It is known that the negative effects of digital addiction are reduced, and communication processes with family, friends and close circles are improved with digital detox practices (16). Albayrak (2020) reports an increase in productivity and effectiveness in participants after a week of digital detox, an increase in family communication and positive awareness (17). Uluçay and Kobak (2020) report that during the digital detox process, participants had the opportunity to spend time with their families, participants realized that they do not devote enough time to their families due to the Internet and technological tools, and after digital detox, participants expressed that they feel liberated (13).

Nurses, who have a significant role in the provision of health service worldwide, are in an important place in the fight against addiction, protection, early diagnosis, treatment, and rehabilitation stages. Knowledgeable and experienced nurses with high awareness of addiction can take an active role in setting an example for society, preventing addiction, identifying risk groups, early diagnosis, treatment, and counseling, and perform important tasks in protecting community health (18). In addition, establishing self-control in the fight against addiction and for individual health, outside the professional roles of nurses, is also extremely important for individual, family, and community health (19).

Aim

In light of all this information, it is understood that digital addiction is a major problem affecting individuals and

society. It is very important to find the causes of digital addiction, to identify them at an early stage, to create solutions for addiction, and to conduct research on the appropriate use of technological tools. Nurses are expected to be role models to society through their health behavior and practices. In addition, it should be determined whether digital detox is adopted as a solution. Within the scope of this information, this study was conducted to determine the level of digital addiction, related factors, and digital detox awareness of nursing students and to contribute to the literature.

MATERIALS AND METHOD

Research Design and Purpose

This descriptive-correlational research was planned to determine the level of digital addiction, associated factors, and digital detox awareness of students studying in the nursing department of a state university.

Research Place, Population and Sampling

The research was conducted at the Faculty of Health Sciences of a state university. The study population is composed of students studying in the nursing department of the Faculty of Health Sciences. There are 411 students studying at the dates of the research. The study was carried random sampling method. Within the scope of the study, 91.2% (375 students) of the desired population was reached. Multiple regression and logistic regression analyses were used in the analysis of the study. Logistic regression analysis requires 20-60 data for each independent variable, and 10-20 data for multiple regression (20). It seems that the sample size is sufficient for these analyses. The research was not planned within the scope of any course.

Data Collection Instruments

The data were collected using the Personal Information Form, which also measures digital detox (13-15), and the Digital Addiction Scale.

Personal Information Form: In this form, which was created by the researchers by scanning the literature, created to determine the socio-demographic characteristics of students, awareness and thoughts about digital detox, there are 32 items about age, gender, year in school, place of residence, use of social media, awareness about the concept of digital detox, readiness for a digital detox, buying books and receiving counseling about digital detox, etc.

Digital Addiction Scale (DAS): DAS was developed by Kesici and Tunç in 2018 in the Turkish language to determine digital addiction in individuals. DAS is a Likert-type scale and consists of 19 items, without any reverse-coded items (5:strongly agree, 4:agree, 3:neutral, 2:disagree, 1:strongly disagree), and there are no inverse substances on the scale. The score obtained from the scale is divided by the number of items, resulting in a score between 1.00 and 5.00. A high score indicates a higher digital addiction. Cronbach's alpha value of the scale was calculated as 0.87, and test-retest reliability as 0.77 ($p<0.001$), and reported to be a valid and reliable measurement tool for measuring digital addiction. In this study, the Cronbach's alpha value of the scale was calculated as 0.89 (21).

Data Collection

The data were collected online, on a voluntary basis, between April 28th and May 20th, 2021. Research questions were shared with WhatsApp groups as links, and the students were reminded to participate at various times. The response time of the questionnaires was approximately 5-10 minutes.

Dependent and Independent Variables of the Study

The independent variables of the research are the socio-demographic characteristics of the students and their awareness of digital detox. The dependent variable of research is the digital addiction of the students. In addition, digital detox behavior was considered a dependent variable when evaluating negative digital detox behavior.

Data Analysis

The study data were analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0 package program. Descriptive data were evaluated by numbers and percentiles. The normal distribution of the scale was evaluated by the Kolmogorov-Smirnov test. The determinants of the Digital Addiction Scale were evaluated by determinative multiple regression analysis (enter model). Categorical variables included in the model were converted to dummy variables and the variables encoded as one (1) are shown in Table 4. Risk factors for not being ready for digital detox were evaluated by logistic regression analysis.

Ethical Aspect of the Study

Before starting the study, approval of the ethics committee (E-18457941-050.99-10532) was obtained from the Artvin Coruh University Ethics Committee. During the research, participants were informed about the research, and voluntary participants were included in the research. This study was carried out in accordance with the principles of the Declaration of Helsinki.

RESULTS

Of the students included in the study, 64.5% was female, 27.5% was 2nd grade, and 69.3%'s mother's education level was primary school. Of the students, 70.9% perceives their academic achievement as "moderate (Table-1).

Table 1: Socio-Demographical Characteristics of Students

Features (M ± SD)		
Average age: 21.3±2.0		
Internet usage time: 4.4±2.3 hours/day		
Social media usage time: 2.1±1.5 hours/day		
Features	**n**	**%**
Gender		
Female	242	64.5
Male	133	35.5
Class		
1st class	97	25.9
2nd class	103	27.5
3rd class	79	21.1
4th class	96	25.6
Mother education status		
Primary school graduate	260	69.3
Secondary school graduate	56	14.9
High school graduate and above	59	15.7
Father's education		
Primary school graduate	201	53.6
Secondary school graduate	71	18.9
High school graduate	65	17.3
University graduate	38	10.1
Place of residence		
Province	201	53.6
District	124	33.1
Village	50	13.3
Income status		
Income less than expenses	138	36.8
Income equal to expenses	175	46.7
Income more than expenses	62	16.5
Perceived academic success		
Good	81	21.6
Middle	266	70.9
Low	28	7.5
Personal tablet/computer presence		
There is	173	46.1
No	202	53.9
M: Mean, SD: Standart Deviation		

It was found that 72% of the students use social media actively, 49.3% sleeps late due to the use of electronic devices, and 30.9% considers social media as an integral part of living space. Of the students, 19.5% uses social media as an area of expression, and 78.1% use the Internet in cases of boredom. Of the students, 68.3% was trying to reduce Internet usage time, and 31.7% of the students watches movies on the Internet, and 20.8% uses the Internet for educational purposes (Table-2).

Table 2: Technological Device and Internet Usage Characteristics of Students

Features	n	%
Social media account use		
Yes	341	90.9
No	34	9.1
Active use of social media		
Yes	270	72.0
No	105	28.0
Sleeping late due to electronic device use		
Yes	185	49.3
No	190	50.7
Seeing social media as an integral living space		
Yes	116	30.9
No	259	69.1
Using social media as a place to express the features that it has to hide in daily life		
Yes	73	19.5
No	302	80.5
Disruption in daily life due to internet use		
Yes	111	29.6
No	264	70.4
Always wondering what's going on on the internet		
Yes	185	49.3
No	190	50.7
The desire to connect to the Internet in cases of boredom		
Yes	293	78.1
No	82	21.9
Efforts to reduce internet usage time		
Yes	256	68.3
No	119	31.7
Internet usage purpose		
Watching movies	119	31.7
Education	78	20.8
Opinion sharing on twitter	72	19.2
Photo sharing on ınstagram	43	11.5
Listen to music	24	6.4
News reading	14	3.7
Playing games	9	2.4
Other	16	4.3

Students' awareness of the concept of digital detox and their thoughts about digital detox are presented in Table 3. It was found that 50.7% of the students did not know the concept of digital detox, 13.9% wanted advice on the digital detox, and 12.3% wanted to buy books on the digital detox. After reading the definition of digital detox, it was found that 50.9% of the students had never considered digital detox, and 6.9% had done digital detox for more than six months. Learning media literacy/digital literacy is the least used method to reduce the time spent in digital media (Table-3).

Table 3: Students' Digital Detox Concept Awareness and Thoughts

Features	n	%
Knowing the concept of digital detox		
Yes	185	49.3
No	190	50.7
Readiness level		
Not doing a digital detox and not thinking about doing it in six months	191	50.9
Not doing a digital detox and thinking about doing it in six months	68	18.1
Desire to do a digital detox, even if sporadically, or to do a digital detox within the next 30 days	80	21.3
Digital detox doing for less than six months	10	2.7
Digital detox doing for more than six months	26	6.9
Request for counseling on digital detox		
Yes	52	13.9
No	323	86.1
Request to buy a book on digital detox		
Yes	46	12.3
No	329	87.7
Identifying a person who will motivate digital detox		
Yes	155	41.3
No	220	58.7
Ability to create a technological tool usage chart		
Yes	146	38.9
No	229	61.1
Efforts to reduce digital tool usage time		
Yes	269	71.7
No	106	28.3
Actions to reduce digital time*		
Leaving the phone/not picking up the phone	267	71.2
Deleting apps	176	46.9
Trying to reduce internet connection time	102	27.2
Mute notifications	62	16.5
Hang up	34	9.1
Learning media literacy/digital literacy	20	5.3
**: Multiple options*		

The average DAS score of the students was 2.6±1.0. Determinants of DAS were evaluated by multiple regression analysis. A maternal education level of secondary school and below (β=0.09), high income level (β=0.12), poor academic achievement (β=0.36), seeing social media as an integral part of living space (β=0.34), using social media as an area for expression of personality traits that are hidden in everyday life (β=0.23), and a desire to connect to the Internet in cases of boredom (β=0.22) increases the digital addiction score. These variables explain 54% of the digital addiction scale. Especially poor academic achievement increases the scale score by 1.4 points, and seeing social media as an integral habitat increases the scale score by 0.7 points (Table-4).

Risk factors for not being ready for digital detox were evaluated by logistic regression analysis. Being in the first 3 years of school increases the risk 2.9 times, having a paternal education level of high school and below increases 9.6 times, seeing social media as an integral part of living space increases 3.4 times, and not being aware of the concept of digital detox increases the risk 1.8 times. Active use of social media and the use of social media as an area to express the personality traits that are hidden in everyday life are variables that support digital detox readiness (Table-5).

DISCUSSION

This research was conducted to assess nursing students' levels of digital addiction, associated factors, and their awareness of digital detox. Nursing students were found to have a moderate level of addiction according to their digital addiction score. Looking at the literature on digital addiction in university students, Aktan (2018) reports that students have lower addiction, Aslan (2020) reports that students have moderate level of addiction, Neverkovich et al. (2018) report that students have moderate addiction and prone to high-level addiction, and Balcı and Günar (2009) report that 84.9% of the students has a risky level and 23.2% has an addiction level of Internet use (8,22,23).

Table 4: Multiple Regression Results for Digital Addiction Scale Determinants					
Determinants	**B**	**SE**	**Beta**	**T test**	**p-value**
Gender (Male)	0,089	0,076	0,043	1,169	0,243
Grade (Last Grade)	0,139	0,085	0,061	1,633	0,103
Mother education (Middle School and below)	0,253	0,107	0,092	2,359	0,019
Father education (High school and below)	0,051	0,136	0,015	0,375	0,708
Income status (High)	0,308	0,102	0,115	3,016	0,003
Academic Achievement (Bad)	1,367	0,144	0,361	9,495	<0.001
Active use of social media (Yes)	0,084	0,090	0,038	0,938	0,349
Seeing social media as an integral living space (Yes)	0,725	0,093	0,336	7,781	<0.001
Using social media as a place to show the features that he/she has to hide in daily life (Yes)	0,567	0,105	0,226	5,398	<0.001
Request to connect to the internet in case of boredom (Yes)	0,538	0,094	0,223	5,695	<0.001
Not hearing the concept of digital detox	-0,072	0,084	-0,036	-0,862	0,389
	R=0.778	R^2=0.544	F=39.439	p<0.001	
Adjusted R^2 = 29.2% The significance level was accepted as p < 0.05.					

Table 5. Logistic Regression Results for Risk Factors for Not Ready for Digital Detox						
Determinants	**B**	**SE**	**Wald**	**OR**	**(95%CI)**	**p-value**
Gender (Male)	0,128	0,277	0,215	1,137	0,661-1,955	0,643
Class (Not being a last student)	1,059	0,284	13,924	2,884	1,654-5,032	<0.001
Mother education (Middle School and below)	-0,409	0,407	1,010	0,664	0,299-1,475	0,315
Father education (High school and below)	2,264	0,574	15,564	9,624	3,125-29,639	<0.001
Income status (High)	-0,291	0,391	0,554	0,748	0,348-1,608	0,457
Academic Achievement (Bad)	-0,671	0,545	1,515	0,511	0,176-1,488	0,218
Active use of social media (Yes)	-1,248	0,319	15,323	0,287	0,154-0,536	<0.001
Seeing social media as an integral living space (Yes)	1,219	0,364	11,210	3,383	1,657-6,904	0,001
Using social media as a place to show the features that he/she has to hide in daily life (Yes)	-2,676	0,436	37,713	0,069	0,029-0,162	<0.001
Request to connect to the internet in case of boredom (Yes)	0,473	0,344	1,889	1,605	0,818-3,150	0,169
Not hearing the concept of digital detox	0,585	0,288	4,133	1,796	1,021-3,157	0,042
	R=0.778	R^2=0.544	F=39.439	p<0.001		
Adjusted R^2 = 29.2% The significance level was accepted as p < 0.05.						

Socio-demographic characteristics such as gender, year in school, and paternal education were not found to be important determinants for digital addiction in the study. Looking at the literature on the subject, it was found that male students at different levels of education had higher levels of digital addiction than female students (3,12,24). Digital addiction in male students is believed to be higher than that of female students due to the reasons such as meeting with digital tools and the Internet earlier than female students, watching matches such as football, basketball more than female students online, going to Internet cafes more often due to PlayStation games, etc. However, due to the COVID-19 pandemic, the difference caused by socio-demographic predictors such as age, and gender may have disappeared, as students use the Internet and technological tools more, both in terms of education and due to social isolation.

Maternal education at a level of primary or secondary school is an important determinant for digital addiction (Table-4). Although Arslan (2019) and Göldağ (2018) define high-level maternal education as a risk factor for digital addiction, mothers with better education can be much more advantageous in terms of recognizing the digital environment, being aware of dangers and threats, and managing this process (3,25). The difference in study results is believed to be due to the difference in study populations and socio-economic situations.

In the study, poor academic achievement was found to be an important risk factor for digital addiction (Table-4). Looking at the literature on the subject, Eryılmaz and Çukurlu (2018) report that high school students who were awarded achievement certificates (honor, appreciation, etc. certificate) had a significantly lower digital addiction compared to students who had low-level academic achievement and were not awarded such certificates, Mishra et al. (2014) report that there is an inverse relationship between Internet addiction and academic achievement, with a decrease in academic achievement as Internet addiction increases (12,26). It may be possible that academically successful students have lower digital addiction due to their higher interest in courses, and lower and limited time spent with digital tools.

The study found that seeing social media as an integral habitat and using it as an area of expression for the personal characteristics hidden in everyday life is a risk factor for digital addiction (Table-4). Today, many social media platforms such as Facebook, Instagram, Twitter, and LinkedIn have entered our lives in line with the rapid development in technology and digital tools, and have become a big part of our lives with the spread of Internet access and the ease of access to digital tools. Although social media and the Internet make our lives easier, excessive and improper use has also led to undesirable problems such as social media addiction (27). Looking at the literature on the subject, Çiftçi (2018) and Aktan (2018) report that social media addiction increases as daily Internet usage time increases in university students (22,27). It is believed that students' digital addiction is high due to constant curiosity about what is happening on the Internet, checking social media accounts, and active social media use. It is believed that students who cannot express themselves comfortably in daily life have a high digital dependence since they find a space to express themselves comfortably through different social media platforms. Digital addiction is believed to be high in students who see social media as an integral part of life for different reasons such as comfortable self-expression, getting information about their environment and the world, and learning new information.

In the study, the desire to connect to the Internet in case of boredom was found to be a risk factor for digital addiction (Table-4). Peper and Harvey (2018) report significantly higher rates of phone use, loneliness, depression, and anxiety in students exhibiting digital addictive behaviors (28). Li et al. (2015) report that boredom and depression are the cause of more Internet use in university students, and that Internet use time is greater in students who are not engaged in face-to-face social activities (29). Resorting to digital tools in case of boredom or any adverse situation in daily life, instead of solving the problem, and increasing the use of the Internet are believed to be higher digital addiction in students.

Implications for Nursing

The most remarkable finding for the concept of digital detox is that about half of students do not aware of this concept (Table-3). Therefore, it seems that their awareness of an important measure of self-control in combating addiction is low. Being in the first 3 years of school, having a paternal education level of high school and below, seeing social media as an integral part of living space, and not being aware of the concept of digital detox were found to be the risk factors for not being ready for the digital detox, and the active use of social media, and using social media as an expression area for the hidden personal traits in everyday life were found to be the variables that support readiness for the digital detox (Table-5). Gaafar (2021) reports in his study with tourists in Egypt that there is a positive and strong relationship between age, education, and awareness of excessive use of computer technologies, and motivation to participate in digital detox (30). Efimova and Semenov (2020) report higher readiness for digital detox among young people who want to quit social media permanently (31). It is believed that the lower level of parental education and insufficient knowledge about the use of digital tools lead to insufficient knowledge about digital detox and a lower level of readiness for the digital detox. Reasons such as graduation, job anxiety, etc. in senior students are believed to cause less interest in digital tools and less time spent on digital platforms, and these reasons are supportive for being ready for the digital detox. It is believed that students who see social media as an integral part of life have a high level of digital addiction and therefore are not ready for a digital detox. It is believed that students who are aware of the concept of a digital detox conduct research on the subject, and are ready for digital detox since they have knowledge in this regard.

It is important that these research findings show that even an awareness of this concept can increase readiness for digital detox. Since there are a very limited number of studies that examine the subjects such as digital detox, readiness for digital detox, the effect of the level of knowledge for a digital detox on the use of technological tools, etc., different studies on different study populations and samples are required to investigate the subject in depth.

In the study, it was found that the most common reason for students to use the Internet was watching movies, studying, sharing opinions on Twitter, sharing photos on Instagram, and listening to music. The study found that students most often resort to methods such as leaving the phone/not picking up the phone, deleting applications to reduce digital tool usage time, while resorting to learning media literacy/digital literacy was found to be the least used method. Considering the literature on the reasons for Internet use of university students, Aslan and Yazıcı (2016) report that the most common reasons for Internet use were chat, social sharing, information research, and reading news, Durmuş et al. (2018) report that the most common reasons were following social media, watching videos, and navigating aimlessly (32,33). It is believed that the difference between the reasons for students' use of the Internet stems from the difference in their interests and goals. Considering the practices made to reduce the students' time spent with digital tools, lower level of media literacy/digital literacy on the basis of awareness, critical approach, and conscious use is believed to be associated with the low level of knowledge and awareness of the students in this regard. Nurse students should be informed about digital addiction, individual practices that can be done to protect from digital addiction, and social practices that can be done to protect from digital addiction. In addition, in today's conditions, where technology has become an integral part of life, a course on digital addiction can be added to the course curriculum for nursing students, who will form an important part of the future profession presentation.

Limitations of the Study

Although the research contributes to the literature, there are some limitations. First, this study was conducted only with nursing students, and second, the study was conducted online. Since the research was conducted online, students who were not included in the student WhatsApp groups may not have access to the data collection tools. In addition, since there is no measurement tool that evaluates the concept of digital detox, the results were examined within the scope of the questionnaire created by the researchers, the Digital Addiction Scale and categorical variables. Research results can only be generalized to the study population.

CONCLUSION

In this study, which was conducted to determine the level of digital addiction of nursing students, related factors, and awareness of digital detox, it was found that the students have moderate level digital addiction, and that half of students do not know the concept of digital detox. In the study, lower level of maternal education, high income level, and low academic achievement were found to be risk factors for digital addiction, and being senior student, paternal education level of high school and below, considering social media as an indispensable part of living space, and not being aware of the concept of digital detox were identified as a risk factor for not being ready for the digital detox.

The results obtained in the research support and contribute to the existing literature. In order to prevent digital addiction and increase students' awareness of digital detox, it is recommended to add digital addiction and digital detox topics to course curricula, to organize symposiums and events as part of the fight against digital addictions, and to raise awareness of digital detox through posters, interviews, written materials, and visual activities, etc. A digital detox can help in the protection of health and treatment of technological addiction due to problematic and excessive use of technological tools, the Internet, and digital addiction. For future research, it is recommended to study the concept of digital detox and digital addiction in different samples and age groups and to plan qualitative and quantitative studies for a digital detox and digital detox readiness.

DECLARATIONS

Ethical Aspect of the Study

Before starting the study, approval of the ethics committee (E-18457941-050.99-10532) was ob-tained from the Artvin Coruh University Ethics Committee. During the research, participants were informed about the research, and voluntary participants were included in the research. This study was carried out in accordance with the principles of the Declaration of Helsinki.

Authorship Statement

We confirm that all the aforementioned authors meet the criteria of authors-hip and all authors agree with the content of the manuscript.

Conflicts of Interest
None.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Experiences of Surgical Intensive Care Nurses on Delirium: A Phenomenological Study

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ABSTRACT

Purpose: The study aims to reveal the perceptions and care practices of nurses working in surgical intensive care units towards delirium in more depth.

Methods: The study is qualitative research with a phenomenological design. Twenty nurses working in the surgical intensive care units of a university hospital and giving care to patients diagnosed with delirium before were included in the study. The data of the research were obtained by interview method, one of the qualitative data collection methods. The obtained qualitative data were analyzed by content analysis method.

Results: The methods used by nurses in the diagnosis of delirium were divided into two main themes subjective and objective. Nurses' care interventions were divided into six themes: providing and maintaining a safe environment, communication, eating and drinking, mobilization, sleeping, and dependent interventions/others. In addition, the difficulties experienced by nurses are divided into three themes: patient-related difficulties, systemic difficulties, and individual difficulties.

Conclusion: It is noteworthy that in this study, nurses did not specify some evidence-based interventions related to delirium care. In addition, it was determined in the study that nurses had some difficulties while giving care.

Keywords: Delirium, Nursing, Patients, Care Management, Critical Care

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Cerrahi Yoğun Bakım Hemşirelerinin Deliryuma İlişkin Deneyimleri: Fenomenolojik Bir Çalışma

ÖZET

Amaç: Bu çalışma, cerrahi yoğun bakım ünitelerinde çalışan hemşirelerin deliryuma yönelik algılarını ve bakım uygulamalarını daha derinlemesine ortaya çıkarmayı amaçlamaktadır.

Yöntem: Araştırma fenomenolojik desende nitel bir araştırmadır. Çalışmaya bir üniversite hastanesinin cerrahi yoğun bakım ünitelerinde çalışan ve daha önce deliryum tanısı almış hastalara bakım veren 20 hemşire dahil edildi. Araştırmanın verileri, nitel veri toplama yöntemlerinden biri olan görüşme yöntemi ile elde edilmiştir. Elde edilen nitel veriler içerik analizi yöntemiyle analiz edilmiştir.

Bulgular: Çalışmada hemşirelerin deliryumun tanılamada kullandığı yöntemler subjektif ve objektif olmak üzere iki ana temaya ayrılmıştır. Hemşirelerin deliryumu olan hastaya bakım verirken uyguladığı girişimler ise güvenli çevrenin sağlanması ve sürdürülmesi, iletişim, beslenme, hareket, uyku ve bağımlı girişimler/diğer olmak üzere altı temaya ayrılmıştır. Ayrıca hemşirelerin deliryumu olan hastaya bakım verirken yaşadıkları güçlükler hastaya bağlı, sistemsel ve bireysel güçlükler olmak üzere üç temaya ayrılmıştır.

