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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

GLOKOM HASTALARINDA SHEAR WAVE ELASTOGRAFİ BULGULARI

SHEAR WAVE ELASTOGRAPHY FINDINGS IN GLAUCOMA PATIENTS

Azad HEKİMOĞLU[1], Onur ERGUN[1], Aysun SANAL DOĞAN[2], Şule Berk ERGUN[3], Mutlu ACAR[2], Canan GÜRDAL[2], Baki HEKİMOĞLU[1]

[1]Dışkapı Eğitim Aratırma Hastanesi Radyoloji Kliniği
[2]Dışkapı Eğitim Araştırma Hastanesi Göz Hastalıkları Kliniği
[3]Ankara Şehir Hastanesi Göz Hastalıkları Kliniği

ÖZET

AMAÇ: Amacımız glokom hastalarında shear wave elastography (SWE) ile gözün farklı bölgelerindeki sertlik değerlerinin ölçülmesi ve sonuçlarının sağlıklı gözlerle karşılaştırılarak oküler kompartmanların elastisitesinde bir değişiklik olup olmadığının araştırılmasıdır.

GEREÇ VE YÖNTEM: Bu çalışmada açık açılı glokomlu 12 hasta ile 32 sağlıklı gönüllüyü SWE donanımlı ultrasonografi cihazı kullanarak karşılaştırdık. Tüm hastalarda sadece sağ göz değerlendirildi. İlk olarak, göz küresi genellikle B-modunda incelendi. Daha sonra arka segmentte optik sinir başı, retro-orbital sinir, sklera-retina kompleksi ve retro-orbital yağ dokusunun sertlik değerleri ile gözün ön segmentinde kornea, lens ve ön kamara sertlik değerleri kiloPaskal cinsinden ölçüldü. SWE ile ve her iki grup istatistiksel olarak karşılaştırıldı.

BULGULAR: Gözün farklı bölgelerinde yapılan ölçümlerde kaydedilen sertlik değerleri açısından hasta ve kontrol grupları arasında istatistiksel olarak anlamlı bir farklılık bulunmadı.

SONUÇ: SWE kolay uygulanabilir bir yöntem olmasına rağmen, glokom ve kontrol grupları arasında anlamlı bir fark bulunmadı. Ancak bu çalışma ile normal kişilerde gözün farklı bölgeleri için referans değerler belirlenmiştir.

ANAHTAR KELİMELER: Göz, Glokom, Shear wave elastografi, Sertlik

ABSTRACT

OBJECTIVE: Our aim is to measure the stiffness values in different regions of the eye with shear wave elastography (SWE) in patients with glaucoma and to compare the results with healthy eyes to investigate whether there is a change in the elasticity of the ocular compartments in glaucoma patients.

MATERIAL AND METHODS: In this study, we compared 12 patients with open-angle glaucoma and 32 healthy volunteers using an SWE-equipped ultrasonography device. Only the right eye was evaluated in all patients. First, the eye globe was generally examined in B-mode. Then, the stiffness values of the optic nerve head, retro-orbital nerve, sclera-retina complex and retro-orbital adipose tissue in the posterior segment and the stiffness values of the cornea, lens and anterior chamber in the anterior segment of the eye were measured with SWE in kiloPascal and both groups were compared statistically.

RESULTS: No statistically significant differences were found between the patient and control groups in terms of the stiffness values recorded in the measurements performed in different parts of the eye.

CONCLUSIONS: Although SWE is an easily applicable method, no significant differences were found between glaucoma and control groups. However, thanks to this study, reference values for different parts of the eye in normal individuals have been determined.

KEYWORDS: Eye, Glaucoma, Shear-wave elastography, Stiffness

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INTRODUCTION

The inflammatory and neoplastic changes in the soft tissues are related to the changes in their elasticity (1). Therefore, elasticity and stiff -ness are important factors in the differential diagnosis. Sonoelastography is a non-invasive method, which has been used recently in the evaluation of the elasticity of the biological tissues and started to be used in the thyroid, lymph node, breast, testis, muscle, and abdominal solid organ diseases (2 - 9).

There are four main types of sonoelastography techniques, which are compression (or strain) elastography, transient elastography, tension elastography and shear-wave elastography (SWE), each with its own advantages and disadvantages (10). In the frequently used strain elastography, stress is applied to the tissue with repeated manual compression of the transducer, and the degree of deformation in the lesion compared to the surrounding normal tissue is measured, and depicted in color. Therefore, with this technique, obtaining and interpreting the data from elasticity images are largely dependent on the experience of the investigator and it was found to show inter-observer variance (11, 12). In contrast to strain elastography, SWE uses an acoustic radiation force impulse created by a focused ultrasound beam, which allows measurement of the speed of shear waves within the tissue to quantify its stiffness in kiloPascals (13, 14). As no pressure on the tissue is required in this method, and the elasticity of the tissue can be measured quantitatively in kiloPascals without the need for comparison with the surrounding tissue, this method was considered to be more advantageous for our study (15).