Sonuç: Bu çalışmada hemşirelerin deliryum bakımı ile ilgili bazı kanıta dayalı girişimleri belirtmemesi dikkat çekicidir. Ayrıca çalışmada hemşirelerin bakım verirken bazı zorluklar yaşadıkları belirlenmiştir.

Anahtar Kelimeler: Deliryum, Hemşirelik, Hastalar, Bakım Yönetimi, Yoğun Bakım

Delirium, a syndrome characterized by acute changes in attention, awareness, and cognition, is a very common condition in intensive care units (ICUs). Delirium affects up to 80% of critically ill patients and negatively influences patient outcomes (1). There are a wide variety of risk factors for delirium that cause the clinical picture of patients to change significantly. Being critically ill patients and undergoing surgery are among the most important risk factors (2). In the literature, it has been reported that the incidence of delirium after surgery varies between 5-52% depending on the surgical procedures (3, 4).

Many studies show that post-operative delirium increases the length of hospital stay, care costs, long-term cognitive impairment, dementia, and mortality risk (2, 5–7). For these reasons, it is very important to diagnose delirium in the early period and plan effective treatment and care by taking precautions against the factors causing delirium without delay (8, 9).

As delirium has significant negative sequelae, the ICU teams should have a strong and consistent focus on its prevention, early recognition, and management (10). For effective delirium management, the intensive care team must have a common understanding and be in constant communication (11). Nurses who are primarily responsible for patient care in the intensive care team have great responsibilities. Nursing care is crucial in the prevention and treatment of delirium. The nurses' approach to the patient with delirium is essential for the quality of care provided to the patient (12,13,14). With the delirium prevention campaign, hospital mortality can be reduced (13). Ogawa and colleagues (2019) evaluated the quality of care before and after implementing a systematic delirium prevention program in hospitalized cancer patients. In this study, a decrease in the frequency of adverse events such as falls, a reduction in benzodiazepine prescriptions, and a shorter length of hospital stay were observed in patients. Additionally, an increase in the level of independence in performing daily life activities was reported when patients were discharged (14). Based on these findings in the literature, it can be said that enhancing nurses' knowledge and skills in delirium management is highly valuable in improving the quality of care and patient outcomes. While there are quantitative studies in the literature assessing nurses' knowledge levels, awareness, and practices related to delirium, qualitative studies on this topic are quite limited (15). Ths study aimed to reveal more deeply how nurses working in surgical ICU define delirium, their care practices for delirium, and the difficulties they experience in these practices.

Methods

Design of the study

The research was conducted as a phenomenological approach, one of the qualitative research methods to reveal the views of surgical intensive care nurses about delirium, their care practices, and the difficulties they experienced in more depth. The study complies with the guidelines of the Standards for Reporting Qualitative Research (SRQR).

Recruitment and sampling

A total of 57 nurses were working in the neurosurgery, cardiovascular surgery, and general surgery ICU of the university hospital where the research was conducted. The criterion sampling method, one of the purposeful sampling techniques, was used in the research. Nurses who work in the surgical ICUs of a university hospital, care for patients with delirium, and have at least five years of experience were included in the study. 36 nurses met the research criteria. The participants of the study were selected among the nurses who accepted the interview and were willing to participate. In the study, interviews were conducted with 20 nurses aged between 27-55 working in neurosurgery, cardiovascular surgery, and general surgery ICU.

Data collection

A semi-structured interview protocol based on open-ended questions was used (see File S1). During the interview, the views of the nurses who care for the patient with delirium in the surgical ICUs, the evaluation of delirium, nursing interventions for delirium, and the difficulties experienced were discussed (9). Interviews lasted for 16-37 min. Interviews were sound recorded, de-identified, and transcribed verbatim. The sample size was determined according to the theoretical saturation point, which meant we stopped recruiting participants after 20 interviews when it became clear that interviewees' responses become redundant and no unique information was achieved (16, 17). Data collection and interviews were conducted in the period from 1-5 October 2022.

Procedure

Nurses who met the research criteria were contacted and detailed information was given about the research. Verbal consent was obtained from the nurses who agreed to participate in the study. Appointments were made from nurses for interviews. The interviews were conducted by

a trained researcher in the nurse rooms of the ICU where the participants worked. Audio recordings of the interviews were taken with the permission of all participants. At the end of the interview, the nurses who participated in the study were thanked.

Data analysis

The data obtained after the interview was transferred to a Microsoft Word document. The content analysis method was used in the analysis of the data obtained from the interviews. Data were coded independently by all researchers. By determining the same and different codes by the researchers, the data were compared and common codes were determined. By providing consensus, codes that can be derived from each sentence and sentence were created. Researchers came together and created a common code list. After the codes were determined, sub-themes and themes were created. Then, the interview data were interpreted and turned into a report. The findings were mapped with the MAXQDA 2022 program. Direct quotations were included in the presentation of the findings to reflect the views of the participants. When quoting the participants, it was stated as "Nurse" and the numbers given to the participants (for example, N1) were added to the end of the quotations.

Quality and rigour criteria

Conducting the interviews and analyzing the data by one person might affect the result of the study. Therefore, all researchers discussed and interpreted the results and data. The findings were corroborated by excerpts from the original interview. This step showed how well the findings of the study matched the data collected and were not affected by the researcher's point of view. Determining the sample size based on a "saturation point" ensured that new ideas or themes were not overlooked. Finally, saving all documents is an additional step that serves to quality control the work.

Ethical Considerations

To carry out the study; approval was obtained from the Ethics Committee of Isparta University of Applied Sciences University (Decision no: 119/02 Date: 30/09/2022). After explaining the study, verbal consent was obtained from the participants and they were informed that they could withdraw from participation at any time.

Results

Table 1. Individual characteristics of nurses

	n	%
Gender		
Female	15	75
Male	5	25
Educational status		
High school degree	3	15
Undergraduate degree	17	85
ICU		
General surgery	8	40
Cardiovascular surgery	7	35
Neurosurgery	5	25
Working experience		
5-10 years	7	35
10-20 years	8	40
More than 20 years	5	25

The ages of the nurses participating in the study were between 27-55, 15 of them were female, 17 of them were undergraduates and 3 of them were high school graduates. Eight of the nurses were working in general surgery, 7 in cardiovascular surgery, and 5 in neurosurgery intensive care. Their working experience ranged from 5 to 37 years.

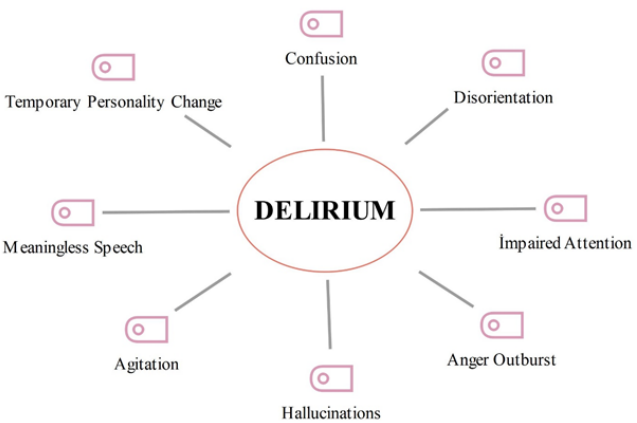

Figure 1. *Views of Nurses on Delirium*

Themes related to the views of nurses about delirium are given in Figure 1. In the study, it was determined that the nurses defined delirium as confusion, disorientation, anger outburst, impaired attention, hallucinations, agitation, meaningless speech, and temporary personality change. The views of nurses about delirium are seen in the quotations below.

-I can describe it as a cloud of consciousness. The patient has no concept of place, time, and space. There are often meaningless, unrelated patient conversations. He can say that objects have moved. Patients do not know exactly where they are. (N_2).

- Delirium is very complex in my opinion. Maybe I can say it is a condition characterized by blurring of consciousness, having trouble focusing, hallucinations, and getting angry. (N_{12}).

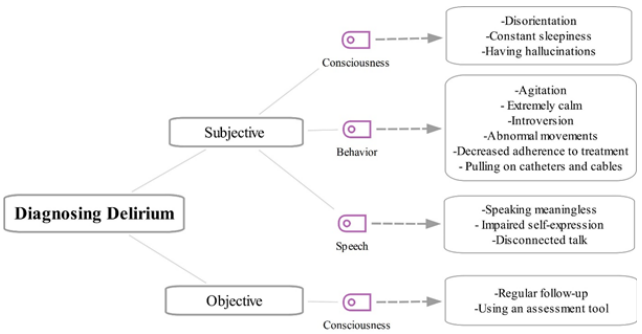

Figure 2. *Methods Used by Nurses to Diagnose Delirium*

Themes related to the methods used by nurses in the diagnosis of delirium are given in Figure 2. The methods used by nurses in the diagnosis of delirium were divided into two main themes subjective and objective. It was determined that the nurses subjectively recognized delirium from their level of consciousness, behavior, and speech. Objectively, it was determined that they knew from their level of consciousness. The views of nurses on diagnosing delirium can be seen in the excerpts below.

-These patients have meaningless speech. They cannot express themselves. Abnormally they are trying to go one day, stay one day or jump out the window. Meaningless movements like these can be agitation. Or it can be in a very quiet sleepy state. In such cases, I think the patient has delirium. (N_3).

- There is usually restlessness, daydreaming, blank staring, etc. I notice it when patients start to remove the catheters, cables, etc. in their bodies or when they cannot keep them in bed. (N_{13}).

Interventions applied by nurses while giving care to patients with delirium are divided into themes according to Roper, Logan, and Tierney's Model activities of daily living and are given in Figure 3. Nurses' care interventions were divided into six themes: providing and maintaining a safe environment, communication, eating and drinking, mobilization, sleeping, and dependent interventions/others. The views of the nurses about the interventions they take while giving care to patients with delirium can be seen in the excerpts below.

- It is important to ensure the safety of the patient. Penetrating cutting tools such as glass and knives are removed. If the patient has a relative, being with them can help calm the patient. Stimuli that may increase agitation such as sound and light should be removed from the environment. According to the doctor's request, if necessary, a patient determination can be made within the order. (N_{19}).

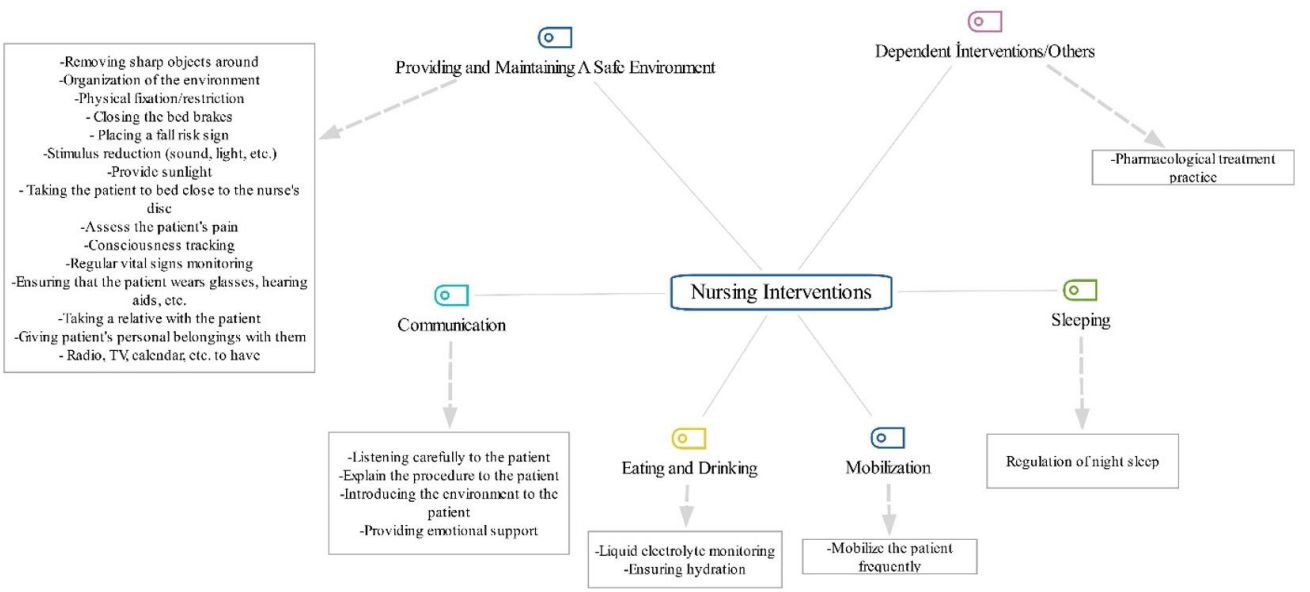

Figure 3. *Nursing interventions*

- ….of course, first of all, we should make the patient feel mentally comfortable. For this reason, if the patient has special things such as favorite items, rosaries, and watches, leaving them with him makes the patient very comfortable. In addition, I can take the patient's relative with him according to the intensive care conditions. We should not forget the pharmacological treatment according to the doctor's order. (H_{20}).

Themes related to the difficulties experienced by nurses while giving care to patients with delirium are given in Figure 4. The difficulties experienced by nurses are divided into three themes: patient-related difficulties, systemic difficulties, and individual difficulties. The views of the nurses regarding the difficulties they experienced can be seen in the excerpts below.

- The fact that the whole team doesn't see delirium as a problem is a problem in itself. We're just trying to look for a pharmacological solution and we don't even know about other methods. The fact that the situation is treated as normal in the ICU leads to the absence of any standard practice to understand and prevent delirium, and this forces us to do so. (N_{15}).

-Patients can use violence. He can harm himself. Most of the time, I can't predict what patients will do. A patient who prayed to us constantly before the operation developed delirium after the operation. He had become a different person. He was constantly cursing, pulling his peripheral catheters, and not wanting to take oxygen. He once threw the patient's diaper, which he had made into a ball, on the window of the intensive care room. This patient had undergone a successful surgical intervention. However, since the delirium could not be brought under control, this care could not be applied and the patient died. This tells us the importance of care. (N_{18}).

Discussion

Delirium is a frequently encountered clinical condition in patients hospitalized in surgical ICU. Therefore, the competence of nurses working in surgical ICUs in preventing delirium, recognizing the patient with delirium, and providing optimal care is very important (13). This study was conducted to determine how surgical intensive care nurses define delirium, their care practices for delirium, and the difficulties they experience in these practices.

In this study, nurses described delirium as "confusion", "disorientation", "anger burst/seizure", "distracted attention", "hallucination", "agitation", "meaningless movements", "meaningless speech" and "temporary personality change". It can be said that nurses define delirium with "delirium signs and symptoms" and in this respect, there are aspects that nurses lack in the definition of delirium. Although nurses' definitions of delirium are consistent with the signs and symptoms stated in the literature are important and desirable for the clinical diagnosis of delirium, the fact that nurses do not know the exact definition of delirium is also an obstacle to prevent delirium. Similar to our study finding, in a study conducted with cardiovascular surgery nurses, it was determined that nurses had insufficient knowledge about the definition of delirium (14). In another study conducted with intensive care nurses, it was reported that the level of knowledge of nurses about delirium was low and that the nurses who stated that they knew about delirium could not fully define delirium (15). This study and similar studies reveal that the level of knowledge of nurses about what delirium is should be increased.

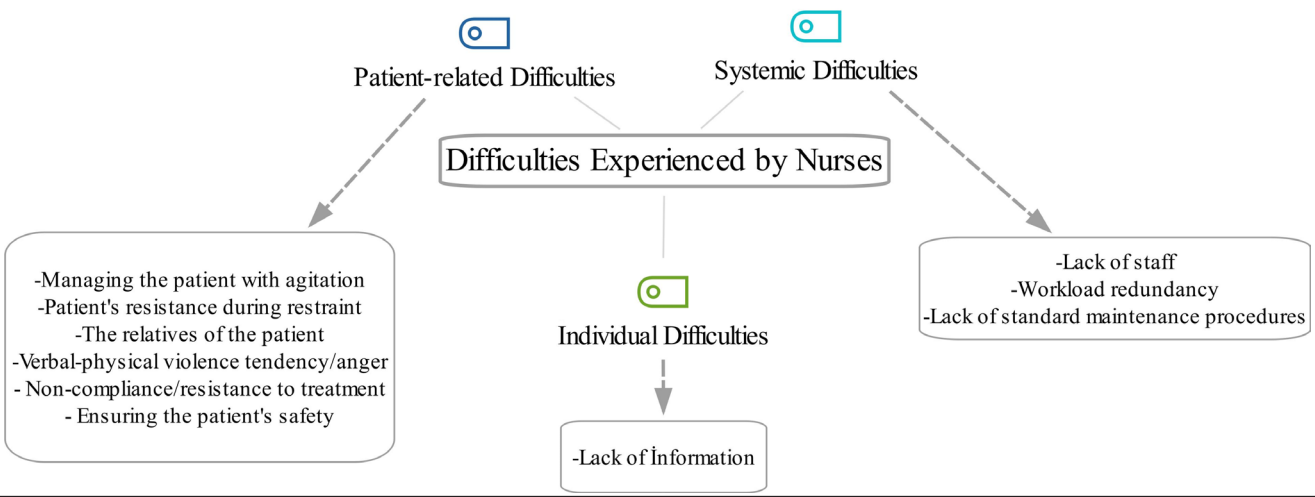

Figure 4. *Difficulties Experienced by Nurses*

Based on the level of psychomotor activity, delirium can be described as hyperactive, hypoactive, or mixed (10). Detection of all subtypes is critical for an effective diagnosis of delirium (16). In this study, it is a remarkable finding that nurses mostly defined delirium with hyperactive delirium signs and symptoms and stated less about hypoactive delirium features. However, in a cohort study conducted with 614 critically ill patients, it was determined that mixed type was most common, followed by hypoactive delirium and purely hyperactive delirium (17). Similarly, it has been reported in the literature that hypoactive delirium is often overlooked because it is underdiagnosed and confused with depression (16, 18). Because delirium is a life-threatening condition, nurses who do not know hypoactive delirium should not be ignored. This study revealed the importance and necessity of informing nurses about hypoactive delirium.

Delirium is a common problem in the ICU that is often undiagnosed if not screened for with a validated tool (19, 20). In this study, it was determined that nurses mostly diagnosed delirium with subjective data, and they also determined it objectively, although less frequently, with diagnostic tools. In a study, it was determined that 56.3% of intensive care nurses used delirium diagnostic tools (13). In a study conducted with surgical intensive care nurses, it was determined that 50.8% of the nurses did not use any form in diagnosing delirium, and 28.6% of them determined delirium with a general clinical assessment (21). In a study conducted with surgical intensive care nurses, it was determined that %24.5 of nurses had screened the delirium routinely and half of the nurses who screen for delirium routinely had done so with a general clinic examination (22). In a study of 1,384 healthcare professionals, 59% of them reported screen for delirium, with 33% of those using a specific screening tool (23). Our study finding is compatible with the literature. Nurses' use of valid and reliable tools in the diagnosis of delirium will play a key role in delirium care management.

In this study, it was determined that nurses mostly efforted to maintain a safe environment for the patient with delirium according to the Life Model of Roper, Logan and Tierney. In addition, it was determined that they also made nursing interventions for communication, sleeping, mobilizing, breathing, and eating and drinking activities. It was also determined that nurses applied pharmacological treatment methods and needed physician support as well as independent nursing interventions. The nursing interventions that surgical intensive care nurses "always" do to prevent and reduce delirium included preventing the self-harm of the patient, complying with infection control measures, and pain management (21). Studies have shown that nurses want to receive physician support in delirium management and apply the pharmacological method (16, 24). On the other hand, our study revealed that involving patients in their own care was not mentioned and that nurses needed awareness to include the patients in their own care. Participating nurses also reported that they applied physical restraint while caring for patient with delirium. Physical restraint can be needed to secure the patients' safety, and as the last intervention and as short as possible. As physical restraint can further increase the patient's current state of delirium and agitation, physical restraining measures need to be professional (25, 26).

It was determined that nurses experienced patient-related, systemic, and individual difficulties while caring for patients with delirium. It was determined that nurses had difficulties related to patients during care due to agitation, violence, and non-compliance with treatment. In addition, although the nurses stated that the participation of the family in the care of the patient with delirium was a part of the care, they also reported that they had difficulties with the relatives of the patients. In a qualitative study, nurses reported that they had difficulties in communicating with patients with delirium (12). In our study, nurses reported that they experienced systemic difficulties in delirium management, such as a lack of personnel, excessive workload, and lack of standard care procedures. This finding is consistent with the literature. In a study, nurses reported excessive workload, complex tasks, and fast pace environment in ICUs as barriers to effective management of delirium (12). It was determined that nurses had difficulties during care due to inadequate knowledge. Similarly, in a study, 15% of nurses stated that they needed training on delirium (24). Similarly, it has been reported that lack of education and knowledge, and inexperience are barriers to the diagnosis of delirium (12, 20). Solberg et al. (2021) reported that interprofessional education about delirium with a standardized screening tool, documentation, and non-pharmacologic interventions improved knowledge of delirium (27). Determining the difficulties experienced by nurses during the care of patients with delirium will contribute to taking the necessary precautions for the obstacles that prevent effective management of delirium. Similarly, studies also show that nurses mostly experience problems and difficulties in delirium management (24, 25, 28).

Limitations

This study has some limitations. First, the main limitation of this study is the relatively small sample size of ICU nurses. Second, the three included wards were specialized surgical wards in one hospital and only in a country. This limits the transferability of the study results. Third, the interviewer fulfilled the dual role of researcher and health professional. Despite these limitations, our research adds to a still growing literature in this area.

Conclusion

In the study, it was determined that the methods and nursing interventions used by nurses to identify patients with delirium generally overlap with evidence-based practices. However, it is noteworthy that the nurses did not specify some evidence-based interventions. In addition, it was determined in the study that nurses had some difficulties while caring. It is recommended that nurses, who have an important place in the intensive care team, should be given in-service training prepared in the presence of current guides by considering the difficulties they experience while giving care to patients with delirium.It is important to define the knowledge and skill levels of nurses about delirium to increase the quality of care given to patients with delirium. For this reason, it is recommended to conduct qualitative and quantitative studies on this subject in larger samples.

Declarations

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Conflict of Interest

The authors have no conflicts of interest to disclose.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Examining the Factors Influencing Turkish Nursing Students' Motivation: An Explorative Qualitative Study

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ABSTRACT

Objective: The purpose of this study was to examine the factors that affect the motivation of students in a Bachelor of Science nursing program.

Methods: A qualitative study was carried out with 32 Bachelor of Science nursing students with different class studying in a non-profit foundation university. Data was collected through four focus groups using a semi-structured interview form. Content analysis was used to analyze data.

Results: The following five themes emerged: Choosing the university, but not the future profession; lack of a feeling of belonging to university; group cohesion; student-faculty relationship; quality of education.

Conclusion: In this study showed how important it is for students' motivation to study on a large campus rather than on an isolated campus.

Keywords: Focus groups, Motivation, Nursing student, Nursing education, Qualitative research

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Hemşirelik Öğrencilerinin Motivasyonunu Etkileyen Faktörlerin İncelenmesi: Nitel Bir Çalışma

ÖZET

Amac: Bu çalışmanın amacı, lisans hemsirelik ogrencilerinin motivasyonlarını etkileyen faktorleri incelemektir.

Yöntem: Bir vakıf üniversitesinde öğrenim görmekte olan 32 Lisans hemşirelik öğrencisi ile nitel bir çalışma yapılmıştır. Veriler, yarı yapılandırılmış görüşme formu kullanılarak dört odak grup görüşmesi ile toplanmıştır. Verilerin analizinde; içerik analizi kullanılmıştır.

Sonuç: Çalışmada, Üniversiteyi seçmek ama geleceğin mesleğini seçmemek; üniversiteye ait olma duygusunun olmaması, grup uyumu; öğrenci-öğretim üyesi ilişkisi; Eğitim kalitesi olmak üzere beş tema belirlenmiştir.

Sonuç: Bu çalışma, öğrencilerin motivasyonu için izole ve küçük bir kampüs yerine, büyük bir kampüste eğitim almanın ne kadar önemli olduğunu göstermiştir.

Anahtar Sözcükler: Odak grup, Motivasyon, Hemşirelik öğrencisi, Hemşirelik eğitimi, Nitel araştırma

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Nurses constitute the largest number of healthcare professionals worldwide. The role nurses play in meeting societal demands for safe, evidence-based, and quality care is increasingly recognized (1) Today, it is expected the undergraduate nursing programs to have graduates who can cope efficiently with various professional difficulties right after graduation (2). However, nursing students usually graduate without acquiring the necessary information and skills and lack of motivation to perform their jobs, and this leads to burnout and a waste of time and money. Undergraduate nursing curricula that are not appealing to students (3). and nursing faculty members who frequently have difficulties in motivating students need special attention in this respect (4).

To motivate young people, it is important to understand what motivation is and how one can be motivated to act in a certain way. Motivation is a prerequisite in the learning process and is the key component in academic achievement (5-6). Motivation can be influenced by many factors such as finding something worthy of learning, the education environment, and the attitude of faculty members (7). Determining the factors motivating students is of necessary in nursing programs (6) especially from the perspective of students (8). In the study by Dalir et al. (9), it was reported that nursing students had a moderate level motivation. On the other hand, it was determined that 30% of nursing students continue their education without desire and motivation (10). In Turkey, while some of some studies found that inner motivation levels of nursing students were higher than outer motivation levels (11-13), one of them revealed both inner and outer motivation levels were high (14). Considering studies regarding motivation in Turkey and other countries, the motivation level of nursing students, who will assume important professional responsibilities shortly after graduation, is low to moderate and factors influencing their motivation have not been investigated in depth. Thus, it has been strongly recommended that new studies should be carried out to understand the motivational factors of nursing students (15) because of their decreasing level of motivation throughout their studies (2). The purpose of this exploratory qualitative study was to examine the factors that affect the motivation of students in a Bachelor of Science nursing program.

MATERIALS AND METHODS

Design

This exploratory qualitative study was carried out to examine the factors that affect the motivation of Turkish students in a Bachelor of Science nursing program. This type of research design allows the participants in the research to express their opinions and experiences about the subject being researched clearly and provides researchers with real data for comprehensive analysis (16).

Sample

Four different focus groups were conducted with overall 32 nursing students studying in a non profit foundation university in Istanbul. The Bachelor of Science nursing program is a four-year program that accepts students according to the results of the nation-wide matriculation exam. A total of 120 students register in the program and around 30 students study at each level every year. However, not all completed the program. The graduation rate for all undergraduate students in the program during the time of this study was monitored after the study had been completed. It was seen that the graduation rate fluctuated among the years: 97% in 2016; 69% in 2017; 77% in 2018, and 93% in 2019.

For this study, instead of selecting participants randomly from each level, the researchers employed a purposive sampling method, which suggests choosing participants who will contribute most to the study because of their knowledge, skills, or experience about the research topic under investigation. Researchers selected and invited 12-15 students from each level to guarantee the ideal number of participants in each focus group. However, the participation in the sophomore-level focus group remained low due to students' conflicting exam schedules. The sample includes 32 nursing students, which includes 31 female participants with an average age of 21years and 75.0% live in the dormitory (Table 1)

Data Collection

Data were collected via four focused groups that were held between 20 and 31 May 2018. The focus group method was chosen for this study to collect rich data from students at different levels. Data were collected via four focused groups with the participation of 32 nursing students (freshman: 7, sophomore: 5, junior: 11, and senior: 9). One of the researchers of this study who had no prior contact with the participants but had sufficient training and prior experience in conducting and analyzing focus group studies held focus groups, each of which lasted approximately 90-120 minutes.

In a focus group, responses to the questions are developed as a result of the interaction among individuals in the

group. Individual responses have the potential to trigger a discussion. Thus, group dynamics affect the content and depth of the answers given to the questions (17). That's why all focus groups were recorded with the consent of all participants to enable the moderator to closely observe and concentrate on group interactions and processes and a semi-structured interview form was used during each focus group to address any issues that emerged from individual responses to the discussion (Table 2).

Table 1. Distribution of nursing students' socio-demographic characteristics (n=32)

Socio-Demographic Characteristics	Min-Max	Mean±SD
Age	19-24	21±1.413
	n	**%**
Class		
Freshman	7	21.9
Sophomore	5	15.6
Junior	11	34.4
Senior	9	28.1
Gender		
Female	31	96.9
Male	1	3.1
Marital status		
Single	32	100.0
Where and who lives together		
Dormitory	24	75.0
With the family	2	6.3
With a friend/friends at home	2	6.3
Alone at home	2	6.3
Both with the family at home and in dormitory	2	6.3

Table 2. Semi-structured form for focus groups

Theoretical courses	Clinical practice
1. How do you evaluate the theoretical courses you have received?	**1.** How do you evaluate your clinical practice in general?
2. How do you think a quality theoretical course should be?	**2.** How do you think a quality clinical practice should be?
3. What do you think about the students' interests and motivation in your classes?	**3.** What do you think about the students' interest and motivation in clinical practice?

Data Analysis

All data generated through four focused groups were transferred from tape records to written transcripts. In data analysis, ''content analysis technique'', which consists of data coding, finding of themes, organization of codes and themes and their description and interpretation of findings, was utilized (17). The basic process in content analysis is to bring together the data in the framework of certain concepts and themes and to organize and interpret them in a meaningful manner. As triangulation of data analysis process was necessary to reach some common understanding for approaching collected data, coding process was carried out separately by all researchers who later on had three online and two face-to-face meetings to discuss emerged codes and to identify themes according to initial data coding process. Some codes were brought together to ensure relevancy and clarity while some others were eliminated to avoid repetition. Researchers had long discussions on identifying emerging themes. Especially, it was difficult to identify the first theme as "choosing the university, but not the future profession" because researchers did not consider the pre-university perception of participants as a motivational factor from the beginning of data analysis. The non-nurse researcher (ZZ) facilitated the focus groups and participants reviewed the codes and her focus group notes again. The whole process of categorizing codes into under five themes on which researchers were in complete agreement took almost four months. To be able to ensure the trustworthiness of the study, in addition to the triangulation of data analysis, the researchers adopted what Auerbach and Silverstein [18]. called "justifiability as an alternative to reliability and validity". Objectivity was ensured by iteratively visiting codes and themes; the whole details of the coding and interpretation process were explained as transparently as possible, and all data analysis was aggregated to make it communicable and coherent.

RESULTS

This study yielded that nursing students' perceptions about the factors that influence motivation to fall into five themes that are inextricably intertwined. Overall results showed that the nursing students' motivation is low and is largely influenced by not only educational factors but some other factors that are associated with students' perceptions about the nursing profession and the university they choose to study at.

Theme 1: Choosing the university, but not the future profession

It was found that nursing students' initial motivation was low when they came to university due to their perceived perceptions about their future profession. Most of the participants reported that they did not want to be a nurse, but they wanted to study at the university where this research was conducted because of the prestige and popularity of the university and its rich and diverse social opportunities. They wanted to hold a diploma from this prestigious university and studying at the Nursing program of the university was their only option due to their scores on the university entrance exam. A sophomore student said:

"My university entrance exam score was low, so I had no choice other than nursing. However, I chose this university because of the value and importance attached to nursing as a profession. It makes this university distinctive from others for me."

Theme 2: Lack of a feeling of belonging to the university

Participants emphasized that studying far from the main campus forced them to lead an isolated university life and this isolation became such a critical factor for motivation that it gradually undermined their attachment and belongingness to the university. The contrast between what they dream of and what they experience in an isolated campus seemed to disrupt students' expectations for being a student in a prestigious university. It seems that their lack of social life opportunities in an isolated campus led to a lost sense of belonging to the university and decreased their motivation. A sophomore student said:

"There are a lot of facilities and social activities, but we cannot attend any of them because of our isolated campus.… I cannot even feel myself belonging to this university where I cannot benefit from any social activities. This is far more important than academic life for our motivation".

Another example is from a junior student:

"This is a university. We still feel that we are in a high school. Our department gave us a pre-determined schedule that gave us no freedom to plan our time. We go to school five days a week. We do not have proper break times. We want a half-day off to have some time for socialization. We want more clubs, social activities and decent places to get socialized. As a result, I don't feel like I'm studying at this university."

Theme 3: Group cohesion

The smaller the program is the more cohesive the student groups become. But it was found that this feature of the program had a negative influence on motivation. Participants said that group cohesiveness dramatically affected their lived experience and their motivation. Students were in proximity to each other regardless of their level of study at the university, thus most of the time they learned many things about the department by word-of-mouth communication. As a sophomore student said:

"We are 120 people all together as a whole department and I think this is the cause of all problems that we have now."

Any negative experience of one level was a source of demotivation for students at other levels. This is like a snowball effect; even a minor problem gets bigger because of word-of-mouth communication. For instance, a senior student said:

"Any problem that occurs in freshman courses can harm us. Let me give you an example. Freshman students did not attend one of their clinical practice as a whole class. This had reflected us though we did not have any involvement. We received a warning because of their fault. This is not fair".

Theme 4: Student-faculty relationship

Student-faculty interaction had a different impact on motivation. When students "liked" their instructors, their motivation increases. On the other hand, some of them said that their motivation dramatically decreased in courses where the instructors treated them like a child, embarrassed one or two in front of others, or biased against students who raised their voice for fair treatment. Most of them used several emotionally loaded words to describe the student-faculty relationship. Some of them even compared their relationships with their instructors with their relationships with their parents. Although they complained about being treated like a child, some of them criticized their instructors for being too reserved and distant. They wished their instructors to take care of them as their parents did before coming to university. They wish the faculty find club activities for them or find solutions to their problems in their residential areas. They felt that they got demotivated when faculty were reluctant to help them with their problems. A sophomore student said:

"Faculty can motivate us. This is their responsibility.... but they always criticize us. We hear neither appreciation nor a motivating word.... They always make us feel incapable."

Theme 5: The quality of education

Participants have some conflicting opinions in terms of the quality of education. They all appreciated the quality of faculty and real-life focus in the program. However, they believed that overemphasis on theory, excellence in academic performance, unfair treatment by some faculty, and heavy workload decreased their motivation greatly. Although students are content with the quality of theoretical education, they feel that most of the theoretical parts can be shortened to leave some free time for students. One of the freshman students said:

"The educational program is rather long with too much emphasis on theory. The classes start at 8:00 am and end at 5:00 pm. It is like a high school. This routine life makes us unhappy and decreases our motivation."

Most of the participants were highly critical about expectations for excellence in academic performance. They always feel under pressure to satisfy the high standards of faculty. A sophomore student said:

"During our clinical duties, we spend an enormous amount of time and energy to complete lots of assignments, but we are always criticized of what we do. We are expected to excel at everything that we are required to do."

Participants apart from freshman students who do not go to clinical practice expressed their concerns for unfair treatment of some faculty during the internship. It is a problem not to expect the same workload from all students and not to use some common criteria to evaluate student performance. A senior student expressed her experience as follows:

"There is a real issue about motivation. We do our internship under the supervision of 3 or 4 instructors. There is a communication breakdown among the instructors. Each instructor is responsible for 3-4 students. Depending on the instructor, some students experience a great deal of anxiety while some others complete their internship without having any problem".

DISCUSSION

This qualitative study was carried out to examine the factors that affect the motivation of students in a Bachelor of Science nursing program. One of the most important findings of the present study was that the way students experienced university life did matter; when their experience was negative, their motivation level decreased, and they lost their sense of belonging to the university. Students' exhaustive exam-centered life during high school and the competitive university entrance exam at the national level shaped students' expectations from the university. That is why their initial expectations from the university were mostly social rather than academic. This contradicts with their lived experience that was shaped by intensive academic realities of the program that seemed to be a source of great disillusionment for students. The importance of social and academic integration is emphasized in literature (19). This study showed that social integration can be far more important than academic integration in the initial stages of university life. However, as students progressed in their studies, the importance attributed to social life seemed to fade out.

In a study carried out with nursing students in Poland, it was shown that the prestige of the nursing profession is low in society (20). Similarly, in a study carried out in Turkey, it was found that 48.2% of the nursing students think that nursing is considered as an auxiliary profession in the community and 21.8% think that nursing has no respectability in the society (21).

In the present study, it was also found that living in an isolated campus life led to the loss of feeling of belonging to the university. A sense of belonging in students is associated with academic achievement and emotional well-being as it influences their attendance, academic motivation and achievement (22). In this study, students expressed that an isolated education far from the campus had a negative impact; students had to build closer relations with each other and living close caused problems such as excessive gossips, word-of-mouth communication.

Another important theme that emerged in the present study was student-faculty relationships. Their motivation increased with a faculty member who built a positive rapport. This was also highlighted in a study that shows the importance of interpersonal relations as perceived by both clinical faculty and the students (23).

Finally, this study shows the importance of program-specific issues on students' motivation. As perceived by participants, some weaknesses in the way courses were structured, scheduled, taught and evaluated affected their motivation. These results are quite in line with the prior studies which show the positive effect of fair workload and evaluation, positive communication, guidance, and constructive feedback in clinical practice (24) on motivation while discouraging teaching approaches (25) and overly intensive Schedule (2) and the sources of students' demotivation.

Limitation

The study has some limitations. It is performed qualitatively and in a single university, which makes it difficult to generalize its results. However, its effect on motivation of students in nursing programs is of important to examine qualitatively.

CONCLUSION

In this study showed how important it is for students' motivation to study on a large campus rather than on an isolated campus. It was revealed that the most important positive sources of motivation for the students were studying the university on a large campus, interacting with other students, participating in social activities at the university, and not being too busy schedule to participate in these activities. In addition, it was determined that the students chose the university, not the nursing profession when decided to studying university. School and university administrators on the entire isolated and small campus should be aware of all these factors besides the qualification of the faculty for the motivation of students. They can schedule the weekly schedule to allow students to socialize and organize activities that allow students to interact with students studying in other departments. The results of this study can also help researchers conduct follow-up studies to further understand how identified motivational factors operate in different settings, such as isolated vs. large campus universities.

IMPLICATION FOR NURSING PRACTICE

Neither the nursing as a profession nor getting a quality education to become a good nurse did not motivate students. Interestingly, rich and diverse social opportunity that the university offered was found to be the most important sources of student motivation. Thus it seems important to fulfill students' social expectations from the university in their early years of nursing education.

DECLARATIONS

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Conflicts of Interest

All authors declare that there is no conflicts of interest.

Availability of Data

Available upon request.

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Ethics Approval

Before the study, approval was obtained from the ethics committee of Koç University (2016. 116.IRB3.070). Besides, written permission was obtained from the school where the study was performed and written informed consent form from the participants was collected.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Nursing / Hemşirelik

Nurses' Compliance with Isolation Precautions and Their Attitudes to Patient Safety

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ABSTRACT

Background/Purpose: Nurses' compliance with isolation measures is extremely important for patient safety. This research was conducted to examine nurses' compliance with isolation precautions and patient safety attitudes.

Methods: This is a cross-sectional and relational study. The data of the study were collected between January and March 2022 in a tertiary education and research hospital. A Nurse Descriptive Form, an Isolation Precautions Compliance Scale and a Patient Safety Attitude Scale were used to collect data.

Results: Three hundred and sixty-two nurses participated in the study. The total mean score of the nurses' Isolation Precautions Compliance Scale was 75.74±11.58, and the total mean score of the Patient Safety Attitude Questionnaire was 127.28±34.29. It was found that the mean patient safety attitude score of the nurses was significantly different according to age and whether they were caring for COVID-19 patients ($p<0.05$). It was also found that the level of compliance of the nurses with the isolation measures did not vary according to their socio-demographic and descriptive characteristics. There was a positive and very weak correlation between worker and patient safety and teamwork climate ($p=0.02$, $r=0.123$), safety climate ($p=0.04$, $r=0.105$), and hand hygiene and use of gloves and teamwork climate ($p=0.04$, $r=0.109$).

Conclusion: It was determined that the level of compliance of the nurses with the isolation measures was high and their attitudes toward patient safety were positive. It was determined that there was no significant relationship between the level of compliance of nurses with isolation precautions and their attitude toward patient safety.

Keywords: Health care-associated infection, patient safety, prevention and control, nurses

Hemşirelerin İzolasyon Önlemlerine Uyumu ve Hasta Güvenliği Tutumları

ÖZET

Amaç: Hemşirelerin izolasyon önlemlerine uyum sağlamaları hasta güvenliği açısından son derece önemlidir. Bu araştırma, hemşirelerin izolasyon önlemlerine uyumu ve hasta güvenliği tutumlarını incelemek amacıyla yapıldı.

Yöntemler: Araştırma tanımlayıcı ve kesitsel nitelikte tasarlandı. Araştırmanın verileri üçüncü basamak bir eğitim araştırma hastanesinde Ocak-Mart 2022 tarihleri arasında toplandı. Verilerin toplanmasında "Hemşire Tanıtıcı Formu", "İzolasyon Önlemlerine Uyum Ölçeği" ve "Hasta Güvenliği Tutum Ölçeği" kullanıldı.

Bulgular: Araştırmaya 362 hemşire katıldı. Hemşirelerin "İzolasyon Önlemlerine Uyum Ölçeği" toplam puan ortalaması 75.74±11.58 ve "Hasta Güvenliği Tutum Ölçeği" toplam puan ortalaması 127.28±34.29 olarak bulundu. Hemşirelerin hasta güvenliği tutum puan ortalamasının yaş ve COVID-19 hastasına bakma durumuna göre farklı olduğu belirlendi ($p<0.05$). Hemşirelerin izolasyon önlemlerine uyum düzeylerinin ise sosyo-demografik ve tanıtıcı özelliklerine göre değişmediği saptandı. Çalışan hasta güvenliği ile ekip çalışması iklimi ($p=0.02$, $r=0.123$) ve güvenlik iklimi ($p=0.04$, $r=0.105$) arasında, el yıkama-eldiven kullanımı ile ekip çalışması iklimi ($p=0.04$, $r=0.109$) arasındaki ilişki pozitif yönde, çok zayıf düzeydeydi.

Sonuç: Hemşirelerin izolasyon önlemlerine uyum düzeylerinin yüksek, hasta güvenliğine yönelik tutumlarının olumlu olduğu belirlendi. Hemşirelerin izolasyon önlemlerine uyum düzeyleri ile hasta güvenliği tutumu arasında anlamlı bir ilişki olmadığı saptandı.

Anahtar kelimeler: Sağlık bakımı ile ilişkili enfeksiyon, hasta güvenliği, önleme ve kontrol, hemşire

Health service related infections, as well as increasing rates of morbidity and mortality, also cause an increase in the length of hospital stay and thus costs (1,2). For this reason, programs are implemented in health institutions to prevent infections (3). Infection control measures include both the standard measures of hand hygiene, the use of gloves and the application of aseptic techniques and advanced measures implemented to prevent infection from an infected or colonized patient, such as wearing a mask and apron, monitoring a patient in a negative pressure room, training health personnel and the implementation of isolation measures: contact, droplet or breathing isolation (4). One infection control measure is isolation (3), and the purpose of isolation is to prevent micro-organisms infecting the patient, the patient's relatives or health workers (4).

Health workers' attitudes and behaviors are a factor affecting the provision and maintenance of isolation (1). For this reason, it is important in order for the implementation of policies on patient safety that health professionals have a positive attitude to patient safety (5,6). Nurses are in the closest contact with patients, and play a key role in the implementation of infection control measures (7), and in providing and improving patient safety (8-10). Interventions to ensure patient safety include providing control of patients and their families in situations which might constitute a risk (11) and preventing unwanted results of interventions (12).

Not implementing isolation measures may give rise to unwanted events which may pose a risk to patient safety (13). Therefore, it is stated to be of the utmost importance that nurses should abide by isolation measures. Studies in the literature have shown that compliance with isolation measures may vary from country to country, and even between different hospitals and clinics in the same country (2,14,15), and in studies conducted in Turkey, it is seen that compliance with isolation measures is at a medium or good level (1,7,16). Most studies on patient safety have reported that nurses' attitudes to patient safety are positive (5,8,17-21). No study was found in the literature making a simultaneous examination of nurses' compliance with isolation measures and their attitudes to patient safety, and therefore, nurses' compliance with isolation measures and their attitudes to patient safety were examined in this study.

MATERIAL AND METHOD

Type of Study

The research had a cross-sectional and relational design.

The Population and Sample of the Research

The minimum sample size in the population was determined with power analysis using the G*Power v 3.1.9.7 program. In order to obtain a 0.05 significance level (α) and an 80% statistical test power (1-β), the effect size in the calculations was calculated as 0.30. Considering the standard deviation value, a minimum sample size of 82 was determined. As a result, 362 nurses who stated that they followed isolation procedures and who agreed to participate in the research were included in the study.

Data Collection and Tools

Data collection was conducted by face to face interview at a tertiary teaching and research hospital between January and March 2022. Each interview took approximately 15 minutes. Data collection instruments were as follows:

Nurse Descriptive Form: There were nine questions on this form, concerning the nurses' socio-demographic and other descriptive characteristics: gender, age, education, total professional experience, place of work (clinic), working status, whether caring for COVID-19 patients, and training on isolation and patient safety.

Isolation Precautions Compliance Scale: This scale was developed in 2011 by Tayran and Ulupınar. The scale has four sub-sections on way of contagion, worker-patient safety, environmental control, and hand hygiene and glove use. It consists of 14 positive items and four negative items (Nos. 5, 7, 12 and 17) showing compliance with isolation measures. The score obtainable on the scale varies from 18 to 90. A high score obtained on the scale indicates good compliance with isolation measures. The Cronbach Alpha value of the scale is 0.85, and that of its subsections between 0.52 and 0.80 (3). In the present study, the Cronbach Alpha value of the scale was 0.82, and the values of the sub-sections varied from 0.77 to 0.80.

Patient Safety Attitude Scale: This scale was developed by Sexon et al. (2006) (22), and its Turkish validity and reliability were tested by Baykal et al. (2010). The scale has six sub-sections, job satisfaction, teamwork climate, safety climate, perceptions of management, stress recognition and working conditions, and a total of 46 items. The score obtainable on the scale varies from 46 to 230. The ten items on the score containing negative statements are scored negatively. As the total score on the scale increases,

patient safety attitude increases, and as the total score decreases, patient safety attitude decreases. The Cronbach Alpha value of the scale is 0.96, and the Cronbach Alpha values of the sub-sections vary between 0.72 and 0.86 (23). In the present study, the Cronbach Alpha value was 0.79 and the values of the sub-scales varied from 0.71 to 0.91.

Statistical Analysis

The program IBM SPSS Statistics 20.00 was used in the statistical analysis of the research data. Normality was tested with the Kolmogorov Smirnov normality test. Mean ± SD values were given for continuous variables, and percentage values for categorical variables. The Student t test and one-way variance (ANOVA) analysis were used in the analysis of data. The correlation between the nurses' levels of compliance with isolation measures and their attitudes to patient safety was determined with Pearson correlation analysis. In interpreting the results, $p<.05$ was taken as significant.