Glaucoma is one of the most common causes of blindness worldwide (16, 17). It is well known that glaucoma has a complex pathophysiology and a multifactorial etiology, and is an optic neuropathy whose severity increases with the increase in intraocular pressure (18, 19). In glaucomatous optic neuropathy, loss of the retinal nerve layer, loss of the focal and generalized neuroretinal rim, optic disc hemorrhage, and parapapillary atrophy can be observed (20 - 22). The aim of our study is to investigate whether there is a change in the elasticity of the ocular compartments caused by high intraocular pressure in glaucoma patients with SWE.

MATERIAL AND METHODS

Our study consists of two groups including patients with glaucoma and healthy volunteers. The patient group comprised 12 patients (8 males, 4 females) who were diagnosed with open-angle glaucoma in the ophthalmology clinic of our hospital with a mean age of 62 years (range: 44-77). The control group consisted of 32 healthy volunteers (14 males, 18 females) with a mean age of 57 years (range: 20-71). All patients with glaucoma were under topical antiglaucoma treatment and had a history of glaucoma for 1 to 10 years (mean value: 5.4 years). In the patient group, the cup-to-disc ratio (CDR), which is an indicator of the severity of the disease, was between 0.5 and 0.9 (mean value: 0.63). Consents of all individuals in the patient and control groups were obtained before including them in the study. Those with other known ophthalmologic, metabolic, or endocrinologic (DM, goiter, etc.) diseases were excluded from the study. In addition, patients who underwent ophthalmologic surgery or patients with a trauma history were not included in the study.

Ethical Committee

Our study is a prospective research study, was conducted according to the ethical standards of the Declaration of Helsinki, and approved by the Institutional Ethics Committee (Ankara Diskapi Yildirim Beyazit Training and Research Hospital) (2015.19/19).

Elastography Technıque

All patients included in the study were evaluated with an ultrasonography device (GE Logiq E9) using a 9L linear probe. The right eye was evaluated in all patients. The eyes of the patients were closed while the patients were in a supine position, and a copious amount of gel was put on the probe. Then, without applying additional pressure, the probe was placed on the upper eyelid of the closed eye.

The patients were instructed not to open their eyes and not to move their eyes while looking at a fixed point during the procedure. All measurements were performed by a single radiologist who has 5-year experience in ultrasonographic examination. All measurements were repeated three times, and the mean of these three measurements was calculated. First, the globe of the eye was examined generally in B-mode. Following the general examination, the image of the posterior segment of the eye was constructed in a way that would include the retro-orbital nerve and the retro-orbital adipose tissue. As shown in **Figure 1a**, in the posterior segment of the eye, the cursor of the region of interest (ROI) was placed on the optic nerve head, retro-orbital nerve, sclera-retina complex and retro-orbital adipose tissue respectively, and the stiffness values were automatically measured in kiloPascals and recorded. Then, the image of the anterior segment of the eye was constructed, and as seen in **Figure 1b**, the cursor of the ROI was placed on the cornea, lens and anterior chamber respectively and the stiffness values were automatically measured in kiloPascals and recorded. Since it is not possible to distinguish between the retina, choroid, and sclera by using ultrasonography, we examined them as a whole under the term "sclera-retina complex" (23).

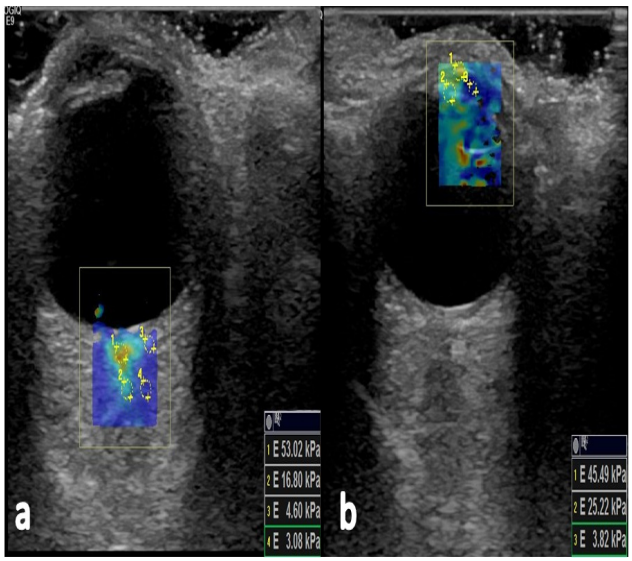

Figure: 1a) Evaluation of the posterior segment of the eye: 1-optic nerve head; 2-retrobulbar nerve; 3-sclera-retina complex; 4-retrobulbar adipose tissue. **1b)** Evaluation of the anterior segment of the eye: 1-cornea; 2-lens; 3-anterior chamber.