Ethical Considerations

This research was conducted in accordance with ethical principles and the Declaration of Helsinki. Institutional permission was obtained from the institution where the research was performed, and permission was obtained from Başakşehir Çam and Sakura City Hospital Clinical Research Ethics Committee, dated 5 January 2022, approval No. 2021.06.204. Informed written approval was obtained from the participants concerning their willing and voluntary participation.

RESULTS

The mean age of the nurses participating in the study was 25.54±1.44 (min.22-max.33) years, and their total professional experience was 24.25±11.03 (min.3-max.120) months. A majority of the nurses were between 21 and 25 years of age (62.7%), female (62.7%), university graduates (97.2%), clinical nurses (98.6%), and working in the emergency service (50%). A majority also had cared for COVID-19 patients (93.6%), had not had training in the past year on isolation measures (74%), but had had training on patient safety (52.5%). The nurses' mean score on level of compliance with isolation measures was 75.74±11.58, and their mean score on attitude to patient safety was 127.28±34.29 (Table 1).

Nurses between the ages of 21 and 25 years had higher mean scores than those aged ≥ 26 years on safety climate (p=.02), perceptions of management (p=.01), stress recognition (p=.02) and total patient safety attitude (p=.03). In those who stated that they had cared for COVID-19 patients, mean scores on total attitude to patient safety were high (p=.02) (Table 2).

Very weak positive correlations were found between the nurses' scores on teamwork climate and worker and patient safety (p=.02, r= 0.123), teamwork climate and hand hygiene and glove use (p=.04, r= 0.109), and safety climate and worker and patient safety (p=.04, r= 0.105) (Table 3).

Table 1. Nurses' Sociodemographic and Descriptive Characteristics

		n	%
Age	21-25 years	227	62.7
	≥ 26 years	135	37.3
Gender	Female	227	62.7
	Male	135	37.3
Education	Bachelors	352	97.2
	Postgraduate (Masters/ Doctorate)	10	2.8
Total professional experience	3-24 months	331	91.4
	≥ 25 months	31	8.6
Place of work (unit)	Internal medicine	38	10.5
	Surgery	30	8.2
	Emergency	181	50.0
	Intensive care	48	13.3
	Other	65	18
Working status	Clinical nurse	357	98.6
	Head nurse/ Nurse manager	5	1.4
Isolation measures training in the past year	Yes	94	26.0
	No	268	74.0
Patient safety training in the past year	Yes	190	52.5
	No	172	47.5
Caring for COVID-19 patients	Yes	339	93.6
	No	23	6.4
Monitoring patients in isolation in the past year	Yes	362	100.0
Isolation Precautions Compliance Scale Score (18-90 points)		75.74±11.58 (min.30-max.90)	
Way of Contagion (5-25 points)		21.44±3.08 (min.11-max.25)	
Worker & Patient Safety (6-30 points)		25.50±4.04 (min.3-max.30)	
Environmental Infection Control (4-20 points)		16.21±2.91 (min.4-max.20)	
Hand hygiene & Glove Use (3-15 points)		12.73±2.18 (min.6-max.15)	
Patient Safety Attitude Total Score (46-230 points)		127.28±34.29 (min.46-max.25)	
Work Satisfaction (11-55 points)		24.79±9.86 (min.11-max.55)	
Teamwork Climate (12-60 points)		35.29±11.42 (min.12-max.60)	
Safety Climate (5-25 points)		16.04±5.08 (min.5 -max.25)	
Perceptions of Management (7-35 points)		20.97±6.05 (min.7-max.35)	
Stress Recognition (5-25 points)		13.69±4.28 (min.5-max.25)	
Working Conditions (6-30 points)		16.76±4.83 (min.6-max.30)	

Table 2. Factors Affecting Nurses' Attitudes to Patient Safety

	Patient Safety Attitude Scale													
	Work Satisfaction		Teamwork Climate		Safety Climate		Perception of Management		Stress Recognition		Working Conditions		Total	
	Mean±SD	p	Mean±SD	p	Mean±SD	p	Mean±SD	p	Mean±SD	p	Mean±SD	p	Mean±SD	p
Age														
21-25 years	25.18±9.73	0.33	36.13±10.99	0.07	16.51±4.88	**.02***	21.60±5.89	**0.01***	14.07±4.22	**.02***	17.13±4.67	0.06	130.17±32.80	**.03***
≥ 26 years	24.14±10.09		33.89±12.02		15.27±5.34		19.92±6.19		13.04±4.31		16.15±5.06		122.41±36.27	
Caring for COVID-19 patients														
Yes	24.90±9.84	0.44	35.59±11.25	0.06	16.14±5.05	.16	21.12±5.98	0.07	13.78±4.27	.12	16.87±4.82	0.09	128.31±33.65	.02*
No	23.26±10.37		30.87±13.21		14.61±5.42		18.83±6.76		12.35±4.35		15.13±4.79		112.09±40.51	

**p<.05, ANOVA, Student's t test*

Table 3. Correlation between Nurses' Patient Safety Attitudes and Isolation Measures Compliance Levels

			Isolation Precautions Compliance Scale				
			Way of Contagion	Worker & Patient Safety	Environmental Infection Control	Hand Hygiene & Glove Use	Total
Patient Safety Attitude Questionnaire	**Work Satisfaction**	**r**	-0.002	0.028	0.031	0.022	0.001
		p	.97	.59	.55	.68	.98
	Teamwork Climate	**r**	0.098	0.123	0.097	0.109	0.097
		p	.06	**.02***	.06	**.04**	.06
	Safety Climate	**r**	0.087	0.105	0.103	0.092	0.064
		p	.09	**.04***	.51	.08	.11
	Perceptions of Management	**r**	0.083	0.091	0.081	0.086	0.084
		p	.11	.08	.12	.10	.11
	Stress Recognition	**r**	-0.022	0.009	0.028	0.006	0.002
		p	.67	.86	.59	.91	.97
	Working Conditions	**r**	-0.018	-0.012	0.018	-0.017	-0.017
		p	.73	.82	.73	.74	.57
	Total	**r**	0.064	0.084	0.087	0.071	0.063
		p	.22	.11	.09	.17	.22

*r: Pearson correlation analysis, *p<.05*

DISCUSSION

Hospital infection rates are one of the quality indicators of health institutions. Non-compliance of health workers with infection control measures has a negative effect on the quality of patient care and patient safety, causing an increase in morbidity and mortality. In this study, an evaluation was made of nurses' compliance with isolation measures and their attitudes to patient safety.

In a study by Arli and Bakan (2017), it was determined that nurses' compliance with isolation measures was good, and that the nurses' age, education level and length of work experience affected their compliance with isolation (1). It was found in a study by Özden and Özveren (2016) that nurses' compliance with isolation measures was at a medium level (24). As in other studies in the literature (2,7,16), the compliance of the nurses in the present study with isolation measures was high. Also, in the present study as in similar studies in the literature, the lowest

score was on the scale's sub-section of hand hygiene and the use of gloves. In Turkey, there is no standard practice on the quality and effectiveness of training given on isolation measures, but annual compulsory training is planned for health workers. In this regard, it is thought that the training given to nurses has affected their isolation compliance. However, the fact that 74% of the nurses stated that they had not had training and that the lowest score was on one of the standard measures, the sub-section of hand hygiene and glove wearing, suggests that the effectiveness of this training needs to be reviewed. Also, there is a need for interventions to increase awareness of the training which they receive.

It is shown in the literature that the most positive attitude concerning patient safety is to teamwork climate, and the most negative attitude is to stress recognition (20,21,25). Teamwork among health workers is necessary both to ensure patient safety and to increase job satisfaction and reduce stress levels (26,27). The findings of the present study also are similar to the literature. In addition, nurses aged 21-25 years were found to have higher mean scores than those aged 26 or more on safety climate, perceptions of management, stress recognition and attitudes to patient safety. Stress recognition concerns nurses' recognition of the effect of work-related stress factors on their work performance (22). It can therefore be said that nurses between the ages of 21 and 25 have better mechanisms to recognize stress in the workplace, and that they think that their daily work performance is affected in stressful situations. For this reason, their awareness of potential risk factors concerning patient safety may be better.

It is reported in the literature that nurses have a positive attitude to patient safety (5,17,19,21). In studies examining attitudes to patient safety in nurses, it has been found that among nurses in the working population, the mean scores on attitude to patient safety of those who are younger was lower (8,19,26,28). In contrast to these findings, it was seen in the present study that the attitudes of younger nurses to patient safety was at a better level. This difference may be related to the fact that the information obtained in the professional training of the nurses participating in the study was new. No correlation was found in different studies between the age and professional experience of nurses working in surgical units and their attitudes to patient safety (8,21,25).

No correlation was found in the study between the nurses' attitudes to patient safety and their levels of compliance with isolation measures, but significant correlations were found between the nurses' teamwork climate and worker and patient safety and hand hygiene and glove use, and between safety climate and worker and patient safety. Teamwork climate describes the quality of cooperation between health professionals. The importance accorded to patient safety in the workplace shows the safety climate (22). Situations which may affect teamwork and the importance given to patient safety may affect hand hygiene and glove use and worker and patient safety, which are important isolation measures.

Limitations of the Study

Selection bias because of the use of a questionnaire is a limitation of this study. The research was conducted with nurses at a tertiary teaching and research hospital. Therefore, the results of the study are limited to the responses given by the nurses in the sample group. Moreover, the cross-sectional nature of the study prevents the attribution of causative effects. The results obtained do not express definite causative relations between the variables.

CONCLUSION

It was found in this study that the nurses' levels of compliance with isolation measures was high, and that their attitudes to patient safety were positive. It was found that the correlation between the nurses' attitudes to patient safety and their levels of compliance with isolation measures was not significant. It is recommended that the effectiveness of training given in the reduction of health service related infection rates should be evaluated, and that compliance with isolation measures should be reviewed. A computer alert system can lead to improvement in the implementation of isolation precautions in health care institutions.

DECLARATIONS

Ethics Approval

This research was conducted in accordance with ethical principles and the Declaration of Helsinki. Institutional permission was obtained from the institution where the research was performed, and permission was obtained from Başakşehir Çam and Sakura City Hospital Clinical Research Ethics Committee, dated 5 January 2022, approval No. 2021.06.204. Informed written approval was obtained from the participants concerning their willing and voluntary participation.

Consent for Publications

All the authors of the study provide their consent for publication.

Authors' Contributions

All authors had substantial contributions to the research and written of the manuscript S.E., B.E. and S.T. were responsible for the overall design of this study. All listed authors meet the authorship criteria and that all authors are in the agreement with the content of the manuscript.

Conflict of Interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Rehabilitation / Rehabilitasyon

The Comparison of the Online and Face-to-Face Assessments of Physical Functions in Healthy Adults

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ABSTRACT

Purpose: This study aims to investigate whether online assessments can be used as an alternative way to face-to-face assessments.

Method: The study included 20 volunteer healthy adults (F/M: 14/6; Age: 59.1 ± 8.02 years-old) without any neurological problems and scored 24 or higher in the Mini-Mental State Examination Test. All assessments (The Timed Up and Go Test (TUG), Berg Balance Scale (BBS), Five Times Sit to Stand Test (FTSTS), Arm Curl Test (ACT) and Toe Touch Tests (TTT)) were performed both online and face-to-face. Google Meet or Zoom Meetings platforms were used for online assessments. Differences between online and face-to-face groups were determined by the Wilcoxon test.

Results: In the study, there was no statistically significant differences between the online and face-to-face assessments of the TUG *(p=0.057), BBS (p= 0.546)* and TTT *(p=0.438)*. However, it was significant differences the online FTSTS *(p=0.028)* and ACT *(p= 0.002)* tests with compared to face-to-face evaluation. The current study has shown that can be performed to adults of the assessments of TUG, BBS and TTT tests on the supervised online platform.

Keywords: Online assessments, Face-to-Face Assessments, Physiotherapy, Healthy Adults, Physical Functions

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Çiğdem YAZICI-MUTLU

Sağlıklı Yetişkinlerde Fiziksel Fonksiyonların Online ve Yüz Yüze Değerlendirme ile Karşılaştırılması

ÖZET

Amaç: Bu çalışma, çevrimiçi değerlendirmelerin yüz yüze değerlendirmelere alternatif olarak kullanılıp kullanılamayacağını araştırmayı amaçlamaktadır.

Yöntem: Çalışmaya herhangi bir nörolojik sorunu olmayan ve Mini-Mental Durum Muayene Testinden 24 ve üzeri puan alan 20 gönüllü sağlıklı yetişkin (K/E: 14/6; Yaş: 59,1 ± 8,02) dahil edildi. Tüm değerlendirmeler (Zamanlı Kalk Yürü Testi; ZKY, Berg Denge Ölçeği; BDÖ, Beş Defa Oturup Kalkma Testi; BDOKT, Ağırlık Kaldırma Testi; AKT ve Parmak Ucuna Dokunma Testi; PUDT) hem çevrimiçi hem de yüz yüze yapıldı. Çevrimiçi değerlendirme için Google Meet veya Zoom Meetings platformları kullanıldı. Çevrimiçi ve yüz yüze gruplar arasındaki farkları Wilcoxon testi ile tespit edildi.

Bulgular: Araştırmada, ZKY *(p=0.057)*, BDÖ *(p=0.546)* ve PUDT *(p=0.438)* online ve yüz yüze uygulamalarının arasında istatiksel olarak önemli bir fark olmadığı ancak BKOK *(p=0.028)* ve AKT *(p=0.002)* testlerinde önemli bir fark olduğu sonucuna ulaşıldı. Mevcut çalışma, ZKY, BDÖ ve PUDT testlerinin değerlendirmelerinin denetimli çevrimiçi platformda yetişkinlere uygulanabileceğini göstermiştir.

Anahtar Kelimeler: Online Değerlendirme, Yüz yüze Değerlendirme, Fizyoterapi, Sağlıklı Yetişkinler, Fiziksel Fonksiyonlar

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In December 2019, a new virus called Coronavirus-2019 (COVID-19), which affects the acute respiratory tract, emerged in China (1). In this pandemic, governments have decided to quarantine to control and spread of disease. The quarantine decision restricted patients' access to health systems, and as a result, tele-rehabilitation began to come to the fore. Actually, tele-rehabilitation systems were popular due to the development and widespread of technology use since 1998 (2). During the quarantine period, physical therapy interventions were applied with different tele-rehabilitation tools. Visual-based video-conferencing system is the most appropriate way to reach patients when the patients cannot reach the conventional rehabilitation system (3,4). In addition, tele-rehabilitation allows therapists supervise to online exercise therapy and follow-up of varied patient groups (5). A systematic review conducted in 2021 included 53 systematic reviews which are assessed tele-rehabilitation practices during the quarantine period. As a result, it was stated that tele-rehabilitation applications can be compared with face-to-face applications and even better results can be obtained (6). Although the general opinion in the literature is that tele-rehabilitation systems are as effective as face-to-face applications, it is also stated that it is appropriate to include a hybrid approach, that is, face-to-face and remote training program (7). Due to the pandemic, living conditions, and ease of access to healthcare systems, online evaluation procedures may be a facilitative method of treatment and follow-up for both patients and health professionals (4,8).

An important question that comes to mind was; Could physical evaluations of patients be performed remotely in front of the screen? The first studies on the evaluation remote of patients came to the fore in the 1999s. In one of these studies, the standard neurological assessment was examined using an interactive video link by a specialist doctor and conventionally face-to-face by an inexperienced doctor. The researchers explained that the results of the tele-health examination were as good as a conventional neurologic examination and the possibility of neurological assessments could be used in tele-medicine (9). Even recent days, common tele-rehabilitation assessments have started doing with a computer or sensors or mobile app that has a price (10-12). When we peruse at the studies on the functional evaluations performed by physiotherapists using tele-rehabilitation systems one systematic review stands out. The systematic review tested the gold standard face-to-face evaluation of physiotherapy evaluation components and the application of tele-rehabilitation technology. As a result, they stated that tele-rehabilitation systems may be a potential platform for several physiotherapy evaluation components (observation, gait analysis, posture, muscle strength, and neurodynamic tests) (10). Researchers performed a standardized remote tele-assessment protocol for patients with Multiple Sclerosis (MS). In this protocol; Timed Up and Go, Berg Balance Test, Five Times Sit to Stand, Hand-Grip Strength (using hand dynamometer), and self-report assessment scales were used but the validity and reliability of the specific tele-assessment procedures have not yet been tested (13). Although, there are studies on tele-rehabilitation, more studies are needed on the assessment of physical functions.

The older adult group either benefit from tele-rehabilitation practices and have the most problems in using technology. Benefiting from the blessings of technology for healthy adults provides very important opportunities for therapists and patients today. In order to apply visual-based video-conferencing treatments to adults, it is vital that therapists know how to make functional assessments and which assessment scales they can safely use. Therefore, our study aimed to compare face-to-face and video conferencing assessments with the Timed Up and Go (TUG), Berg Balance Scale (BBS), Five Times Sit-to-Stand (FTSTS), Arm Curl Test (ACT) and Toe Touch Tests (TTT) in healthy adults.

MATERIAL AND METHOD

Participants

The participants of study consisted of 20 volunteer healthy adults (F/M: 14/6; Age: 59.1 ± 8.02 years-old). Before the evaluation, all participants were informed about the research and the purpose of the study. After their willingness to participate, they were obtained written consent. The Yeditepe University Non-Interventional Clinical Research Ethics Committee approved the study (E.83321821-805.02.03-64, 19 October 2022).

The sample size of the study was calculated as 20 by the GPower program, type 1 error α= 0,1, Power (1- β)= 0.9 and effect size value was calculated 0.8 for the Wilcoxon test. This study was carried out 20 volunteer healthy adults who lives in Istanbul Beylikdüzü between October-December 2022.

Mental status of the participants was determined by Mini-Mental State (MMSE) and also a possible risk of falling was determined by the Falls Efficiency Scale-1 (FES-1) (14-16). The willing participants who had MMSE score 24 and higher, and the Falls Efficiency Scale-1 between 16 and

64, and also knew how to use a tablet or computer were included in the study. Persons who had a neurological disorder or **musculoskeletal system problems such as orthopedic problems and also persons were not willing to participate were excluded from the study. None of the participants had rheumatological problems.**

Assessment

Assessment Procedure

Google Meet and Zoom meeting platforms used for video-conferencing were chosen by participants due to their preferences of comfort. For the online assessment, the screen was adjusted so that the researcher could see the participant's entire body. All assessments were done at the participant's houses on the same day. A 45-second coffee break was taken between face-to-face and online assessments. The evaluation started with an online procedure to prevent the learning of tests and testing procedures by participants.

- The researcher explained the testing instructions to the participants.

- The participants were applied either online and face-to-face assessments: Upper extremity strength; ACT, Lower extremity strength; TUG and FTSTS, Balance assessment; BBS, Flexibility; TTT.

- All scales used in the study were chosen from reliable and valid versions of the Turkish scales.

- Face-to-face and online assessments were performed in accordance with the testing procedures in the literature.

- A scheduled time for the evaluation day was offered to the participants.

- The participant prepared the necessary equipment before the test.

- On the day of the evaluation, participants were invited to bring a family member with them.

- The screen was altered for each test since the therapist and the participant needed to be able to see one another clearly.

- The participant was asked to conduct the test after the therapist demonstrated how it was done for all tests.

Upper Extremity Strength Assessment

Arm Curl Test (ACT)

Upper extremity flexor muscle strength and endurance evaluate with the ACT. This test is one of the testing protocols of the Senior's Fitness Test (17). The test aimed to complete as many curls as possible in 30 seconds. In the test, 2 kg dumbbells are used for women and 4 kg dumbbells are used for men for the curls of the dominant arm (18). In this study, white beans, rice or chickpea were used as a weight.

Online:

- The screen was adjusted.

- Therapist demonstrated the test.

- The weights that were prepared before the test were near the participant.

- Therapist asked the patient to take the weight from the ground, curl their forearm from the elbow and do curls in 30 secs as much as they could.

- Therapist was counting the curls with a chronometer.

- Number of curls was noted.

Lower Extremity Strength Assessment

Time up to go (TUG)

The test evaluates the dynamic balance in relation to the center of gravity. Also measure the sit-to-stand ability, walking and risk of falls for older adults. In this test, time is important. If the time exceeds 12 seconds, it means that the participant is at fall risk (19,20).

Online:

- The screen had been adjusted to follow the participant in a three-meter area.

- The chair with no arms was used.

- The participant measures the 3-meters distance.

- The chair was at the start point and the slipper was at the 3rd-meter point.

- Therapist demonstrated the test and the participant applied the test.

- The test time was determined by a chronometer and noted by the therapist.

Five times sit-to-stand test (FTSTS)
Five times sit-to-stand test is associated with lower extremity strength for the elderly. This test shows clinicians the relationship between static and dynamic balance and transitional movements for older adults (20,21).

Online:
- The screen was adjusted.
- The chair without arms was used.
- Therapist demonstrated the test.
- A chronometer was used to measure how many seconds it took to stand up and sit down at five times.
- The time elapsed while sitting and standing up five times was noted.

Balance Assessment

Berg Balance Scale (BBS)
The scale measures both static and dynamic balance with tasks. The 14 items in this scale measure the static sitting and standing balance. Normal performances are graded from 0 (the patient is unable the perform the task) to 4 points (normal performance) (22). In this study, a ruler and board pen were used for the evaluation of reaching forward with an outstretched arm while standing.

Online:
- The screen was adjusted.
- Two chairs were used (one of them had arms the other had no arms).
- Test was explained to the participant and their family member.
- Therapist demonstrated the all instructions before the participant applied.
- Family member helped with the measurement.
- During the evaluation, the therapist corrected the participant's posture verbally.
- All the instruction results were noted.

Flexibility Assessment

Toe touch test (TTT)
The Toe touch test is used to assess hamstring muscle flexibility. The therapist asks the participant to lean forward without bending the knees as far as s/he can on the step board. Step ground is accepted as ground (zero line). Measures are taken between the step ground and the participant's fingers (23). In this study, a ruler and board pen were used for distance measurement.

Online:
- The screen was adjusted.
- The test was explained to the participant and family member.
- A step board that the participant had was used.
- Therapist demonstrated the test.
- Therapist corrected the participant's posture verbally during the test.
- The top of the third finger of the participant was pointed with a board pen.
- The distance between the zero point and the top of the finger was measured by the family member.
- The distance was noted by therapist.

STATISTICAL ANALYSES

The IBM SPSS Statistics program was utilized to conduct the statistical analysis in this study. Wilcoxon test was used to analyze the differences between online and face-to-face groups. P-values above 0.05 showed no significant differences between the groups.

RESULTS

The participants' demographic features as age, BMI, MMSE and FES-1 values were given as mean and standard deviation in the table 1. The results of both online and face-to-face assessments were presented in the table 2. The results revealed that there were no statistically significant differences between the online and face-to-face assessments of the TUG (p=0.057), BBS (p= 0.546) and TTT (p=0.438). However, the online FTSTS (p=0.028) and ACT (p= 0.002) tests were significant differences compared to face-to-face evaluation.

Table 1: Descriptive statistics of demographic measurement

	Mean	SD
Age	59.1	8.02
Height (cm)	165.3	7.82
Weight (kg)	71.8	15.28
BMI (kg/m²)	26.18	4.55
MMSE	26.8	2.09
FES-1	19.8	4.29

(BMI: Body Mass Index, MMSE: Mini Mental State Examination, FES-1: Falls Efficacy Scale-1)

Table 2: Comparison of TUG, BBS, FTSTS, Arm Curl and Toe Touch tests of face-to-face and online assessments.