Statistical Analysis

Data analysis was performed by using SPSS for Windows, version 11.5 (SPSS Inc., Chicago, IL, United States). Whether the distributions of continuous variables were normal or not was determined by the Shapiro Wilk test. Continuous variables were shown as mean ± SD. The number of cases and percentages were used for nominal data. The mean differences between the control and glaucoma groups were compared by Student's t-test. Nominal data were analyzed by Pearson's Chi-square test. A p-value less than 0.05 was considered statistically significant.

RESULTS

Based on the demographic characteristics of the patients, there were no statistically significant differences between the glaucoma group and the control group in terms of mean age and distribution of males and females (p=0.104, p=0.176, respectively) **(Table 1)**.

Table 1: Demographical and clinical characteristics for control and glaucoma groups

Variables	Control (n=32)	Glaucoma (n=12)	p-value
Age (years)	57.1±7.1	62.0±8.4	0.104†
Gender			0.176‡
Male	14 (43.8%)	8 (66.7%)	
Female	18 (56.2%)	4 (33.3%)	
Optic nerve head	42.5±7.0	41.7±6.2	0.743†
Retro-orbital nerve	24.0±5.2	23.7±6.5	0.901†
Sclera-retina complex	4.77±1.86	4.77±1.84	0.997†
Retro-orbital fat	2.54±1.05	2.70±0.89	0.662†
Cornea	43.1±7.8	38.2±11.8	0.200†
Lens	25.3±6.8	23.1±5.8	0.348†
Anterior camera	3.8±1.1	3.7±1.4	0.826†

† Student's t test, ‡ Pearson's Chi-square test.

The mean stiffness values of the right eyes of the 32 healthy volunteers were: 42.5±7.0 kiloPascals at the optic nerve head, 24.0±5.2 kiloPascals at the retro-orbital nerve, 4.77±1.86 kiloPascals at the sclera-retina complex, 2.54±1.05 kiloPascals at the retro-orbital adipose tissue, 43.1±7.8 kiloPascals at the cornea, 25.3±6.8 kiloPascals at the lens and 3.8±1.1 kiloPascals at the anterior chamber (Table 1).

The mean stiffness values of the right eyes of 12 patients were: 41.7±6.2 kiloPascals at the optic nerve head, 23.7±6.5 kiloPascals at the retro-orbital nerve, 4.77±1.84 kiloPascals at the

sclera-retina complex, 2.70±0.89 kiloPascals at the retro-orbital adipose tissue, 38.2±11.8 kiloPascals at the cornea, 23.1±5.8 kiloPascals at the lens and 3.7±1.4 kiloPascals at the anterior chamber (Table 1).

Based on the posterior segment examination with SWE, there were no statistically significant differences between the glaucoma group and the control group in terms of the stiffness values of the right optic nerve head, retro-orbital nerve, sclera-retina complex, and retro-orbital adipose tissue (p=0.743; p=0.901; p=0.928; p=0.354, respectively) (Table 1).

Based on the anterior segment measurements of the eye with SWE, cornea, lens and anterior chamber stiffness values of glaucoma, and control group were statistically similar (p=0.200, p=0.348, p=0.826, respectively) (Table 1).

DISCUSSION

Elastography is a diagnostic tool which measures the elasticity and stiffness of the tissues and is used in the differential diagnosis between pathological (malign or benign) and normal tissues (24). The elasticity of the pathological tissues is less compared to the normal tissues. It is known that there is scleral rigidity in glaucoma patients (25). Unlike other organs, the eye has a heterogeneous structure, and the application of elastography is difficult. However, in a study conducted by Detorakis et al., strain elastography was shown to be usable in ocular tissues (26).

The number of studies on the sonoelastrography of the eye is rather limited compared to other organs. The first studies were performed on patients with vision loss (26, 27). In the strain elastography study on patients with vision loss secondary to glaucoma which was performed by Vural et al., it was found that orbital elastography can distinguish the strain values of the optic nerve and retrobulbar adipose tissue, and they stated that this can be used in other prospective studies (27). Likewise, Detorakis et al. reported that ultrasound elastography can be used for the evaluation of various ophthalmic pathological conditions for the ocular and periocular tissues (26). While the use of strain elastography is limited to compressible, superficial tissues, SWE enables the evaluation of more deeply located structures such as liver and prostate. This feature becomes more significant in the ocular use of elastography since applying pressure on the eye with the ultrasound probe causes more dramatic changes in the anterior segment of the eye, which is more superficial than the posterior segment (28). SWE is the new-generation elastography method, which produces low-frequency and low-speed waves perpendicular to the tissue and quantitatively measures the elasticity of the tissue (29). With this method, the elasticity of an area can be quantitatively measured in kiloPascals with the acoustic impulses sent to the area of interest (30). One of the most important advantages of the SWE is that, unlike strain elastography, the application of compression or pressure is not required (28).

Moreover, applying pressure to the eye during the examination can be uncomfortable for the patients. Thus, in our study, we believed that SWE was more easily applicable to the eye. The first ocular use of SWE in the literature was in 2014, on the rabbit eye. Detorakis et al. investigated the elasticity of the ciliary muscles and the lens during contraction (using a cholinergic agonist) and relaxation (using a cholinergic antagonist) (28).

Glaucoma is a multifactorial and progressive optic neuropathy, characterized by the destruction of the retinal ganglion cells, loss of visual field and the cupping of the optic nerve head. High intraocular pressure has been considered one of the important factors that play a prominent role in the initiation or progression of glaucoma and loss of the retinal ganglion cells (31). It is an insidious disease with the gradual loss of vision and is one of the main causes of secondary blindness (32). It is often difficult to detect the development of glaucoma, but there are physical and morphological differences between glaucoma patients and healthy individuals. In this study, our objective was to identify the physical changes in glaucoma patients using SWE.

We investigated the elasticity of the optic nerve head, retro-orbital nerve, sclera-retina complex, and retro-orbital adipose tissue in the posterior segment of the eye in 12 glaucoma patients and

32 healthy controls. In addition, the elasticities of the cornea, lens, and anterior chamber in the anterior segment of the eye were measured, which was not performed previously in the literature, and the results of the two groups were statistically compared. Based on the results, in the posterior segment of the eye, the stiffness of the optic nerve head was the highest, and the stiffness of the retro-orbital adipose tissue was the lowest. Also, in the study conducted by Pekel et al., the most elastic (soft) part of the eye was found to be the retro-bulbar adipose tissue, and the least elastic (stiff) part was the optic nerve head (33). In the study by Vural et al., which used strain elastography on patients with glaucomatous visual loss, a significant difference was observed between the optic nerve head and retro-orbital adipose tissue; however, the comparison between normal and atrophic optic nerve was not made (27). In the previous studies conducted using strain elastography, one of the structures whose elasticity was evaluated was the anterior and posterior vitreous (26, 27). However vitreous stiffness could not be measured with SWE in our study. The tissue with the highest stiffness at the anterior segment of the eye was the cornea. We found that the lens was more elastic than the cornea, and the anterior chamber was the most elastic part of the anterior segment of the eye.

So far, there is only one study on glaucoma which used SWE, and it evaluated the distal end of the optic nerve, the distal part of the optic nerve, and the nasal and temporal parts of the perineural sclera (23). In our study, these parameters correspond to the optic nerve head, retro-bulbar nerve, and sclera-retina complex indicated with numbers 1, 2, and 3 respectively in Figure 1. In the aforementioned study, it was found that in patients with glaucoma, the stiffness increased in all these parts compared to the control group, and the difference was statistically significant. However, in our study, the difference between the two groups in terms of stiffness was not significant. In the aforementioned study, the mean CDR value was 0.53 in the glaucoma group. In our study, the same value was 0.63. Furthermore, treatment duration was less than 3 years for almost half of the glaucoma patients while the mean duration of treatment was 5.4 years in our study. In other words, it can be said that glaucoma was more advanced in our patients, and the duration of the disease was longer. Therefore, it was not possible to explain our results with the stage or duration of the disease. Obviously, the relatively small number of patients in our study may be the reason behind our results. Indeed, Dikici et al. reported that even though considerable differences were noted between glaucomatous and normal eyes in general, an overlap of stiffness values between patients with glaucoma and healthy controls was noticed (23). Also, according to the results of the study conducted by Agladioglu et al., the elasticity index of the optic disc was higher than the optic nerve, which was similar to our study (34).