	Face-to-face Assessment	Online Assessment		
	Mean±SD	Mean±SD	Z	p
TUG (sec)	10.55±2.92	11.75±3.08	-1.904	0.057
BBS	49.9±2.78	49.75±3.12	-0.604	0.546
FTSTS (sec)	17.14±4.98	18.89±4.80	-2.203	**0.028**
ACT	18.8±3.59	16.1±4.27	-3.168	**0.002**
TTT (cm)	-4.15±17.05	-4.85±14.97	-0.776	0.438

(TUG: Timed Up and Go, BBS: Berg Balance Scale, FTSTS: Five Times Sit to Stand, TTT: Toe Touch Test)

DISCUSSION

This study aimed to compare the online and face-to-face assessment of physical functions in healthy adults. The study found that there were no statistically significant differences between face-to-face evaluation and on the online platform for the TUG, BBS, and TTT assessments which are perform on the supervised online platform.

In the literature many studies show that the possibility of exercise prescription and following their efficiency on the online platform. However, there are very few studies on recent online assessment. Studies that are exercise prescription and following their efficiency did not report if the assessment of the physical functions was done on the online platform (7,24-26). One study performed a remote tele-assessment for patients with Multiple Sclerosis. In this study, researchers were testing balance (TUG and BBS) and also Hand-Grip Strength. While the findings of this study are consistent with the TUG and BBS results of our study, the opposite result was obtained for functional exercise capacity (FTSTS). However, results of the studies validity and reliability have not tested yet (13). Beside, the Tele-rehabilitation was assessment of 30 seconds of sit-to-stand (30-s STS) test for people with type 2 diabetes. Face-to-face assessment and tele-assessment were doing with WhatsApp application by different physiotherapists. This study revealed that although physiotherapists used different assessment methods, there was no difference between the results (27). In additionally, Mani et al. showed that Tele-rehabilitation based assessments were valid and reliable for the neck pain intensity, active range of motion, deep neck flexor muscle endurance and disability with using computer program. They found that acceptable values for the validity and higher degree of reliability values for this study (10). In another study, face-to-face and Tele-rehabilitation online evaluations of people with low back pain were made by different therapists, and as a result, researcher explain that Tele-rehabilitation could be used for the people with minimal disability of low back pain (12). Tore et al. showed the telerehabilitation exercise program had great effect on patients with knee osteoarthritis. And the groups had been evaluated before the exercise program via Zoom Meetings for only 30 chair-stand test (CST). The results of the study, both groups mean scores increased in 30 CST. However, Tele-rehabilitation group showed statistically significant improvements of physical functions (28).

In our study, we observed statistically significant differences between the online and face-to-face evaluation scores of the FTSTS and Arm Curl. We noted that the Arm Curl and FTSTS test results may be impacted by internet speed. Internet issues may impact both fine and gross movements, as indicated by a recent study on Tele-rehabilitation (29). The patients might not have understood the directions when the researcher conducted the tests. For this reason, we consider that prior experience of online evaluations by therapists will be useful in solving the problems that may arise during the evaluation.

The most important difference of our study from other studies is that it was carried out at home and by the same physiotherapist. In addition, the study design is planned in such a way that everyone can easily implement it without a special technological arrangement. Tele-rehabilitation applications will be used more widely in the future, so we think it is important to determine the standards for the online use of all assessment methods. The current study has shown that can be performed to adults of the assessments of TUG, BBS and TTT tests on the supervised online platform.

DECLARATIONS

Ethics Approval

This study was performed in line with the principles of the Declaration of Helsinki. The Yeditepe University Non-Interventional Clinical Research Ethics Committee approved the study (E.83321821-805.02.03-64, 19 October 2022).

Consent to Participate

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

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Conflict of Interest

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

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Rehabilitation / Rehabilitasyon

Possible Demographic, Physical, and Psychological Characteristics Associated with Internet Addiction in Turkish People

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ABSTRACT

Background: Internet addiction, which affects people of all ages and backgrounds, is a worldwide issue that has to be addressed. To date, little is known about the demographic, physical, and psychological characteristics of Turkish adults with this addiction. Therefore, the aim of this study was to investigate the possible demographic, physical, and psychological characteristics associated with Internet addiction in Turkish adults, with the goal of informing prevention and intervention efforts.

Methods: The sociodemographic information collected included age, sex, dominant upper limb, educational status, employment status, size of place of residence, and smoking status. The Internet Addiction Scale was used to assess the participants' addiction. The International Physical Activity Questionnaire was used to assess physical activity levels. The Beck Depression Inventory was used to assess depression-related symptoms and the Pittsburgh Sleep Quality Index was used to assess sleep quality.

Results: The participants in the study had a mean age of 45 years with a standard deviation of ±9 years, ranging from 18 to 65 years. The multinomial logistic regression analysis revealed that, among the variables studied, only moderate or severe depression was significantly associated with strong Internet addiction with an odds ratio of 11.496 ($p=0.002$). None of the other variables showed a significant association with strong Internet addiction ($p>0.05$).

Conclusion: Overall, the findings of this study highlight the importance of considering depression as a potential risk factor for Internet addiction. Future research could explore the underlying mechanisms and causal pathways between depression and this addiction, and investigate potential interventions to address the issue.

Keywords: Depression, Internet addiction, Physical activity, Sleep quality, Turkish people

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Türk Halkı'nda İnternet Bağımlılığıyla İlişkili Olası Demografik, Fiziksel ve Psikolojik Özellikler

ÖZET

Arka plan: İnternet bağımlılığı, her yaştan ve farklı geçmişlere sahip bireyleri etkileyen, dünya çapında büyüyen bir endişe kaynağıdır. Bugüne kadar internet bağımlısı Türk yetişkinlerinin demografik, fiziksel ve psikolojik özellikleri hakkında yeterince bilgi bulunmamaktadır. Bu nedenle, bu çalışmanın amacı, önleme ve müdahale çabalarına bilgi vermek amacıyla Türk yetişkinlerinde internet bağımlılığıyla ilişkili olası demografik, fiziksel ve psikolojik özellikleri araştırmaktır.

Yöntemler: Bu çalışmada toplanan sosyodemografik bilgiler yaş, cinsiyet, baskın üst ekstremite, eğitim durumu, çalışma durumu, ikamet edilen yerin büyüklüğü ve sigara kullanımını içermektedir. İnternet bağımlılığını değerlendirmek için İnternet Bağımlılığı Ölçeği kullanıldı. Fiziksel aktivite düzeylerini değerlendirmek için Uluslararası Fiziksel Aktivite Anketi kullanıldı. Depresyonla ilişkili semptomları değerlendirmek için Beck Depresyon Envanteri, uyku kalitesini değerlendirmek için Pittsburgh Uyku Kalitesi İndeksi kullanıldı.

Bulgular: Çalışmaya katılanların ortalama yaşı 45, standart sapması ±9 yıl olup, 18 ile 65 arasında değişmektedir. Çok terimli lojistik regresyon analizi, incelenen değişkenler arasında yalnızca orta veya şiddetli depresyonun, 11.496 olasılık oranı ve 0.002 p değeri ile güçlü internet bağımlılığı ile anlamlı şekilde ilişkili olduğunu ortaya koydu. Diğer değişkenlerin hiçbiri güçlü internet bağımlılığı ile anlamlı bir ilişki göstermedi ($p>0.05$).

Sonuç: Genel olarak, bu çalışmanın bulguları, depresyonu internet bağımlılığı için potansiyel bir risk faktörü olarak görmenin önemini vurgulamaktadır. Gelecekteki araştırmalar, depresyon ve internet bağımlılığı arasındaki altta yatan mekanizmaları ve nedensel yolları keşfedebilir ve bu konuyu ele almak için potansiyel müdahaleleri araştırabilir.

Anahtar kelimeler: Depresyon, İnternet bağımlılığı, Fiziksel aktivite, Uyku kalitesi, Türk insanı

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Internet addiction is a worldwide issue affecting people of all ages and backgrounds (1). Adult Internet addiction has developed in Türkiye as a result of the Internet's increased accessibility and availability. A variety of detrimental health and psychological effects, including sleep difficulties, anxiety, sadness, and social isolation, have been linked to this addiction (2).

Age, sex, educational attainment, and employment status were all factors included in the study. Young people are more likely than older people to develop an Internet addiction, as has been demonstrated numerous times (3). For instance, a study found that those between the ages of 18 and 24 are more likely than those between the ages of 25 and 34 to develop this addiction (4). The link between sex and Internet addiction is less obvious than it is with age (3). There is no difference between the sexes in terms of Internet addiction according to several studies (5-7). Sex is not a factor in Internet addiction, according to a Turkish study (8). Lower levels of addiction have been linked to higher levels of education (9). For instance, a Chinese study indicated that those with more education have lower rates of Internet addiction (10). The data supporting a link between employment status and Internet addiction are conflicting. While some studies have revealed a strong correlation between Internet addiction and unemployment, others have found no such correlation (11, 12). While there are some general trends in the data on demographics and Internet addiction, the relationship is complicated and could be influenced by contextual and cultural factors. There has been little systematic research on the connection between physical traits and Internet addiction. Body mass index (BMI) and Internet addiction appear to be positively correlated in some studies. According to this finding, those with higher BMIs are more likely to have online addiction. Elevated BMI has been linked to increased levels of Internet addiction according to several studies (13–15). Additionally, sleep issues such trouble falling asleep or waking up early have also been linked to this addiction (16). According to a Chinese study (17), Internet addiction is strongly linked to poor sleep quality. It is unclear whether physical exercise and Internet addiction are related. Higher levels of physical activity have been linked to decreased levels of Internet addiction in some studies, whereas no significant relationship has been observed in others (18–20). Internet use for extended periods has been linked to musculoskeletal problems such eyestrain and back and neck pain (21). Internet addiction was linked to greater prevalence of musculoskeletal issues according to a study performed in Türkiye (22). Overall, more research is required to clearly correlate Internet addiction to certain physical traits, despite the fact that they are associated. Numerous correlations between numerous psychological traits and Internet addiction have been discovered. Higher levels of anxiety and despair have been linked to Internet addiction. For instance, a study indicated that people with this addiction had higher levels of anxiety and despair than people without it (23).

Lack of social support and social anxiety have been linked to Internet addiction. According to one study, people addicted to the Internet had lower levels of social support and higher levels of social anxiety than people not addicted (24). Internet addiction has been linked to specific personality features. For instance, research has shown that Internet addicts tend to be less pleasant and conscientious and more neurotic (25). Higher degrees of impulsivity have been linked to this addiction. According to a Chinese study, people addicted to the Internet had higher degrees of impulsivity than those who were not (26). In general, psychological variables appear to be significant in the emergence and perpetuation of this addiction. To completely comprehend the intricate connection between psychological traits and Internet addiction, more research is required.

The demographic, physical, and psychological traits of Turkish Internet addicts are still mostly unknown. In order to inform preventative and therapeutic efforts, the purpose of our study was to evaluate the potential associated demographic, physical, and psychological traits of Internet addiction in Turkish people.

METHODS

Participants

In January-February 2023, 100 adults (55 females, 45 males) voluntarily participated in the study (Table 1). All measurements were performed at Çankırı Karatekin University's Department of Occupational Therapy. The local ethics committee of Çankırı Karatekin University approved the protocol for the study (Protocol ID: ee880d6501f54d5c). All participants provided informed consent before enrollment.

This cross-sectional study was conducted with data obtained in January-February 2023 in Türkiye and investigated the relationship between characteristics (demographic, physical, and psychological) and internet addiction. All participants signed a consent form explaining the study's aims and procedures. The study was performed

in line with the principles of the Declaration of Helsinki. Informed consent was obtained from all the participants. Those with certain abnormalities, such as cognitive or neurological disorders, pain in the upper extremities, functional limitations, or cognitive impairments, were excluded from the study to ensure appropriate norms. The sample consisted of 100 adults aged 18-65 years. All were literate and all reportedly routinely used internet. Fourteen participants were excluded because they had not filled out the information forms adequately. The results of a similar study investigating factors influencing smartphone addiction among adults in Brazil were used to estimate the appropriate sample level. Based on the logistic regression results in that study, 94 participants was chosen as the minimum required sample size for a study with an expected odds ratio of 1.9 at the 80% confidence interval. Considering 10% data loss, it was decided to carry out the study with at least 104 people (27).

Main Outcomes

Sociodemographic Information

Age, sex, dominant upper limb, educational status, employment status, size of place of residence, and cigarette and alcohol consumption were recorded. The instrument was designed by the researchers based on a population survey.

Internet Addiction Scale (IAS)

The IAS was developed in 2009 and its validity and reliability were confirmed (28). The scale consists of 35 items and has four subdimensions: deprivation, difficulty in control, impairment in functioning, and social isolation. Items are evaluated using a 5-point Likert-type scale (completely agree, agree, undecided, disagree, and strongly disagree) and each item is scored from 5 to 1. All items of the scale are for addiction and no score conversion was conducted. In the evaluation of the score obtained from the scale, two-stage clustering analysis was performed with the total scores obtained from the participants and addiction status. They were classified into 4 groups: the addicted group (>118), the group at risk of addiction (90-118), the threshold group (67-90), and the non-dependent group (<67).

International Physical Activity Questionnaire (IPAQ)

Eight items are used in the IPAQ to gauge how much time and effort people devote to physical exercise in various contexts, including work, transit, housework, and leisure. The degrees of physical activity are divided using the IPAQ (29). Accordingly, the metabolic equivalent of task (MET) can be divided into low, moderate, and high categories. Less than 600 MET-min/week is considered low (sedentary, inactive), 601-3000 MET-min/week is considered moderate, and more than 3000 MET-min/week is considered high physical activity.

Beck Depression Inventory (BDI)

The BDI assesses symptoms related to depression. It is a scale consisting of 21 items and measures the cognitive, emotional, behavioral, somatic, and motivational symptoms of depression. Symptoms in the scale include sadness, pessimism, dissatisfaction with oneself, sleep-related problems, and depressive complaints such as fatigue. Each question in the scale includes four different options, ranging from zero to three, from mild to severe. Total scoring ranges from 0 to 63. Depression is determined by summing the scores for all questions. The higher the total score, the higher the severity of depression. If the BDI total score is between 0 and 9, it means "no depression", between 10 and 16 "mild depression", between 17 and 29 "moderate depression", and between 30 and 63 "severe depression" (30).

Pittsburgh Sleep Quality Index (PSQI)

The PSQI was developed to determine the sleep quality of individuals. Eighteen of the questions are self-report questions. Although 5 questions are answered by the spouse or roommate of the individual, they are excluded from the scoring. Each of the components is included in the calculation by giving a score between 0 and 3. By summing the scores of the 7 components, the total PSQI score is obtained. The total score ranges from 0 to 21. If the total PSQI score is greater than 5, sleep quality is considered poor (30).

Statistical Analysis

Using SPSS Statistics (v.28.0), descriptive and inferential statistical analysis of the data acquired was performed. While numerical variables were expressed as mean and standard deviation, qualitative variables were expressed as relative (%) and absolute (n) frequencies. Inferential statistics were used to assess several dichotomized variables. In the bivariate analysis, Pearson's chi-squared test, raw odds ratios (ORs), and their corresponding confidence intervals (CIs) were used to find correlations between the dependent variable (degree of Internet addiction) and the other variables. Multivariate logistic regression was then carried out. A 5% level of statistical significance was used to obtain adjusted OR values and their corresponding CIs.

RESULTS

The participants in the study had an average age of 45 years with a standard deviation of ±9 years, ranging from 18 to 65 years. The mean BMI was 26.5 with a standard deviation of ±4.4. The average IPAQ score was 2711.7 with a standard deviation of ±2447.9. The mean BDI score was 12.4 with a standard deviation of ±7.9. The mean IAS score was 74.7 with a standard deviation of ±30.4. Lastly, the mean PSQI score was 5.8 with a standard deviation of ±2.9. The predominant sociodemographic and lifestyle characteristics of the sample were as follows: 55.0% of the participants were female (n=55), 46.0% had a middle school education (n=46), 52.0% were employed (n=52), 56.0% lived in rural areas (n=56), 64.0% were non-smokers (n=64), 89.0% reported no alcohol consumption (n=89), 48.0% had a moderate level of physical activity (n=48), 40.0% reported mild depression (n=40), 48.0% had a moderate level of physical activity (n=48), 39.0% were not addicted to the Internet (n=39), and 52.0% reported poor sleep quality (n=52) (Table 1).

Table 1. Distribution of sociodemographic variables

	Mean±SD	n (%)
Age	45.4±9.2	
Sex		
female		55 (55%)
male		45 (45%)
Weight	74.8±12.9	
Height (cm)	168.4±8.9	
BMI	26.5±4.4	
Educational Status		
elementary school		7 (7%)
middle school		46 (46%)
high school		19 (19%)
bachelor's degree or higher		28 (28%)
Working Status		
employed		52 (52%)
non-employed		48 (48%)
Living Status		
rural		56 (56%)
urban		44 (43%)
Smoking		
smoker		36 (36%)
non-smoker		64 (64%)
Alcohol Consumption		
yes		11 (11%)
no		89 (89%)
Physical Activity (IPAQ)	2711.7±2447.9	
low (<600)		26 (26%)
moderate (600-3000)		48 (48%)
high (>3000)		26 (26%)
Depression (BDI)	12.4±7.9	
no depression (0-9)		34 (34%)
mild depression (10-16)		40 (40%)
moderate or severe depression (17-63)		26 (26%)
Internet Addiction (IAS)	74.7±30.4	
addicted (>118) — **STRONG**		
risk of addiction (90-118) — **STRONG**		
threshold (67-90) — **WEAK**		
non-addicted (<67) — **WEAK**		
Sleep Quality (PSQI)	5.8±2.9	
poor (>5)	52 (52%)	
good (≤5)	48 (48%)	

Abbreviations: SD: Standard deviation, BMI: Body Mass Index, IPAQ: International Physical Activity Questionnaire, BDI: Beck Depression Inventory, IAS: Internet Addiction Scale, PSQI: Pittsburgh Sleep Quality Index.

The multinomial logistic regression analysis revealed that among the variables studied only moderate or severe depression was significantly associated with strong Internet addiction (n=30; 30%) with an OR of 11.496 and a p-value of 0.002. None of the other variables showed a significant association with strong Internet addiction (p>0.05) (Table 2).

DISCUSSION

The results of our study revealed that moderate or severe depression was significantly associated with strong Internet addiction, as demonstrated by the multinomial logistic regression analysis. Participants who reported moderate or severe depression were approximately 11 times more likely to exhibit strong Internet addiction compared to those without depression. However, none of the other variables studied, including age, BMI, physical activity level, education, employment status, alcohol consumption, smoking status, rural/urban residence, and sleep quality, showed a significant association with strong Internet addiction.

Table 2. Association of Variables with Strong Internet Addiction Based on Multinomial Logistic Regression Analysis

Variable	Internet Addiction		Raw OR (95% CI)	p-value
	Weak n (%)	Strong n (%)		
Age				
(>45) (Ref)	42	17	1	
(≤45)	28	13	1.692	0.233
Sex				
male (Ref)	32 (45.8)	13 (43.3%)	1	
female	38 (54.2%)	17 (56.7%)	0.916 (0.249-3.372)	0.895
Educational status				
elementary school (Ref)	4 (5.6%)	3 (10%)	1	
middle school	37 (52.9%)	9 (30%)	0.425 (0.044-4.083)	0.458
high school	13 (18.6%)	6 (20%)	0.540 (0.046-6.284)	0.623
bachelor's degree or higher	16 (22.9%)	12 (40%)	1.286 (0.122-13.587)	0.835
Working Status				
employed (Ref)	40 (57.2%)	18 (60%)	1	
not employed	30 (42.8%)	12 (40%)	1.722 (0.474-6.260)	0.409
Living Status				
urban (Ref)	30 (42.9%)	14 (46.7%)	1	
rural	40 (57.1%)	16 (53.3%)	1.488 (0.436-5.076)	0.526
Smoking				
non-smoker (Ref)	47	17 (56.7%)	1	
smoker	23	13 (43.3%)	2.481 (0.710-8.663)	0.155
Physical activity				
high (>3000) (Ref)	19 (27.1%)	7 (23.3%)	1	
moderate (600-3000)	31 (44.3%)	17 (56.7%)	1.182 (0.299-4.669)	0.811
low (<600)	20 (28.6%)	6 (20%)	0.336 (0.069-1.628)	0.176
Depression				
no depression (0-9) (Ref)	27 (38.5%)	7 (23.3%)	1	
mild depression (10-16)	35 (50%)	5 (16.7%)	0.750 (0.162-3.479)	0.714
moderate or severe depression (17-63)	8 (12.5%)	18 (60%)	11.496 (2.466-53.581)	0.002
Sleep quality				
good (≤5) (Ref)	35 (50%)	13 (43.3%)	1	
poor (>5)	35 (50%)	17 (56.7%)	1.737 (0.519-5.815)	0.370

*Abbreviations: Ref: reference, OR=odds ratio; 95% IC=95% confidence interval. Chi-squared test, *=p<0.05.*

According to these findings, depression may be a serious risk factor for the emergence of this addiction. This is in line with earlier studies that established a connection between depression and problematic Internet use, as people with depression may use the Internet as a coping technique or a means of escape (31, 32). The propensity of depressed people to look for solace, diversion, and social engagement online, which results in excessive and compulsive Internet use, may be the explanation for the link between depression and Internet addiction (33, 34). Age, education, employment status, and rural/urban residence may not have been strong predictors of Internet addiction in this particular sample, based on the lack of significant associations between other sociodemographic and lifestyle characteristics and strong Internet addiction in our study. It is crucial to keep in mind that we used a specific sample with certain features and, as a result, the conclusions may not apply to other groups (35, 36). To fully comprehend the complicated relationship between Internet addiction and different sociodemographic and lifestyle aspects, more research is required.

To gain a deeper knowledge of the risk factors for problematic Internet use, future studies may examine additional possible predictors of Internet addiction, such as personality traits, cognitive factors, and social factors. Additionally, longitudinal research could shed light on the underlying mechanisms and causal pathways relating these two phenomena and assist in clarify the temporal association between depression and Internet addiction. Furthermore, to contribute to clinical practice and public health policies addressing this expanding problem, therapies that focus on depression as a risk factor for Internet addiction might be created and assessed.

Nevertheless, it is important to acknowledge that the remaining variables examined in this study did not exhibit a statistically significant correlation with severe Internet addiction. The variables examined in this study encompassed a diverse range of factors, such as age, BMI (Body Mass Index), level of physical activity, educational attainment, employment status, alcohol consumption, smoking habits, rural or urban residence, and sleep quality. The study's findings indicate that these variables may not significantly influence the likelihood of developing strong Internet addiction, consistent with mixed literature on the relationship between these variables and addiction. Previous research examining the influence of age on Internet addiction has produced inconclusive results, as certain studies have indicated a positive relationship (37), while others have found no significant correlation (38). The lack of a substantial correlation between variables such as BMI, physical activity level, educational attainment, and employment status, and the occurrence of Internet addiction in our research prompts intriguing inquiries and necessitates additional investigation. While prior studies have indicated a possible correlation between these factors and Internet addiction, our research findings are consistent with an expanding body of scholarly work that has produced contradictory outcomes (6,13,39). There are several possible explanations that could contribute to the absence of observed associations in our study. Firstly, it is plausible that the influence of these variables on Internet addiction is intricate and subject to diverse individual, cultural, and contextual factors. In our study, we did not directly assess psychological factors such as self-esteem or body image dissatisfaction, which may potentially mediate the relationship between BMI and Internet addiction. Moreover, the impact of one's level of physical activity on the development of Internet addiction may depend on various factors such as the specific type and intensity of activities involved, as well as the presence of alternative leisure choices. Furthermore, the complex nature of education and employment status could potentially account for the inconclusive results. Nevertheless, it is imperative to conduct further investigation in order to comprehend the intricate mechanisms that underlie these relationships.