Similar to our study, in the elastography study by Agladioglu et al. on glaucoma patients, no significant difference was detected between the control group and glaucoma group in terms of the stiffness of the optic nerve, optic disk, retina-choroid-sclera complex, retrobulbar adipose tissue and anterior-posterior vitreous (34). However, they the authors used the strain elastography method instead of SWE in their study. They attributed the lack of significant difference to the fact that the disease may be in its early stages and that the patients were under treatment. In another study by Unal et al., the ratio of the optic nerve head to the orbital adipose tissue and the ratio of the optic nerve head to the lateral rectus muscle was measured in glaucoma patients and the control group, and a statistically significant increase was found in the stiffness value of the optic nerve head in glaucoma patients (35). Although we could not find any statistically significant difference between glaucoma patients and the control group, similar to this study stiffness value of the optic nerve head was more than retrobulbar optic nerve and retroorbital adipose tissue.

The major limitation of our study was the small size of the patient group, and the other limitation was the lack of an eye-specific ultrasonography probe for a superficial, small and sensitive organ.

Based on the hypothesis that increased intraocular pressure in glaucoma can cause changes

in the elasticity of different parts of the eye, we aimed to determine the changes using SWE. However, against our expectations, we were not able to determine a statistically significant difference between glaucoma and control groups. Because there are studies in the literature with contradicting results, it is clear that there is a need for further studies with a larger sample size. On the other hand, we believe that the reference values obtained from the important structures localized at the anterior and posterior segments of the eye, particularly in the control group comprising 32 healthy volunteers, can be used in prospective studies on various ophthalmologic diseases.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

DÖRT YAŞINDAN BÜYÜK GELİŞİMSEL KALÇA DİSPLAZİSİ OLAN HASTALARDA, TEK AŞAMALI AÇIK REDÜKSİYON, FEMORAL KISALMA VE SALTER OSTEOTOMİSİ'NİN RADYOLOJİK SONUÇLARINI, İLK AMELİYAT YAŞI NASIL ETKİLER ?

HOW DOES INITIAL SURGERY AGE AFFECT THE RADIOLOGICAL RESULTS OF SINGLE-STAGE OPEN REDUCTION, FEMORAL SHORTENING, AND SALTER'S OSTEOTOMY IN PATIENTS OVER THE AGE OF FOUR WITH DEVELOPMENTAL HIP DYSPLASIA ?

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ÖZET

AMAÇ: Pediatrik ortopedide, tedavisi en tartışmalı konulardan biri, Gelişimsel Kalça Displazisidir (GKD). Tanı ve tedavi zamanlaması, bu durumu başarılı bir şekilde tedavi etmek için ana hedeftir. Özellikle gelişmekte olan ülkelerde ilerleyen yaşa kadar teşhis edilemeyen vakalar halen görülmektedir. Gecikmiş tanı ve tedavi , ilerleyen yaşla birlikte daha kapsamlı ameliyatlara yol açar ve düşük memnuniyet oranlarına neden olabilir. Bu çalışmanın amacı, Gelişimsel Kalça Displazisi'nin tek aşamalı tedavisinin sonuçlarına, hasta yaşının etkisini değerlendirmektir.

GEREÇ VE YÖNTEM: 2004 ve 2010 yılları arasında hastanemizde tedavi edilen 23 hasta (34 kalça) çalışmaya dahil edildi. Ortalama ameliyat yaşları 7,5 olan hastalara açık redüksiyon, femoral kısaltma ve Salter innominate osteotomi'yi içeren tek basamaklı tedavi uygulandı. Radyolojik sonuçlar, asetabular indeksteki, asetabuler açıdaki ve Severin radyolojik sınıflamasına göre düzelme ve son takiplerindeki Bucholz ve Ogden avasküler nekroz (AVN) sınıflamasına göre değerlendirildi.

BULGULAR: Hastalarımızın ortalama takip süremiz 60 ay (24 ila 84 ay arası) idi. Asetabuler indeks, ameliyat öncesi 39.7°±1.4° (25° - 52° arası) iken ameliyat sonrası 21.8°±1.8° saptandı. Ameliyat sonrası çekilen pelvis grafilerinde ölçülen asetabuler açıda ortalama düzelme miktarı 17.9°±0.8° saptandı. Bucholz ve Ogden AVN sınıflamasına göre; 1 hastada Tip 1 (% 2.9) ve 1 hastada Tip 3 (% 2.9) AVN saptandı. Radyolojik olarak 8 yaş ve altındaki çocuklarda başarı oranı (85.7%) belirgin olarak yüksekti. (p =0.008)

SONUÇ: Asetabuler indeks ve Severin'in radyolojik sınıflamasındaki düzelmeye göre, 4 - 8 yaş aralığında tedavi edilen GKD'nin tek basamaklı tedavisi sonrası başarılı sonuçlar elde edilir. Ancak 8 yaştan daha büyük çocukların radyolojik sonuçları 8 yaş altındakilere göre daha kötü sonuçlanmaktadır.

ANAHTAR KELİMELER: Gelişimsel Kalça Displazisi, Kalça, Femur, Ostetotomi

ABSTRACT

OBJECTIVE: One of the most controversial issues in pediatric orthopedics is Developmental dysplasia of the hip (DDH). The timing of diagnosis and treatment are is the main goal to treat this condition successfully. Neglected cases that may remain undiagnosed until advancing age are still seen especially in developing countries. Delayed diagnosis and treatment with advancing age leads to more extensive surgery and cause low satisfactory rates. The aim of this study is to evaluate the effect of patients' age on the results of single-stage treatment of Developmental Dysplasia of the Hip.

MATERIAL AND METHODS: 23 patients (34 hips) treated in our hospital between 2004 and 2010 were included in the study. Single-stage treatment including open reduction, femoral shortening, and Salter's innominate osteotomy was applied to patients whose mean age of surgery was 7.5 years. Radiological results were evaluated in terms of improvement in the acetabular index, in the acetabular angle and according to Severin's classification, and Bucholz and Ogden's avascular necrosis (AVN) classification at the final follow-up.

RESULTS: The average follow-up period was 60 (range: 24 - 84) months. While the acetabular index was 39.7°±1.4° (range: 25°-52°) preoperatively, it was measured as 21.8°±1.8° postoperatively. The mean amount of improvement in the acetabular angle was 17.9°±0.8°. According to Bucholz and Ogden's classification, one patient (2.9%) had Type 1 AVN and one patient (2.9%) had Type 3 AVN. Radiologically, the success rate (85.7%) was significantly higher in children aged 8 years and younger (p = 0.008).

CONCLUSIONS: According to the improvement in the acetabular index and Severin's radiological classification, successful results are obtained after a single-step treatment of DDH, which is treated in the 4-8 age range. However, the radiological results of children older than 8 years are worse than those under 8 years old.

KEYWORDS: Developmental Hip Dysplasia, Hip, Femur, Osteotomy

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INTRODUCTION

One of the most challenging conditions in pediatric orthopedics is Developmental dysplasia of the hip (DDH) (1). The timing of diagnosis and treatment is the main goal to treat this condition successfully. DDH, which is diagnosed early in infants aged 0-6 months, can be successfully treated with conservative treatment methods such as the Tubingen device (2, 3). However, neglected cases are still seen that may remain undiagnosed until advancing age especially in developing countries and among low socioeconomic groups (4). It leads to more extensive surgery with advancing age. Also, it can cause low satisfactory rates dues to pronounced acetabular dysplasia, permanent dysplastic changes, the elongated joint capsule, retraction of the muscles around the hip and loss of function in the hip, abnormal gait, and ultimately osteoarthrosis in early adulthood (5 - 7). Although the details of the surgical strategy differ from one center to another, skin traction is not recommended preliminary before the surgery, the common approach is to release the soft tissue contractures, reduce the femoral head to its original location, and increase the acetabular coverage (8). With the advancing age, debates continue regarding the timing of these surgeries. Reducing the hip with developmental dislocation of the hip, especially after the age of 4 is a difficult task with frequent complications (4, 6).

Persistent acetabular dysplasia is another important problem among patients with late-detected developmental hip dislocation. The acetabulum is shallow and dysplastic in these patients, since the stimulating effect of the femoral head on the development of the acetabulum disappears. Closed or open reduction without bone alignment, also depending on the age-related developmental capacity of the acetabulum, has been associated with permanent dysplasia (8, 9). The evolution of the acetabular index is the most important parameter to predict persistent acetabular dysplasia. If residual acetabular dysplasia is present, a surgeon should perform pelvic or femoral osteotomies (10). Pelvic osteotomy increases the coverage of the femoral head, provides stability, and prevents residual dysplasia (8). Due to the pressure-generating effect of the tendon and the capsule and the muscle contractures around the hip and on the femoral head that develop during and after reduction, avascular necrosis (AVN) is commonly encountered (4, 7).

Single-stage surgical treatment of DDH includes open reduction, femoral shortening, and pelvic osteotomy. While this procedure is performed in patients over the age of 4, it is technically dependent and requires experience (4, 6, 7). The current literature requires new studies with a large number of patients who have undergone single-stage surgical treatment of DDH with long follow-ups.

In this study, we aimed to evaluate the effect of patients' age on the results of single-stage treatment of Developmental Dysplasia of the Hip.