It is crucial to be aware of the limitations of the present study, including the use of a narrowly defined sample and the cross-sectional nature of the data, which precluded drawing inferences about causation. However, the research adds to the expanding body of knowledge on Internet addiction and offers insightful information about how depression plays a part in this phenomenon. It is necessary to conduct more studies to fully comprehend the underlying mechanisms and potential treatments for depression as a risk factor for Internet addiction.

CONCLUSION

Overall, the study's findings emphasize the significance of taking depression into account as a potential risk factor for Internet addiction. Clinicians and practitioners may need to screen and intervene for depression in people at risk for developing this addiction. They should be aware of the link between depression and problematic Internet use. Future studies should examine the underlying causes and causal chains that link depression to Internet addiction and look into new treatment options.

DECLARATIONS

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None.

Conflict of Interest

There is no conflict of interest.

Ethics Approval

Written informed consent was obtained from the individuals participating in the study and their parents (Protocol ID: ee880d6501f54d5c).

Authors' Contributions

Conceived and designed the analysis: CT, NŞ, TA, MYG; Collected the data: NŞ, TA; Contributed data or analysis tools: CT, NŞ, TA, MYG; Performed the analysis: CT; Wrote the paper: CT, NŞ; Final review; MYG

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Healthcare Management / Sağlık Yönetimi

Evaluation of Vaccination and Polymerase Chain Reaction Test Positivity of Hospital Personnel During the COVID-19 Pandemic

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ABSTRACT

Objective: This study aimed to evaluate the vaccination and polymerase chain reaction (PCR) test positivity of hospital personnel during the COVID-19 pandemic.

Methods: The research is a retrospective cross-sectional study and was conducted in a university hospital in Istanbul between January 01, 2021, and December 31, 2021. The data of 572 personnel, who did not experience admission to employment-quit job mobility, were evaluated in the study. Descriptive statistics and Chi-square test were used to analyze the dataset.

Results: According to the findings, it was seen that 95% of the participants had at least one dose of vaccination, and the participants aged 51 and over together with the physicians had the highest vaccination rate. It was conducted that 9% of the participants had a chronic disease, and 3% of the participants were hospitalized due to COVID-19. It was determined that the pre-vaccination PCR positivity rate of hospital personnel was 19%, and the post-vaccination PCR positivity rate was lower than those who did not get vaccinated. In the study, a statistically significant difference was found between vaccination status of the participants and post-vaccine PCR positivity ($p<0.05$).

Conclusion: It is important to make arrangements for the vaccination of hospital personnel with the high-risk group in terms of transmission during the pandemic.

Keywords: COVID-19, Hospital Personnel, PCR, Vaccination

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COVID-19 Pandemisi Sürecinde Hastane Çalışanlarının Aşılanma ve Polimeraz Zincir Reaksiyonu Testi Pozitiflik Durumunun Değerlendirilmesi

ÖZET

Amaç: Bu çalışmanın amacı COVID-19 pandemisi sürecinde hastane çalışanlarının aşılanma ve polimeraz zincir reaksiyonu (PCR) testi pozitiflik durumlarının değerlendirilmesidir.

Yöntem: Retrospektif türde kesitsel olarak tasarlanan çalışma İstanbul'da yer alan bir üniversite hastanesinde 01.01.2021-31.12.2021 tarihleri arasında yapılmıştır. Çalışmada işe giriş-çıkış hareketliliği yaşamamış 572 personelin verileri değerlendirilmiştir. Verilerin analizinde tanımlayıcı istatistiklerden ve Ki-kare testinden yararlanılmıştır.

Bulgular: Çalışma sonucunda elde edilen bulgulara göre, katılımcıların %95'inin en az bir doz aşı yaptırdığı, 51 yaş ve üzeri katılımcılar ile hekimlerin en yüksek aşılanma oranına sahip olduğu görülmüştür. Katılımcıların %9'unun kronik hastalık öyküsü olduğu, %3'ünün COVID-19 nedeniyle hastanede yatarak tedavi gördüğü tespit edilmiştir. Araştırmada hastane çalışanlarının aşılanma öncesi PCR pozitiflik oranının %19 olduğu, COVID-19 aşısı yaptıran çalışanların aşılama sonrası PCR pozitiflik oranının, aşı yaptırmayan çalışanlara oranla daha düşük olduğu tespit edilmiştir. Çalışmada aşı olma durumu ile aşı sonrası PCR pozitifliği arasında istatistiksel olarak anlamlı bir fark saptanmıştır ($p<0,05$).

Sonuç: Pandemi sürecinde bulaşma açısından yüksek risk grubunda yer alan hastane personelinin aşılanmasına yönelik düzenlemelerin yapılması önemlidir.

Anahtar Kelimeler: COVID-19, Hastane çalışanları, PCR, Aşılanma

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The coronavirus disease, which emerged in China in December 2019, has caused severe and fatal respiratory symptoms in humans. Many countries announced the number of cases and declared a health emergency soon after it was seen in China. The World Health Organization (WHO) has declared COVID-19 a global pandemic on March 11, 2020. The Ministry of Health reported the first COVID-19 case in Turkey on the same day that the pandemic was declared.

The pandemic has caused great pressure on the health systems of the countries. Healthcare personnel made great efforts in terms of the sustainability of the system, and they have played an important role in the fight against to the virus during pandemic. They are the most valuable resource in the global fight against COVID-19, and ensuring their safety is one of the top priorities (1). Especially hospital personnel who have close contact with patients infected by the COVID-19 virus have been evaluated in the high-risk group (2). Therefore, it has been stated that protecting the personnel is crucial for patient treatment and the prevention of transmission to other patients (1,3,4). According to a study conducted in Korea, healthcare personnel have a high risk of contracting the COVID-19 pandemic, and governments should make regulations to protect them (5).

Vaccination is one of the most effective ways to protect healthcare personnel from COVID-19 infection. Vaccines are the most powerful and cost-effective way to prevent infectious diseases worldwide. Evidence- based studies show that vaccines can reduce COVID-19 infection (6,7). Nguyen et al. found that vaccines reduce COVID-19 infection by 70-90% and protect healthcare personnel against serious infections (8). Centers for Disease Control and Prevention (CDC) stated that COVID-19 vaccines protect people against infection, symptomatic illness, hospitalization, and death (9). According to another study conducted in China, it is critical to develop proper vaccine strategies and immunization programs in order to respond to the COVID-19 pandemic (10). Therefore, healthcare personnel have been evaluated as the priority group in terms of access to vaccines in many countries (11). WHO and the Ministry of Health have also identified healthcare personnel as the priority group for vaccination against COVID-19 (12,13). In addition, vaccination is mandatory for healthcare personnel in some countries (14). At this point, management approaches to immunization are becoming increasingly important in the fight against the COVID-19 pandemic.

The success of vaccination programs depend on several requirements such as the understanding of leadership that responds quickly in the effective fight against the pandemic, the use of appropriate screening methods, effective treatment, evidence-based education programs and protocols, and also surveillance studies (4,13). When these requirements are not adequately satisfied, healthcare personnel suffers a variety of issues, such as infection risk, fear of death, anxiety, stress, depression, and stigmatization (15). In addition, research shows that previous COVID-19 infections protect individuals against new infections, and this protection lasts 4-6 months for the majority of healthcare personnel (16,17). Therefore, polymerase chain reaction (PCR) tests are important for the effective use of vaccines and the early detection of asymptomatic COVID-19 cases. This study aimed to evaluate the vaccination and PCR test positivity of hospital personnel during the COVID-19 pandemic. The study's contribution to the literature is summarized below:

- To be informed about the state of being affected by COVID-19, the number of vaccine doses, PCR positivity according to the occupational group, and the immunization rates of hospital personnel in a university hospital during the COVID-19 pandemic
- To examine the relationship between vaccination and PCR positivity
- Contributing to the determination of institutional policies for the protection of hospital personnel during the pandemic.

MATERIAL AND METHODS

The retrospective cross-sectional study was conducted in a university hospital in Istanbul. Institutional permission was obtained for the research.

Samples

In the study, the data of 572 personnel who worked in the institution between January 01, 2021, and December 31, 2021, and who did not experience admission to employment-quit job mobility were evaluated. In the study, sample selection was not made and the entire population was taken into consideration.

Measures

The records of the occupational health and safety unit were used as a data collection tool. In the study, participants' age, gender, profession, chronic disease history,

hospitalization due to COVID-19, being vaccinated against COVID-19, and PCR test positivity were evaluated.

Data Analysis

The data were analyzed using IBM SPSS (Version 23.0). Descriptive statistics and chi-square test were used in the data analysis.

RESULTS

Descriptive characteristics of the participants are shown in Table 1. Accordingly, 65% of the participants were women, 32.3% were in the 20-29 age group, 25.3% were support services personnel, and 95.1% had at least one dose of COVID-19 vaccine. In addition, it was seen that 3.3% of the participants were hospitalized due to COVID-19, 19.1% had a positive PCR test before vaccination, and 14% had a positive post-vaccination PCR test.

The relationship between the third and fourth dose of vaccination of the participants by occupation is shown in Table 2. A statistically significant difference was found between getting the third and fourth dose of the vaccine according to the occupation of the participants ($p<0.05$). In the further analysis, it was determined that for the third and fourth dose, the difference was between physicians and all occupation categories.

The relationship between the third and fourth dose of the vaccination of the participants by age is shown in Table 3. A statistically significant difference was found between getting the third and fourth dose of the vaccine according to the age groups of the participants ($p<0.05$). In the further analysis, it was determined that the difference for the third dose was between the 20-29 age group and the 40-49 and 50 and over age group. For the fourth dose, it was determined that the difference was between the 20-29 age group and the other age groups, and the 50 and over age group and the 30-39, 40-49 age groups.

The relationship between pre-vaccine PCR positivity and post-vaccine PCR positivity with hospitalization is shown in Table 4. A statistically significant difference was found between the pre- and post-vaccine PCR positivity ($p<0.001$). Post-vaccination PCR positivity rate was found to be lower in vaccinated group compared to non-vaccinated ones. According to the Fisher's Exact Test results, which were performed to evaluate the relationship between pre-vaccine PCR positivity and hospitalization of the participants in Table 4, there is a statistically significant difference between pre-vaccine PCR positivity and hospitalization ($p<0.001$).

Table 1. Descriptive Characteristics of the Participants (N:572)

Variables		n	%
Gender			
Male		200	35
Female		372	65
Age			
20-29		185	32.3
30-39		163	28.5
40-49		146	25.5
50 and over		78	13.6
Profession			
Physician		86	15.0
Nurse		123	21.5
Technician		51	8.9
Administrative personnel		138	24.1
Support services		145	25.3
Other		29	5.1
State of being vaccinated			
Yes		544	95.1
No		28	4.9
Hospitalization status			
Yes		19	3.3
No		553	96.7
Pre-vaccine PCR positivity status			
Yes		109	19.1
No		463	80.9
Post-vaccine PCR positivity status			
Yes		80	14.0
No		492	86.0
State of being vaccinated			
1st Dose	**Yes**	544	95.1
	No	28	4.9
2nd Dose	**Yes**	533	93.2
	No	39	6.8
3rd Dose	**Yes**	389	68.0
	No	183	32.0
4th Dose	**Yes**	175	30.6
	No	397	69.4
5th Dose	**Yes**	3	0.5
	No	569	99.5
Total		**572**	**100**

Table 2. The Relationship between the Third and Fourth Vaccination Dose of the Participants by Professions

	Yes		No		X^2	SD	p
Third dose vaccination status							
	n	%	n	%			
Physician	82	21.1	4	2.2	48.790	5	.000
Nurse	75	19.3	48	26.2			
Technician	33	8.5	18	9.8			
Administrative personnel	92	23.7	46	25.1			
Support services	81	20.8	64	35			
Other	26	6.7	3	1.6			
Total	**389**	**100**	**183**	**100**			
Fourth dose vaccination status							
Physician	68	38.9	18	4.5	124.927	5	.000
Nurse	26	14.9	97	24.4			
Technician	10	5.7	41	10.3			
Administrative personnel	41	23.4	97	24.4			
Support services	19	10.9	126	31.7			
Other	11	6.3	18	4.5			
Total	**175**	**100**	**397**	**100**			

Table 3. The Relationship between the Third and Fourth Vaccination Dose of the Participants by Age

	Yes		No		X^2	SD	p
Third dose vaccination status							
	n	%	n	%			
20-29	110	28.3	75	41	20.053	3	.000
30-39	108	27.8	55	30.1			
40-49	103	26.5	43	23.5			
50 and over	68	17.5	10	5.5			
Total	389	100	183	100			
Fourth dose vaccination status							
20-29	31	17.7	154	38.8	42.668	3	.000
30-39	46	26.3	117	29.5			
40-49	55	31.4	91	22.9			
50 and over	43	24.6	35	8.8			
Total	175	100	397	100			

Table 4. The relationship between Pre-vaccine PCR Positivity and Post-vaccine PCR Positivity and Hospitalization

		Yes		No		X^2	SD	p
Post-vaccine PCR positivity								
		n	%	n	%			
Pre-vaccine PCR positivity	**Yes**	3	2.8	106	97.2	14.126	1	.000
	No	77	16.6	386	83.4			
	Total	80	14	492	86			
Hospitalization status								
		Yes		**No**		X^2	SD	p
		n	%	n	%			
Pre-vaccine PCR positivity	**Yes**	13	11.9	96	88.1	31.049	1	.000
	No	6	1.3	457	98.7			
	Total	19	3.3	553	96.7			

DISCUSSION AND CONCLUSION

In the study, it was found that 95% of the participants had at least one dose of COVID-19 vaccine and the highest vaccination rate was in the 50 years and older group. The rate of vaccination increases with age. Tyagi et al. and Peirolo et al. found the vaccination rate of healthcare personnel to be 91.9% and 88%, respectively, consistent with our findings (18,19). According to a comprehensive study that included 3,357,348 healthcare personnel from 2,086 hospitals in the United States, 70% of the participants were vaccinated, and concluded that more efforts were needed to boost the immunization rate (20). Another study conducted in Colombia found that full vaccination against COVID-19 is effective in preventing COVID-19 hospitalization and deaths in adults aged 60 and over, stated that vaccines should be evaluated in the priority group because their effectiveness decreases with the age, and that a booster dose can be recommended (21). In addition, CDC noted that adults over the age of 65 who received the vaccine had a 94% reduction in the risk of COVID-19-related hospitalization (22). The highest rate of vaccination in the older age group can be explained by the increased risk of contracting the disease with the age.

In the study, physicians were found to be the most vaccinated group, with more than 90% of individuals in other occupations having received at least one dose of immunization. Lee et al. found that vaccination coverage was the highest among physicians similarly (75.1%) (23). Many specialist and professional organizations have recommended the COVID-19 vaccination that protects patients and healthcare personnel from COVID-19 infection (24). Physicians' high immunization rate can be explained by their strong conviction in the efficacy of COVID-19 vaccines.

It was determined that 9% of the hospital personnel had a history of chronic disease and all of these individuals had at least one dose of the COVID-19 vaccine. Peirolo et al. found the vaccination rate of healthcare personnel with chronic diseases as 89% (19), consistent with our findings. These outcomes suggest that healthcare personnel with chronic diseases are more sensitive to vaccination.

According to the study, hospitalization symptoms occurred in 3.3% of the participants, and there was a statistically significant difference between pre-vaccination PCR positivity and hospitalization. In general, participants with high pre-vaccine PCR positivity had a higher hospitalization rate. Additionally, it was found that no personnel died during the study period. Toniasso et al. reported a 4.9% hospitalization rate in healthcare personnel diagnosed with COVID-19, and no one who tested positive died (6). However, pre-vaccination PCR tests on six hospitalized and treated participants were negative. It is thought that viral exposure and individual characteristics may have an impact on this result. Additional studies should be conducted to determine the association between immunizations, PCR positivity, and hospitalization.

Study results have showed that participants with pre-vaccine PCR positivity had lower post-vaccine PCR positivity compared to those who did not. Studies conducted in Denmark and Qatar have found that the presence of a previous diagnosis of COVID-19 infection provides up to 78.8% and 95% protection against a new infection, respectively (25,26). In a multicenter, prospective cohort study of hospital personnel in the United Kingdom, it was found that the presence of a previous coronavirus infection was associated with an 83% lower risk of infection, consistent with our study (27). Another study carried on 12,541 healthcare personnels in the UK showed that a previous COVID-19 infection provided 89% protection for at least 6 months (17). However, the CDC has stated that some people who are vaccinated are at risk of contracting COVID-19 and that no vaccine is 100% effective (9). A different study conducted in Brazil showed PCR positivity in 35.4% of vaccinated healthcare personnel with COVID-19 symptoms (6). Furthermore, Tyagi et al. found that the rate of PCR positive after the vaccination, considered to be related to the vaccine, was 16.9% (18). It might be influenced by the type of vaccine, the timing of vaccination, the age of the personnel, the presence of chronic diseases, the viral load to which the personnel are exposed, the immune system, and factors like prior COVID-19 infection. Therefore, the protective effect of PCR positivity should be taken into account in the determination of vaccination policies for hospital personnel.

Study results have showed that 4.9% of the personnel were not vaccinated against COVID-19. In a study carried out in India, 8.1% of the personnel working in hospitals were found to be COVID-19 unvaccinated (18). Another study, involving 776 healthcare personnels who preferred to participate in the study at a university hospital in Geneva, found that 11.9% of participants were not vaccinated (24). One of the factors affecting vaccination in healthcare personnel may be vaccination hesitancy. Studies show that the prevalence of COVID-19 vaccine hesitancy in healthcare personnel worldwide ranges from 4.3% to 72% (the average rate of individuals who are hesitant to 22.51%) (28).

Studies conducted to evaluate the factors that cause vaccine indecision among healthcare personnel show that there are concerns about the efficacy of the COVID-19 vaccine, its side effects, the speed of vaccine development, and the lack of the Food and Drug Administration approval (29). The CDC noted that the risk of contracting COVID-19 increases with age, especially older adults are more likely to be affected by COVID-19. It is important for health policymakers and hospital administrators to create strategies to improve the working conditions of healthcare personnel and increase their commitment to universal precautions during the pandemic (30).

Healthcare personnels are critical, as they are the key target group for immunization programs and have a huge impact on the vaccination preferences of the general population. WHO, CDC, and Ministry of Health evaluated hospital personnel in the priority group in the vaccination list against COVID-19. According to the study, hospital personnel generally had high COVID-19 immunization rates for all occupations. A high incidence of vaccination in all occupations in a university hospital in Turkey was considered a positive outcome at a time when there were hesitations about vaccination among individuals and healthcare professionals around the world. Considering that the PCR test positivity rate among vaccinated personnel is lower than in those who were not vaccinated, this is important in emphasizing the significance of vaccination. However, the effect of previous coronavirus infections on immunization should not be ignored. Past infections provide a high level of protection for about 6 months (26). This is important in terms of the effectiveness of institutional-level vaccination programs and the planning of equal, equitable, and fair access to the vaccine. Because the countries' economic resources are limited, and the number of personnel who require immunization during the pandemic is high. It may be helpful for the infection control committees of hospitals to consider that hospital personnel who are PCR-positive before vaccination have immunity for a certain period of time. In this context, PCR positivity should be taken into account when planning the vaccination program in hospitals.

The personnels' attitude toward the vaccine becomes crucial when taking into account how immunizations affect PCR positives. It may be beneficial to provide training to health institution personnel on the importance of vaccination. To protect hospital personnel, especially those who are in the high-risk group in terms of disease transmission, against COVID-19 infection during the pandemic, policymakers and health institution managers at the country level should make regulations to increase vaccination rates and monitor healthcare personnel. This is important for the protection of healthcare personnel and the public. Since vaccines are known to be the strongest and most cost-effective way to protect against infectious diseases worldwide, it can be stated that vaccination studies are also important in terms of the management of similar situations that may emerge in the future. In addition, evidence-based guidelines should be followed for planning the vaccination of PCR-positive hospital personnel.

Limitations

The research is limited to the personnel who worked in a university hospital between January 01, 2021, and December 31, 2021, and did not experience admission to employment-quit job mobility. Another limitation of the study is the situation of personnel who without symptoms, do not have a PCR test, or are not required to be tested by the physician.

DECLARATIONS

Funding

No financial support was received for the study.

Conflicts of Interest

There are no potential conflict of interest was reported by the authors.

Ethics Approval

Ethical approval that the study was ethically appropriate was obtained with decision number 2022-3 on March 11, 2022 from the Bandırma Onyedi Eylül University Health Sciences Non-Interventional Research Ethics Committee. To conduct the present study, the ethical principles for medical research on human subjects established by the Declaration of Helsinki were followed.

Availability of Data and Material

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

Authors Contributions

Conceived and designed the analysis YA; collected the data YA, SG; contributed data or analysis tools YA, ES, SG; performed the analysis YA, ES; wrote the paper YA, ES; critical review YA, ES, SG.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Healthcare Management / Sağlık Yönetimi

The Fear of Covid-19 and Professional Commitment in Nursing Students Switching from Online Education to Face-to-face Education: A Cross-sectional Study

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ABSTRACT

Purpose: During the novel coronavirus disease 2019 (COVID-19) pandemic, courses were offered online in departments of nursing, and hence, clinical practices were interrupted. Along with the fall in COVID-19 cases, the decision to switch from online education to face-to-face education was taken. This study was carried out to determine the fear of COVID-19 and professional commitment levels of nursing students who switched from online education to face-to-face education.

Methods: The descriptive cross-sectional study was performed with 340 nursing students. The data were collected online with a Personal Data Form, the Fear of COVID-19 Scale (FCV-19S), and the Nursing Professional Commitment Scale (NPCS).

Results: The mean FCV-19S score of the participants was found as 16.44±6.03, whilst their mean NPCS score was identified as 79.67±10.53. It was determined that there was no statistically significant relationship between nursing the FCV-19S and NPCS scores of the participants ($p>0.05$).

Conclusion: It was discerned that nursing students had below-average levels of fear of COVID-19, while they exhibited moderate professional commitment, and their fear of COVID-19 did not affect their professional commitment.

Keywords: COVID-19, coronavirus, nursing student, fear, professional commitment

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Online Eğitimden Yüz Yüze Eğitime Geçen Hemşirelik Öğrencilerindeki Covid-19 Korkusu Ve Mesleğe Bağlilik Düzeyi: Kesitsel Bir Çalişma

ÖZET

Amaç: Yeni koronavirüs hastalığı 2019 (COVİD-19) pandemisi sürecinde hemşirelik bölümlerinde dersler online olarak verilmeye başlanmış ve klinik uygulamalara ara verilmiştir. COVİD-19 vakalarındaki düşüşle birlikte online eğitimden yüz yüze eğitime geçiş kararı alınmıştır. Bu araştırma, online eğitimden yüz yüze eğitime geçen hemşirelik öğrencilerindeki COVİD-19 korkusu ve mesleğe bağlılık düzeyini belirlemek amacıyla yapılmıştır.

Yöntem: Tanımlayıcı ve kesitsel tipteki bu araştırma 340 hemşirelik öğrencisi ile yürütülmüştür. Araştırma verileri online ortamda, Tanıtıcı Bilgi Formu, COVİD-19 Korkusu Ölçeği (KKÖ) ve Hemşirelikte Mesleğe Bağlılık Ölçeği (HMBÖ) kullanılarak toplanmıştır.