MATERIAL AND METHODS

The files of the patients between the ages of 4 and 12 years, whose triradiate cartilages were not closed and treated between 2004 and 2010 at the Metin Sabancı Baltalimanı Bone Health Research Hospital were retrieved and reviewed. Eight patients diagnosed with a neuromuscular disease and teratologic dislocation of the hip were excluded from the study. The clinical and radiological results of one-stage surgical treatment performed on 34 hips of 23 patients (15 females, 8 males) diagnosed with DDH were retrospectively evaluated. The patients had a mean age of 7.5±3 (range: 4 to 12) years at the time of surgery and were followed up for a mean period of 60±8 (range: 24 to 84) months. Eleven patients had bilateral DDH.

Preoperative, early postoperative, and final follow-up radiographs were evaluated by an independent orthopedic surgeon other than the performing surgeon. The patients were followed up every six weeks for the first two visits, while the third follow-up was on the 24th week, and the fourth follow-up was on the 48th week. The patients were checked on an annual basis thereafter. The degree of hip dislocation on the preoperative radiographs was evaluated using the Tönnis classification. Final radiographs were evaluated based on Severin's radiological criteria and the postoperative acetabular index (11).

All final follow-up radiographs were examined for the presence of AVN in the femoral head and were classified according to Bucholz and Ogden's classification in the case of AVN (12).

Ethical Committee

This retrospective study was performed under the approval of Metin Sabancı Baltalimanı Bone Health Research Hospital Ethics Committee (29.06.2010/74) and conducted in accordance with the Declaration of Helsinki.

Surgical Technique

All surgeries were performed by a single surgeon. Skeletal traction was not applied initially. The hip joint was approached with a Smith-Peterson incision, and a long lateral incision starting from the greater trochanter was made for femoral osteotomy. Salter's pelvic osteotomy was performed in 34 hips to realign the acetabulum. Femoral shortening and derotation were performed from the proximal of the femur, through the intertrochanteric area. The amount of femoral shortening and derotation was decided during surgery. After the first osteotomy, the femoral head was reduced to the acetabulum, and the overlapping femoral segment on the osteotomy line was resected. The average amount of shortening was 1.7±0.25 (range:1 to 3) cm. Derotation was performed in case anterior instability was observed while reducing the femoral head to the realigned acetabulum. Ten patient's proximal femur were derotated from 10° to 20° to provide adequate stabilization. Capsulorrhaphy was not performed in any patient. The initial, postoperative, and final follow-up radiographs of our 7-year-old patient with bilateral Tönnis Stage 4 DDH are given in **Figures (1, 2, 3).**

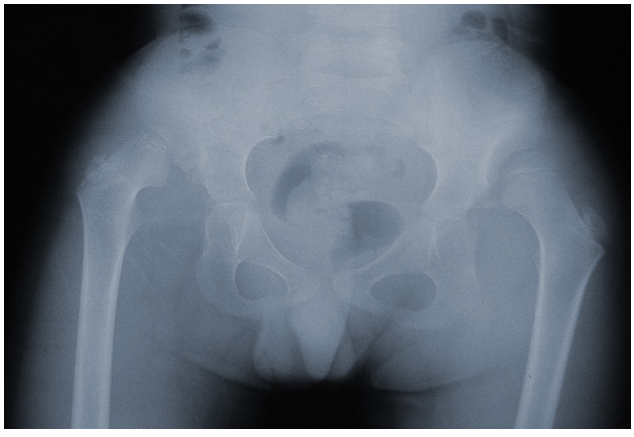

Figure 1: Standing anteroposterior radiograph showing the pelvis before surgery.

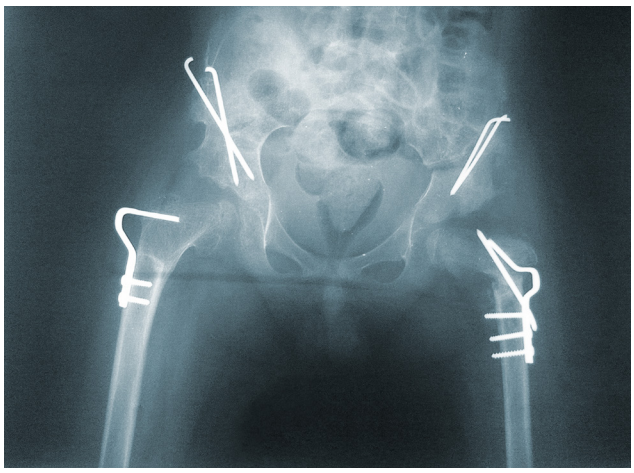

Figure 2: Standing anteroposterior radiograph showing the pelvis after Salter's pelvic osteotomy, femoral shortening, and intertrochanteric derotation osteotomy.