Bulgular: Hemşirelik öğrencilerinin KKÖ puan ortalaması 16.44±6.03 bulunurken, HMBÖ puan ortalaması 79.67±10.53 bulunmuştur. Hemşirelik öğrencilerinin KKÖ ve HMBÖ puanları arasında istatistiksel olarak anlamlı bir ilişki olmadığı saptanmamıştır ($p>0.05$).

Sonuç: Hemşirelik öğrencilerindeki COVİD-19 korkusunun ortalamanın altında, mesleğe bağlılığın ise orta düzeyde olduğu ve COVİD-19 korkusunun mesleğe bağlılığı etkilemediği saptanmıştır.

Anahtar Kelimeler: COVİD-19, koronavirüs, hemşirelik öğrencisi, korku, mesleki bağlılık

The novel coronavirus disease 2019 (COVID-19) was declared a pandemic by the World Health Organization in March 2020 (1). Due to the high morbidity and mortality rates of the COVID-19, governments issued public policies that included restrictions such as social distancing and self-isolation. These restrictions also affected educational institutions. Higher education institutions in Turkey switched to online education as of 23 March 2020 (2).

The transition to online education in higher education institutions impacted applied sciences the most. Nursing is one science that was adversely impacted by this transition (3,4). The transition to online courses and the interruption of clinical practices were unexpected developments for nursing students. While it was known that nursing students already experience high levels of anxiety and stress due to their nursing education, it was revealed that their stress and anxiety levels increased along with the COVID-19 pandemic (5-8). The fast spread of COVID-19, which was a development that caught many individuals and systems off guard, and the lack of information about its control and treatment also led to fear in nursing students just as all active and prospective health workers (5,8-10).

Fear is one of the psychological aspects of the COVID-19 pandemic. When fear is chronic and disproportionate, it prepares the groundwork for the development of a variety of psychological problems (11-14). The fear felt by nursing students and the uncertainty of the forthcoming process gave rise to worries about their professional roles and a decrease in the perceived quality of learning by restricting the learning opportunities of nursing students (3,9). Besides, by leading to uncertainty about one's professional future, fear can lower professional commitment and positive attitudes toward their profession (3,15,16).

Nursing is an occupation that requires a high level of professional commitment. Professional commitment in nursing refers to the belief of a nurse in the values of the profession of nursing and their acceptance of these values, efforts for the profession, willingness to have professional self-development, and determination to carry out the profession of nursing (17). While the need for nurses continues to grow on the global level along with the COVID-19 pandemic, nursing students make up a significant part of the nursing workforce of the future. It was put forward that in this process, professional commitment becomes a determinant for nursing students to be included in the nursing workforce (18). For this reason, it is quite important to examining the professional commitment of nursing students during the COVID-19 pandemic and associated factors.

Higher education institutions that switched to online education in Turkey on 23 March 2020 because of the COVID-19 pandemic switched back to face-to-face education as of 13 September 2021 along with the decrease in the number of COVID-19 cases. It was discerned that no study was performed in Turkey to identify the COVID-19 fear and professional commitment levels of nursing students who switched from online education to face-to-face education. As nursing students are an important resource of the nursing workforce of the future, evaluating their fears and professional commitment before their graduation should be a priority. This study was conducted to determine the COVID-19-related fear and professional commitment levels of nursing students switching from online education to face-to-face education, answers to the following questions were sought:

- What are the COVID-19 fear levels of nursing students who switch from online education to face-to-face education and influencing factors?
- What are the professional commitment levels of nursing students switching from online education to face-to-face education and influencing factors?
- Is there any relationship between the COVID-19 fear and professional commitment levels of nursing students switching from online education to face-to-face education?

MATERIAL AND METHODS

Design

This study was conducted with a descriptive cross-sectional design.

Population

The population of the study consisted of 387 students studying in the nursing department of a state university in Turkey. The haphazard sampling method was used in the study. The sample comprised 340 nursing students who volunteered to participate in the study and filled out the data collection forms completely.

Data Acquisition

The data were collected from 13 to 30 September 2021 with the survey form distributed by the researcher to the participants. The survey form included a Personal Data Form, the Fear of COVID-19 Scale (FCV-19S), and the Nursing Professional Commitment Scale (NPCS).

Personal Data Form: The form included seven questions related to the demographic characteristics of the participants, their professional characteristics, and their variables associated with the COVID-19 pandemic.

FCV-19S: FCV-19S was developed by Ahorsu et al. (19) and its validity and reliability in Turkish were tested by Bakioğlu et al. (11). The five-point Likert-type scale has 7 items. A high FCV-19S score points to a high level of fear of COVID-19.

NPCS: NPCS was developed Lu et al. (20) and tested for validity and reliability in Turkish by Çetinkaya et al. (21). The four-point Likert-type scale has 26 items and 3 subscales (Willingness to Make an Effort, Desire to Stay in the Profession, Belief in Goals and Values). A high NPCS score points to a high level of professional commitment.

Data Analysis

The data were analyzed with the Statistical Package for the Social Sciences (SPSS) 20.0. The Mann-Whitney U test, the Kruskal-Wallis H test, and Spearman's correlation coefficient, as well as descriptive statistics, were used in the analyses of the data. The Shapiro-Wilk test was utilized to determine whether the data were normally distributed. The level of statistical significance was accepted as $p<0.05$.

Ethical Aspect of the Study

For conducting the study, ethical approval was obtained from the Clinical Research Ethics Committee of Amasya University (Date: 21 June 2021, No: 77). Nursing students were informed that their participation in the study was completely on a voluntary basis, and those who agreed to participate submitted an informed consent form in written format. The study was carried out in accordance with the principles of the Declaration of Helsinki.

RESULTS

It was determined that 61.80% of the participants were aged 20 years or younger, 72.90% selected the profession of nursing willingly, 95.60% had no chronic diseases, 54.70% could not decide whether they were willing to provide care to COVID-19 patients, and 70.00% did not lose any family member or anyone in the inner circle due to COVID-19 (Table 1).

Table 1. Descriptive characteristics (n=340)

Descriptive characteristics	n (%)
Age	
20 or younger	210 (61.80)
21 or older	130 (38.20)
Gender	
Female	247 (72.60)
Male	91 (26.80)
Class year	
1	96 (28.20)
2	98 (28.80)
3	90 (26.50)
4	55 (16.20)
Chose the profession of nursing willingly	
Yes	248 (72.90)
No	92 (27.10)
Has a chronic disease	
Yes	15 (4.40)
No	325 (95.60)
Is willing to provide care to COVID-19 patients	
Yes	81 (23.80)
Undecided	186 (54.70)
No	73 (21.50)
Has lost a family member or someone in one's inner circle due to COVID-19	
Yes	102 (30.00)
No	238 (70.00)

The mean FCV-19S score of the participants was 16.44±6.03, and their mean NPCS total, NPCS 'Willingness to Make an Effort' subscale, 'Desire to Stay in the Profession' subscale, and 'Belief in Goals and Values' subscale scores were identified respectively as 79.67±10.53, 38.89±5.79, 25.16±4.51, and 15.60±2.00. However, the mean subscale scores of the participants are not shown in a table. It was discerned that the participants had below-average levels of fear of COVID-19, and moderate professional commitment levels.

Table 2 presents the results of the comparisons of the mean FCV-19S and NPCS scores of the participants based on their descriptive characteristics. Accordingly, the FCV-19S scores of the participants differed significantly based on their age, gender, class year, status of choosing the profession of nursing willingly, and status of being willing to provide care to COVID-19 patients. In this respect, the participants who were 20 years old or younger had higher levels of fear of COVID-19 than those who were 21 years old or older, and the female participants had higher levels of fear of COVID-19 than the male participants. The participants who were first-year and second-year nursing students had higher levels of fear of COVID-19 than those who were fourth-year nursing students (Tamhane's T2 post hoc test), those who chose the profession of nursing willingly had higher levels of fear of COVID-19 than those who chose it unwillingly, and those who were unwilling to provide care to COVID-19 patients and those who were undecided had higher levels of fear of COVID-19 than those who were willing to provide care to COVID-19 patients ($p<0.05$).

In the comparisons of the mean NPCS scores of the participants based on their descriptive characteristics, it was found that there were statistically significant differences in their total NPCS scores and their NPCS 'Desire to Stay in the Profession' subscale scores based on their gender, where the female participants had higher mean NPCS total and 'Desire to Stay in the Profession' subscale scores than the male participants ($p<0.05$).

Moreover, based on their status of choosing the profession of nursing willingly, the total NPCS scores and all NPCS subscale scores of the participants varied significantly. In this context, those who chose the profession willingly had higher NPCS total and subscale mean scores than those who chose the profession unwillingly ($p<0.001$).

Furthermore, based on their statuses of being willing to provide care to COVID-19 patients, there were statistically significant differences in the mean total NPCS and all NPCS subscale scores of the participants, where the participants who were willing to provide care to COVID-19 patients had higher mean scores than those who were unwilling and those who were undecided about the matter (Tamhane's T2 post hoc test) ($p<0.01$).

Besides, the mean NPCS 'Belief in Goals and Values' subscale scores of the participants varied significantly based on whether they lost a family member or someone in their inner circle due to COVID-19, where the participants who had lost people around them had a higher mean score than those who had not ($p<0.05$) (Table 2).

Lastly, no statistically significant relationship was found between the FCV-19S and NPCS scores of the participants ($p>0.05$) (Table 3).

DISCUSSION

Fear of COVID-19

In this study, it was discerned that nursing students who switched from online education to face-to-face education had below-average levels of fear of COVID-19. In the relevant literature, there are studies that obtained similar results (4,5,22). In the study performed by Terkeş and Ateş (10) to compare the COVID-19 fear levels of nursing students who received online and face-to-face education, it was found that students generally had moderate levels of fear of COVID-19, and those students who had face-to-face education had higher levels of fear of COVID-19. There are also other studies that identified moderate levels of fear of COVID-19 among students (12,23,24). On the other hand, Emory et al. (3) found that students had low levels of fear of COVID-19. Lovrić et al. (25) reported that students felt mild levels of fear during face-to-face education, but they had more severe fear in the clinical environment. There are also studies that identified high levels of fear of COVID-19 among students (8,9). The result of our study may have been affected by the start of the normalization process along with the fall in COVID-19 cases.

Besides, in this study, it was discerned that the participants who were 20 years old or younger had higher levels of COVID-19 fear than those who were 21 years old or older. Likewise, Beisland et al. (12) found that those who were at younger ages had higher levels of COVID-19 fear, and Değirmen et al. (26) reported that COVID-19 phobia levels increased as age decreased. In the relevant literature, there are also studies which indicated that the levels of fear of COVID-19 increased along with an increase in age (9,16). The result of this study may have been affected by the fact that the participants who were at younger ages were in relatively early years of their nursing education. In this sense, it is considered that the participants who were recently enrolled in the department of nursing had inadequate knowledge and skills about the profession, and hence, this situation may have led to fear.

Table 2. Comparisons of mean FCV-19S and NPCS scores based on descriptive characteristics (n=340)

Descriptive characteristics	FCV-19S	NPCS			
		Willingness to Make an Effort	Desire to Stay in the Profession	Belief in Goals and Values	Overall NPCS
	Median (Min-Max)	Median (Min-Max)	Median (Min-Max)	Median (Min-Max)	Median (Min-Max)
Age					
20 or younger	17.00 (7.00-35.00)	38.00 (22.00-52.00)	25.00 (14.00-32.00)	15.00 (8.00-19.00)	79.00 (46.00-99.00)
21 or older	15.00 (7.00-31.00)	39.00 (16.00-50.00)	26.00 (8.00-32.00)	16.00 (8.00-20.00)	82.00 (35.00-102.00)
Statistical significance	**p= 0.004***	p= 0.146	p= 0.315	p= 0.095	p= 0.142
Gender					
Female	18.00 (7.00-35.00)	39.00 (21.00-52.00)	26.00 (14.00-32.00)	16.00 (8.00-20.00)	81.00 (49.00-102.00)
Male	12.00 (7.00-35.00)	38.00 (16.00-50.00)	25.00 (8.00-32.00)	15.00 (8.00-20.00)	78.00 (35.00-96.00)
Statistical significance	**p= 0.000***	p= 0.070	**p= 0.022***	p= 0.078	**p= 0.022***
Class year					
1 [a]	17.50 (7.00-35.00)	38.00 (22.00-52.00)	26.00 (14.00-32.00)	15.00 (8.00-20.00)	80.00 (46.00-99.00)
2 [b]	17.00 (7.00-35.00)	39.00 (22.00-51.00)	26.00 (14.00-32.00)	15.00 (11.00-19.00)	81.00 (54.00-99.00)
3 [c]	17.00 (7.00-31.00)	38.50 (25.00-50.00)	25.00 (14.00-32.00)	15.50 (10.00-20.00)	80.00 (54.00-102.00)
4 [d]	13.00 (7.00-29.00)	40.00 (16.00-50.00)	25.00 (8.00-32.00)	15.00 (8.00-19.00)	79.00 (35.00-100.00)
Statistical significance	**p= 0.037*** **a>d** **b>d**	p= 0.366	p= 0.869	p= 0.873	p= 0.905
Chose the profession of nursing willingly					
Yes	17.00 (7.00-32.00)	40.00 (25.00-52.00)	27.00 (13.00-32.00)	16.00 (8.00-20.00)	83.00 (58.00-102.00)
No	14.00 (7.00-35.00)	35.00 (16.00-50.00)	22.00 (8.00-32.00)	14.00 (8.00-19.00)	71.00 (35.00-95.00)
Statistical significance	**p= 0.040***	**p= 0.000***	**p= 0.000***	**p= 0.000***	**p= 0.000***
Has a chronic disease					
Yes	18.00 (7.00-24.00)	39.00 (35.00-50.00)	24.00 (20.00-32.00)	16.00 (14.00-19.00)	80.00 (71.00-99.00)
No	17.00 (7.00-35.00)	39.00 (16.00-52.00)	25.00 (8.00-32.00)	15.00 (8.00-20.00)	80.00 (35.00-102.00)
Statistical significance	p= 0.869	p= 0.106	p= 0.789	p= 0.365	p= 0.245
Is willing to provide care to COVID-19 patients					
Yes [a]	14.00 (7.00-32.00)	40.00 (29.00-52.00)	27.00 (13.00-32.00)	16.00 (8.00-20.00)	83.00 (60.00-102.00)
Undecided [b]	17.50 (7.00-32.00)	39.00 (21.00-50.00)	25.00 (14.00-32.00)	15.00 (10.00-19.00)	80.00 (49.00-100.00)
No [c]	17.00 (7.00-35.00)	36.00 (16.00-51.00)	24.00 (8.00-32.00)	15.00 (8.00-19.00)	75.00 (35.00-99.00)
Statistical significance	**p= 0.002*** **b>a** **c>a**	**p= 0.000*** **a>b** **a>c**	**p= 0.002*** **a>b** **a>c**	**p= 0.005*** **a>b** **a>c**	**p= 0.000*** **a>b** **a>c**
Has lost a family member or someone in one's inner circle due to COVID-19					
Yes	18.00 (7.00-32.00)	39.00 (22.00-50.00)	26.50 (14.00-32.00)	16.00 (9.00-20.00)	83.00 (46.00-99.00)
No	16.00 (7.00-35.00)	39.00 (16.00-52.00)	25.00 (8.00-32.00)	15.00 (8.00-20.00)	79.00 (35.00-102.00)
Statistical significance	p= 0.089	p= 0.854	p= 0.054	**p= 0.027***	p= 0.103

**p<0.05*
Abbreviations: NPCS, the Nursing Professional Commitment Scale; FCV-19S, the Fear of COVID-19 Scale

Table 3. Relationship between the fear of COVID-19 and professional commitment

Variable		NPCS			
		Willingness to Make an Effort	Desire to Stay in the Profession	Belief in Goals and Values	Overall NPCS
FCV-19S	**r**	0.060	-0.019	0.173	0.023
	p	0.271	0.722	0.111	0.674

Abbreviations: NPCS, the Nursing Professional Commitment Scale; FCV-19S, the Fear of COVID-19 Scale; r, Spearman's correlation coefficient

Moreover, in this study, the female participants had higher levels of COVID-19 fear than the male participants, and this result was in support of the relevant literature (5,9,16,22). In this context, it is thought that women paid more importance to their inner experiences and perceptions and were fragile/sensitive, and this situation, in turn, made them more defenseless against psychological problems (27).

Next, in this study, it was observed that the participants who were first-year and second-year nursing students had higher levels of COVID-19 fear than those who were fourth-year students. Oducado et al. (8) stated that first-year students had higher fear levels than those in other class years. Turan (28) reported that coronaphobia decreased as the class year of students increased. Beisland et al. (12) found that the fear of COVID-19 was associated with years spent at school and disengagement from clinical practices during the COVID-19 pandemic period. Lin et al. (16) stated that third-year and fourth-year students reported higher levels of fear than first-year students. The result of our study may have been affected by the fact that fourth-year students had experienced the school and clinical settings before and had more professional experience, while first-year and second-year students arrived at the school settings recently and were not prepared well for these settings and professional practices yet.

Furthermore, in this study, the participants who chose the profession of nursing willingly were determined to have higher levels of COVID-19 fear than those who chose it unwillingly. Turan (28) found that students who had high academic achievement levels and career goals for the future had higher levels of coronaphobia, and professional inadequacy was one of the most frequently experienced anxieties. Because of spending a significant part of the education and training process in an online format, students who chose the profession of nursing willingly and had future career goals in the profession of nursing may have felt inadequate, and accordingly, experienced more fear.

Moreover, the participants of this study who were unwilling to provide care to COVID-19 patients and those who were undecided about this issue had higher levels of COVID-19 fear than those who were willing to provide care to COVID-19 patients. Alsolais et al. (23) reported that perceiving a high infection risk increased the fear of COVID-19. Nehir and Tavşanlı (24) discerned that most students were unwilling to provide care to COVID-19 patients. The result of this study may have been affected by the perceived risk of infection in nursing students.

Professional Commitment

In this study, the participants exhibited moderate levels of professional commitment, and the female participants, the participants who chose the profession willingly, and those who were willing to provide care to COVID-19 patients exhibited higher levels of professional commitment than those in other corresponding groups. In the study carried out by Lin et al. (16), it was found that nearly half of students did not want to continue to attend school and did not think of working as nurses in the future, while they also had moderate levels of turnover intention. In the relevant literature, there are other studies which showed that during the COVID-19 pandemic period, nursing students wanted to quit the profession (29,30). The result of this study may have been due to the negative experiences of health workers during the COVID-19 pandemic.

Finally, in this study, the fear of COVID-19 among the participants was not associated with their professional commitment levels. In the relevant literature, it was reported that the fear of COVID-19 increased turnover intention (16,29). Çalışkan et al. (15) stated that the fear of COVID-19 reduced the prevalence of positive attitudes toward the profession of nursing. The result of this study may have been associated with the decrease in the number of cases and the transition to the normalization process.

Limitations

The strength of this study is the fact that the rate of participation in the study was 87.85% (340 students from the population), while its limitation was that it was carried out in a single center.

CONCLUSION

It was found that nursing students had below-average levels of fear of COVID-19 and moderate levels of professional commitment, whereas the fear of COVID-19 did not affect professional commitment. Additionally, it was determined that the fear of COVID-19 was higher in the participants who were 20 years old or younger, the female participants, the participants who were first-year and second-year nursing students compared to fourth-year students, those who choose the profession willingly, and those who were undecided about providing or unwilling to provide care to COVID-19 patients. Professional commitment levels were seen to be higher in the female participants, the participants who chose the profession

willingly, and those who were willing to provide care to COVID-19 patients. This study is important because it is the first study to determine the COVID-19 fear and professional commitment levels of nursing students who switched from online education to face-to-face education in Turkey. There is a need for more studies to identify the fear of COVID-19, professional commitment, and associated factors in nursing students who form a crucial resource of the nursing workforce of the future and alleviate their fears of COVID-19.

DECLARATIONS

Funding

'Not applicable'.

Conflict of Interest

'Not applicable'.

Ethics Approval

The study was approved by the Clinical Research Ethics Committee of Amasya University (Date: 21 June 2021, No: 77).

Availability of Data and Material (Data Transparency)

'Not applicable'.

Author Contributions

MÇY: Design, MÇY: Literature review, MÇY: Data collection and interpretation, MÇY: Statistical analysis and reporting, MÇY: Writing, MÇY: Critical reading.

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ORIGINAL ARTICLE / ARAŞTIRMA YAZISI

Primary Health Care / Birinci Basamak Sağlık Hizmetleri

Effect of Heel Warming with a Thermofor at Two Different Temperatures Before Heel Stick Sampling in Healthy Term Neonates on Total Crying and Procedure Durations: A Randomized Controlled Trial

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ABSTRACT

Purpose: The purpose of this research is to determine the effect of heel warming with a thermofor at two different temperatures before heel stick sampling in healthy term neonates on total crying and procedure durations.

Methods: This study was a randomized controlled trial. The sample for the research comprised 120 healthy term neonates with heel stick sampling performed by the same nurse. Neonates were randomized into control (n = 40), heel warming with a thermofor containing warm water (n = 40) and heel warming with a thermofor containing hot water (n = 40) three groups. In the study, to determine the efficacy of the heel warming intervention, neonates were recorded for six minutes before heel stick sampling and five minutes after heel puncture with a video camera.

Results: In the study, both the total procedure duration and total crying duration were statistically significantly shorter in the group with heel warming with hot water compared to the control group (KW = 6.088, p = 0.016; KW = 7.611, p = 0.006, respectively). However, in the group with heel warming with warm water, there was no significant difference in terms of total crying and procedure durations compared to both the control group and the group with heel warming using hot water (p> 0.05).

Conclusion: Before heel stick sampling in healthy term neonates, warming the heel with a thermofor containing hot water is effective in shortening the total crying and procedure durations.

Keywords: Atraumatic Care, Heel Warming, Heelstick Sampling, Thermotherapy, Neonate Care

Fahriye PAZARCIKCI
Ayşe AYDINLI

Sağlıklı Term Yenidoğanlarda Topuk Kanı Örneklemesi Öncesinde İki Farklı Sıcaklıkta Termofor İle Topuk Isıtmanın Toplam Ağlama ve İşlem Süreleri Üzerindeki Etkisi: Randomize Kontrollü Çalışma

ÖZET

Amaç: Bu çalışmanın amacı, sağlıklı term yenidoğanlarda topuk kanı örneklemesi öncesinde iki farklı sıcaklıkta termofor ile topuk ısıtmanın toplam ağlama ve işlem süreleri üzerindeki etkisini belirlemektir.

Yöntem: Çalışma, randomize kontrollü bir araştırmadır. Araştırmanın örneklemini aynı hemşire tarafından topuk kanı örneklemesi alınan 120 sağlıklı term yenidoğan oluşturdu. Yenidoğanlar, kontrol (n = 40), içinde ılık su olan termofor ile topuk ısıtma (n = 40) ve içinde sıcak su olan termofor ile topuk ısıtma (n = 40) olmak üzere üç gruba randomize edildi. Çalışmada, yenidoğanlar topuk kanı örneklemesi öncesinde altı dakika ve topuk delindikten sonra beş dakika bir video kamera ile kaydedildi ve böylece topuk ısıtma müdahalesinin etkinliği belirlendi.

Bulgular: Çalışmada, içinde sıcak su olan termofor ile topuk ısıtma yapılan grupta, hem toplam işlem süresi hem de toplam ağlama süresi, kontrol grubuna göre istatistiksel olarak anlamlı derecede kısaydı (KW = 6.088, p = 0.016; KW = 7.611, p = 0.006, sırasıyla). Ancak, içinde ılık su olan termofor ile topuk ısıtma yapılan grupta hem kontrol grubuna hem de içinde sıcak su olan termofor ile topuk ısıtma yapılan girişim grubuna göre toplam ağlama ve işlem süreleri açısından anlamlı fark yoktu (p>0.05).

Sonuç: Sağlıklı term yenidoğanlarda topuk kanı örneklemesi öncesinde topuğun içinde sıcak su olan bir termofor ile ısıtılması, toplam ağlama ve işlem sürelerini kısaltmada etkilidir.

Anahtar Kelimeler: Atramatik Bakım, Topuk Isıtma, Topuk Kanı Örneklemesi, Termoterapi, Yenidoğan Bakımı

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Heel stick sampling is an important protective and preventive health service implemented around the world (1,2). However, it causes distress, pain and stress in neonates (3,4), and disrupts comfort (5). Invasive interventions disrupting comfort may negatively impact the biopsychosocial development of neonates (3,4). As a result, there is a need for support and protection of neonates during invasive interventions like heel stick sampling (6–10). During invasive interventions, a way to support and protect neonates is to implement atraumatic care during the procedure (4,11,12).

Atraumatic care is a therapeutic care philosophy developed by Donna Wong that reduces or eliminates physical and psychological stress experienced by children and families through interventions applied by health care professionals during therapeutic or health-developing behavior in health care systems (4,11,12). Scientific evidence shows that atraumatic care implementation during heel stick sampling may have positive effects like less procedural pain and stress experienced in neonates (3–5), shortening the duration of crying (13,14), preventing bruised or swollen heels (7), shortening the procedure duration (14), and preventing repetition of the procedure (7). Additionally, atraumatic care implementations in this process may reduce parental concern (2), and may increase the quality of the blood taken (7). However, some current studies revealed that though nurses have information related to how to prepare heel stick samples, they frequently do not implement atraumatic care during the stages of sampling (2,6). Erdim et al. (2023) found that 56.7% of nurses did not use any intervention to soothe the neonate before heel stick sampling, 38.2% did not pay attention to the temperature of the heel and 56.2% continued the intervention by squeezing the heel if blood did not flow (2). Furthermore, since beginning spinal muscular atrophy (SMA) screening in 2022, Guthrie papers in Turkey contain five circles. Considering the increased need for blood, the importance of nurses implementing atraumatic care in this process is revealed once again.

A variety of non-pharmacological atraumatic care implementations (breastfeeding, oral breast milk, non-nutritive sucking, oral sucrose, facilitated tucking, swaddling, kangaroo care, automatic lancet use, white noise, holding) can be used alone or combined during the heel stick sampling process (1,3,4,15,16). One of these interventions is to pay attention to the temperature of the heel before taking the blood sample (5,7,13,14,17). Current available evidence shows positive effects of warming the heel with an additional intervention before taking heel blood like increasing blood flow (18), reducing acute symptoms like pain (5,13,19), preserving comfort (5), and reducing total procedure duration and total crying time (13,14). Heel warming was stated to reduce pressure applied to the heel and may prevent injury to the heel (5,7). Additionally, in the literature there are studies reporting that the temperature of the heel is adequate and there is no need to heat the heel with an additional tool (16,20–22). When studies are investigated, it appears there is no consensus between researchers about heel warming. When the literature is further examined, studies reporting advantages of heel warming appear to have been completed with tools providing heel warming with warm (34-37 ºC) or hot (38-40 ºC) temperatures before heel stick sampling (5,14,17,23). In the literature, there is no study comparing the effect of heel warming with a thermofor using warm (34-37 ºC) and hot (38-40 ºC) temperatures on total crying and procedure durations. Before heel stick sampling, warming the heel with a thermofor is a method without high cost that can be easily applied in clinic. The findings of this study may guide clinical applicators with the aim of ensuring standardization in practice. It may create a database to guide future studies. As a result, this study is needed. This article presents findings of a study to research the effect of heel warming with a thermofor with warm and hot temperatures before heel stick sampling in healthy term neonates on total crying and total procedure durations.

Methods

Study Design

This study was a randomized controlled, experimental, single-center study. It was registered at ClinicalTrials.gov with identifier NCT05228366.

Study Settings, and Participants

The research was completed from May-October 2022 with participation of healthy term neonates with capillary blood samples taken from the heel for the metabolic and endocrine screening program in the obstetrics III ward of a hospital in the Mediterranean region of Turkey.

G*Power package version 3.1.9.2 was used to determine the sample size. The study took total procedure duration points from a similar study as reference and for 0.78 effect size, 5% error, and 95% power, each group would be adequate with 36 participants (14). Considering missing data, the decision was made to include 40 participants in each group. The study ended after inclusion of a total of 120 healthy term neonates (Table 2).

Inclusion Criteria

Term newborns born between 38 and 42 gestational weeks, with birth weight 2500-4400 g, physiological parameters and general condition stable, vitamin K injection and hepatitis B vaccine administered in the delivery room, Apgar score ≥ 8 in the first and fifth minutes, with no complications during or after birth and during pregnancy, no congenital anomaly, not receiving oxygen therapy, not having undergone a surgical procedure, and without sepsis or suspected sepsis were included in the study.

Exclusion Criteria

Term newborns who received pharmacological or non-pharmacological pain management intervention before the procedure, and term newborns whose parents stated that they wanted to leave the study while the study continued were excluded from the study.

Randomization

Participants were randomly assigned to one of three groups using a simple randomization method. A total of 120 envelopes (40 for each group) were placed inside an opaque envelope, from which parents selected envelopes for their newborns who met the inclusion criteria.

Interventions

In the study, all groups received standard nursing care during heel stick sampling. In addition to standard care, Group A received ineffective heel warming with 28°C water, Group B received heel warming with warm water (34-37°C), and Group C received heel warming with hot water (38-40°C). The same nurse provided standard care and performed blood draws for both control and intervention groups. Researchers performed heel warming only and ineffective heel warming procedures.

In the study, water temperature in the thermofor was checked using a calibrated thermometer capable of measuring from -50 to 300 degrees Celsius. The thermofor was filled two-thirds with water, air was removed, and the lid was sealed. It was checked for leaks. To prevent contamination, each intervention used a separate plastic bag. Neonates remained in their clothing during heel warming or ineffective warming, with the thermofor not directly touching their skin. They were observed closely, lying supine, with their own blankets during the procedures.

- Standard nursing care: As routine in the hospital where the research was performed, each neonate had heel stick sampling performed 24-48 hours after beginning oral feeding before discharge. The procedure is performed in the patient's room. The temperature of the patient rooms is mean 25-26°C and mean humidity is 40%. The neonates are held in the arms of the mother or father during the heel prick and sampling procedure. To increase venous pressure, the legs of the neonate are held below heart level. Mothers or fathers are requested to talk to the neonate in a pleasant calm tone of voice during the heel stick and sampling process. During the procedure, the neonate is wrapped so only their foot is open. Before the heel stick, the skin is cleaned with 70% alcohol, then dried with a sterile gas compress. Heel blood is sampled from one of the medial or lateral external sides of the planar face of the heel. During the heel stick process, a single-use sterile manual lancet is used. During heel stick sampling, no pressure/compression is applied to the heel. In Turkey, metabolic and endocrine screening is performed for five diseases (phenylketonuria, biotinidase deficiency, congenital hypothyroidism, cystic fibrosis, congenital adrenal hyperplasia, and spinal muscular atrophy).

- Control group (Group A): To ensure blinding in the study for neonates in the control group, in addition to the standard nursing care applied routinely in the ward, ineffective heel warming was applied with a thermofor containing water at 28°C for 5 minutes before heel stick sampling.

- Heel warming group with a thermofor containing warm water (34-37°C) (Group B): Neonates included in Group B received standard nursing care applied routinely in the ward and the heel was heated with a thermofor containing water at 34-37°C for 5 minutes before heel stick sampling.

- Heel warming group with a thermofor containing hot water (38-40°C) (Group C): Neonates included in Group C received standard nursing care applied routinely in the ward in addition to warming of the heel for 5 minutes before heel stick sampling with a thermofor containing water at 38-40°C.

Data Collection Tools

Neonate Information Form

A neonate information form was used to determine the descriptive characteristics of neonates participating in the study. The neonate information form was prepared by the researchers in line with the literature. The form included 5 questions about the sex, type of birth, gestational week, mean body weight or mean body length of the neonates (13–15).

Measurement of total crying, and procedure durations

In the study, the efficacy of the heel warming interventions was determined by investigating data from video camera recordings. The healthy term newborns were recorded with a video camera for 6 min before the procedure, during the procedure and for five minutes after. The average recording time was 15 min (Figure 2).

Video recordings were investigated by an independent evaluator who did not know the purpose of the study and hence total crying and procedure durations were identified. The digital camera focused on the heel from the 0 second when the heel was punctured until the second when the 5th circle on the filter paper was filled. Apart from this the focus was on the face of the neonate and high quality image and sound recording was obtained.

Characteristics of the thermophore

In the study, a thermophore (hot water bag) was used to warm the heel. The thermophore was a durable and reusable device with a 2-liter capacity, measuring 20x35 cm, and featuring a plush cover and rubber properties. It had been reported in previous research as suitable for heel warming (5,7,13), which is why it was used in this study.

Blinding

Participants were randomly selected by simple random selection method and had no knowledge of the interventions. Information about which group the participant was assigned to was not given to the nurse sampling heel blood or the parent. Total crying and procedure durations in the research were identified by an independent evaluator who did not know the purpose of the study by observing video recording data. Hence, the health professional assessing the study data was blinded. The database for the research was created with Group A, Group B and Group C, by a health professional with no knowledge of intervention-control groups. Statistics for the research were assessed by a statistical expert blind to the study.

Ethical Considerations

Study data were collected in accordance with the standards of the Helsinki Declaration after receiving approval from Suleyman Demirel University Clinical Research Ethics Committee (Approval number: 23/358, Date of approval: 23.12.2021) and from the hospital where the study would be performed. During registration, parents of potential participants were given information about being able to freely choose or reject participation. Then parents of participants who met the inclusion criteria provided written consent.

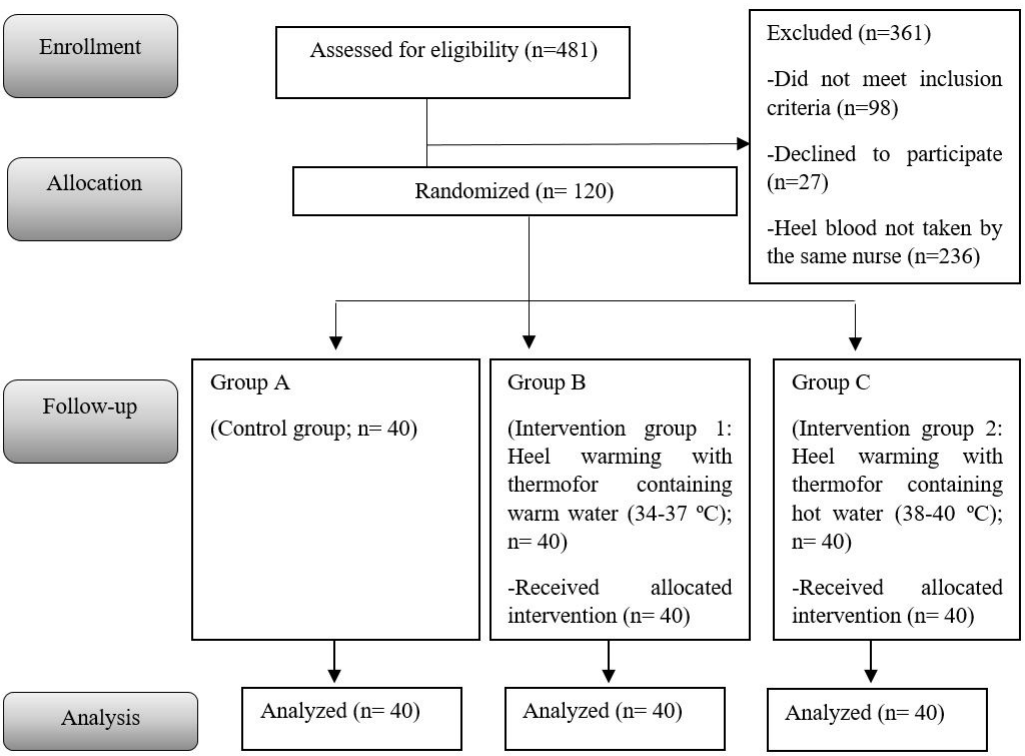

Figure 1. CONSORT flowchart for the research

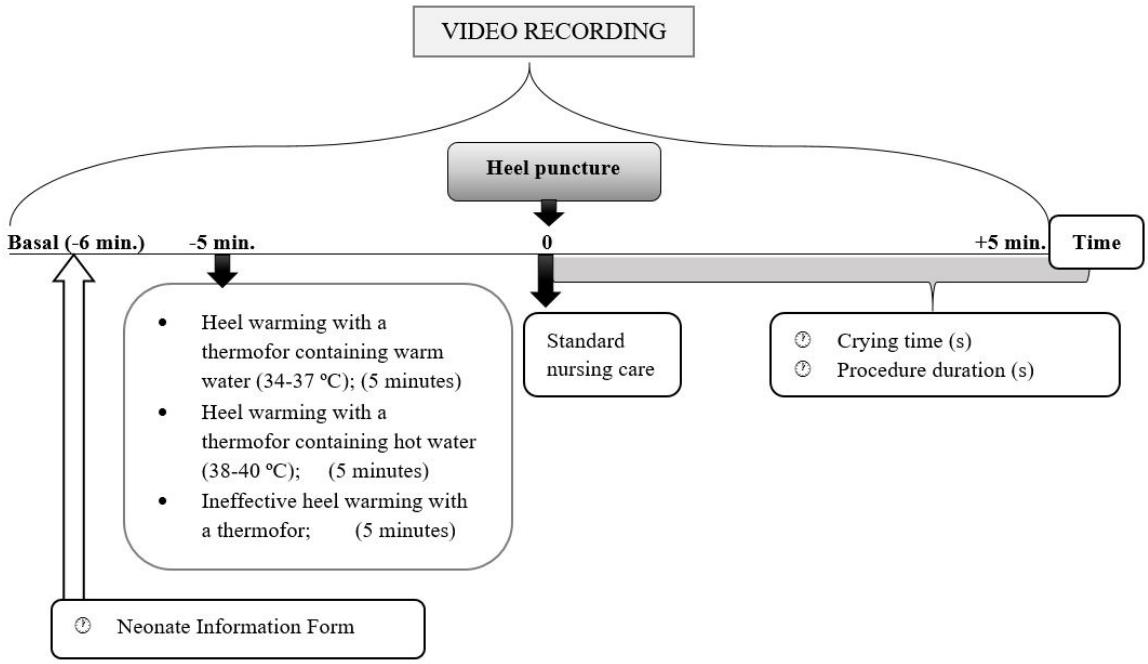

Figure 2. Study protocol

Data Analysis

Statistical analysis was carried out using a statistical package for the social sciences (SPSS) version 23.0 (IBM Corp., Armonk, NY), with statistical significance set at $p< 0.05$. Fit of data to normal distribution was assessed with the Kolmogorov-Smirnov test, skewness and kurtosis values and Q-Q plot. Descriptive statistical methods (mean, standard deviation, frequency, rate) were used to evaluate the study data. Pearson's chi-square test was used for the comparison of qualitative data. The one-way analysis of variance (ANOVA) test was used for the comparison of normally distributed data from the three groups. Intergroup comparisons of total procedure and crying durations used the Kruskal Wallis test. After the Kruskal Wallis test, Dunn's post hoc test was applied to determine the group(s) causing significance.

Results

Infant Characteristics

The study sample comprised 120 term infants with mean gestational age of 39.08±1.27 weeks. Among them, 49.2% were male and 50.8% were female. In addition, 57.5% of term newborns were born by vaginal delivery and 42.5% by cesarean section.

At baseline, infants in all groups did not differ significantly in terms of sex, delivery method, gestational age, mean body weight, or mean birth length ($p> 0.05$). These results indicate that the groups were similar in terms of variables (Table 1).

Comparison of Procedure Duration

Table 2 shows the distribution of mean total procedure duration for the groups. Total procedure duration was determined to be shorter by a statistically significant difference in the group with heel warming with hot water (38-40°C) (Group C) compared to the control group (Group A) ($KW = 6.088$, post hoc test $p = 0.016$, $d = 0.61$).

Comparison of Total Crying Time

Table 2 shows the distribution of mean total crying duration for the groups. Total crying duration was shorter by a statistically significant difference in the group with heel warming using hot water (38-40°C) (Group C) compared to the control group (Group A) ($KW = 7.611$, post hoc test $p = 0.006$, $d = 0.67$).

Table 1. Characteristics of the participants in the groups

Variables	Total (n=120)	Group A Control group (n=40)	Group B Intervention group 1 (n=40)	Group C Intervention group 2 (n=40)		
	n (%)	n (%)	n (%)	n (%)	X^2	p
Sex						
Female	61 (50.8)	18 (15.0)	20 (16.7)	23 (19.2)	1.267	0.531
Male	59 (49.2)	22 (18.3)	20 (16.7)	17 (14.2)		
Delivery Method						
Vaginal birth	69 (57.5)	23 (19.2)	26 (21.7)	20 (16.7)	1.841	0.398
Cesarean	51 (42.5)	17 (14.2)	14 (11.7)	20 (16.7)		
	Mean±SD	**Mean±SD**	**Mean±SD**	**Mean±SD**	**F**	**p**
Gestational Age (week)	39.08±1.27	39.15±1.16	39.05±1.37	39.05±1.29	0.081	0.922
Body Weight (g)	3249.01±333.10	3246.55±356.10	3239.25±299.23	3261.25±349.23	0.045	0.956
Birth Length (cm)	49.85±0.78	49.95±0.90	49.65±0.53	49.95±0.84	1.980	0.143

Note. SD= Standard deviation; X^2= Pearson Chi-Square; F= One-Way ANOVA; Intervention group 1= Heel warming group with a thermofor containing warm water (34-37°C); Intervention group 2= Heel warming group with a thermofor containing hot water (38-40°C)

Table 2. Comparison of total procedure and crying durations of neonates by group

Variables	Group A Control group (n=40)	Group B Intervention group 1 (n=40)	Group C Intervention group 2 (n=40)				
	Mean±SD 95% CI (L;U)	Mean±SD 95% CI (L;U)	Mean±SD 95% CI (L;U)	*KW*	*p*	*Post Hoc Test p*	*Effect size d*
Total procedure time (s)	143.75±99.64 (111.88; 175.61)	113.57±56.47 (95.51; 131.63)	94.72±51.28 (78.32; 111.12)	6.088	**0.048**	c-b= 0.092 **c-a= 0.016** b-a= 0.473	**a to c= 0.61**
Total crying time (s)	165.82±135.18 (122.59; 209.05)	115.07±56.82 (96.90; 133.24)	96.45±50.77 (80.21; 112.68)	7.611	**0.022**	c-b= 0.106 **c-a= 0.006** b-a= 0.259	**a to c= 0.67**

Note. 95% CI (L;U)= 95% Confidence Interval (Lower; Upper); KW; Kruskal Wallis Test; Post Hoc Test p= Dunn's Post Hoc Test; Intervention group 1= Heel heating group with a thermofor containing warm water (34-37°C); Intervention group 2= Heel heating group with a thermofor containing hot water (38-40°C)

Discussion

There is no consensus in the literature about the need to perform an additional intervention like warming the heel before heel stick sampling (7,13,16,18,21,22). Furthermore, current studies appear to apply heel warming with hot or warm temperatures (5,13,14,18). There is no study comparing the effect of heel warming with hot water bottles at different temperatures on total crying and procedure durations in the literature. To the best of our knowledge, this study is the first study to research the effect of heel warming with hot water bottles containing warm and hot water before heel stick sampling on total crying and procedure durations in healthy term neonates with randomized, controlled, experimental research.

In this study, heel warming with a thermofor containing 38-40°C water before heel stick sampling in healthy term neonates was determined to be effective in shortening the total crying and procedure durations compared to a control group. This result of the study is similar to the results of some studies performing heel warming with devices at 38-40°C temperature. Shu et al. (2014) reported that heel warming with a thermofor containing 40°C

water was effective in reducing pain, and shortening total procedure and crying durations during heel blood sampling in neonates (7). Buyuk (2018) identified that heat application with a bottle containing maximum 38°C water before heel blood sampling shortened the time of crying in infants and total operation duration (13). Balcı et al. (2021) heated the hands of nurses to 40°C under a radiant heater, and then held the heels of the infants in the nurse's palms for 3 minutes before the procedures. Compared with the unheated manual lancet group, the total procedure and crying durations were significantly shortened (14). Mir et al. (2018) reported that warming the heel with a bottle containing 40°C water increased blood flow for easy blood sampling (18). Different to our study, Barker et al. (1996) reported no effect of heel warming with a hot gel pack at 40°C on procedure duration, collected blood volume, number of repeated procedures and behavioral responses of infants (20). Janes et al. (2002) reported that warming the heel with a chemical heel warmer pack for five minutes before the procedure was not effective on blood volume, total procedure duration, crying duration and number of repeated heel stick procedures (24). Hassan and Shah (2005) and Ray et al. (2011) stated that heel warming may cause negative unwanted effects like burns and they did not recommend the practice for this reason (21,22). Heel warming with a thermofor containing 38-40°C water before heel blood sampling is a method without high costs that can be easily applied. It is possible to implement it within routine care in the clinic. Minimum crying and stress experienced by neonates may support healthier growth and development.

In the study, heel warming with a thermofor containing warm water (34-37°C) before heel stick sampling did not cause a significant difference in total crying and procedure durations when compared to either the control group or the group with heel warming using a thermofor containing hot water (38-40°C). Different to our study, KarabıyıkOğurlu et al. (2019) reported that heel warming with a thermofor containing warm water (34-37°C) shortened the duration of heel blood sampling in neonates with heel warming (5). It is considered that heel warming with a thermofor containing warm water (34-37°C) does not adequately accelerate regional blood perfusion and hence did not create a significant difference compared to the control group.

Conclusion

The results of this study revealed that heel warming with a thermofor containing hot water (38-40°C) before heel stick sampling in healthy term neonates was an effective intervention to shorten total crying and procedure durations. Nurses may use the heel warming intervention with a thermofor containing hot water (38-40°C) before heel stick sampling as a part of standard care. In line with this, it is recommended to inform nurses about this intervention and to add it to guidelines. Additionally, future studies are recommended to test heel warming with a thermofor containing hot water (38-40°C) for preterm neonates undergoing heel stick sampling.

Implications for Practice

The heel warming intervention with a thermofor containing hot water (38-40°C) is a low cost, easy to apply, non-invasive, non-pharmacological atraumatic care method that can be applied before heel stick sampling. The heel warming intervention may support protection of infant health, healthier growth and development and effective time management for nurses by shortening total procedure and crying durations. Nurses may potentially contribute to increasing health care quality and care satisfaction by applying this intervention in clinic.

Limitations

This study has several strong aspects. The study is the first study to compare the effect of heel warming with hot water bottles containing water at different temperatures on total crying and procedure durations with randomized, controlled, experimental double-blind research. The study had adequate sample size. In spite of these strong aspects, the study has some limitations. This study is a single-center study. The sample only included participation of healthy term neonates with capillary blood samples taken from the heel for metabolic and endocrine screening program in the obstetrics III ward of a hospital located in the Mediterranean region of Turkey.

Declarations

Funding

The present study was not funded by any corporation.

Conflicts of Interest

The authors declare no conflict of interest.

Ethics Approval

All protocols for this study were approved by the Suleyman Demirel University Clinical Research Ethics Committee (Approval number: 23/358, Date of approval: 23.12.2021).

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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