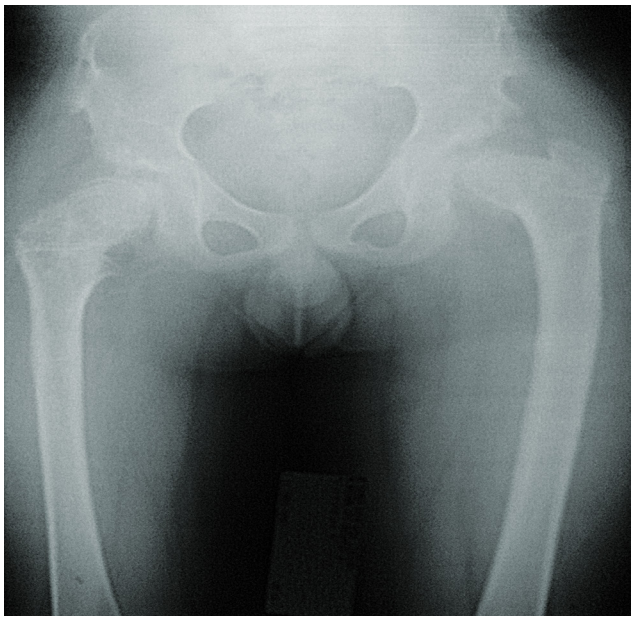

Figure 3: Anteroposterior radiograph of the pelvis at the 6th year final follow-up.

Postoperative Carepatient

All patients were immobilized in a pelvic pedal cast for six weeks with their hips in 20° to 60° of flexion, 30° to 60° of abduction, and neutral to 15° of internal rotation. After the cast was removed, range of motion exercises was initiated and the patients were allowed to put on as much weight as they could tolerate. No additional orthoses were used. The plates and screws used for the fixation of the femoral osteotomy and the Kirschner wires used for fixation of Salter's innominate osteotomy were removed after a mean period of 9±3 (range: 6 to 12) months.

Statistical Analysis

Statistical evaluations were made using the NCSS 2007 software for Windows. The paired t-test was employed to evaluate the pre- and

post-treatment values, while the chi-square and McNemar's tests were used to evaluate the qualitative data. Statistical significance was set at $p<0.05$.

RESULTS

According to the Tönnis classification, 27 hips were Grade 4, and seven hips were Grade 3. A total of 17 right hips and 17 left hips were operated on. While the acetabular index was 39.7°±1.4° (range: 25° to 52°) preoperatively, it was measured as 21.8°±1.8° postoperatively. The mean amount of improvement in the acetabular angle measured on the pelvic radiographs taken on the first postoperative day was 17.9°±0.8°. According to Severin's classification, 13 hips (38.2%) were Class 1, eight hips (23.5%) were Class 2, nine hips (26.5%) were Class 3, two hips (5.9%) were Class 4, and two hips (5.9%) were Class 6. According to Bucholz and Ogden's classification, one patient (2.9%) had Type 1 AVN, and one patient (2.9%) had Type 3 AVN. One patient who developed redislocation refused to undergo surgery again. Osteosynthesis was performed on one patient with a fracture that was detected on the femoral osteotomy line. This patient did not have any radiological problems. Infection, implant failure, or wound problems were not encountered in any patient. Radiological grades were significantly lower in patients who were older than 8 years, ($p=< 0.00015$). The cut-off point for age was taken as 8 years regarding the results of the Chi-square statistics. Satisfactory results for children who were 8 years or younger (85.7%) were significantly better than that of the children who were older than 8 years (33.3%), ($p=< 0.008$). Our radiological results are summarized in the table **(Table 1)**.

Table 1: Radiological results of the patients.

Patient no.	Age (years)	Involved hip	Follow-up period (months)	Preop. Tönnis Stage	Preop. AI (right)	Postop. AI (right)	Follow-up AI (right)	Preop. AI (left)	Postop. AI (left)	Follow-up AI (left)	Severin Class (right)	Severin Class (left)
1	12	Bilateral	78	4	44	26	26	45	28	27	3	3
2	12	Right	80	4	48	30	30				4	
3	9	Bilateral	76	4	45	29	27	46	28	26	2	2
4	6	Bilateral	84	4	38	22	18	39	22	19	2	1
5	6	Bilateral	74	4	35	17	16	38	22	20	1	1
6	6	Left	76	3				28	12	10		2
7	11	Right	12	4	49	30	30				6	
8	5	Bilateral	72	4	36	20	18	38	20	17	1	1
9	6	Left	70	3				39	24	24		1
10	9	Left	69	4				48	30	28		3
11	4	Right	72	4	44	28	23				1	
12	4	Bilateral	58	4	41	24	22	42	23	20	3	1
13	9	Left	62	4				52	29	34		4
14	4	Bilateral	56	4	25	12	10	29	15	12	1	1
15	7	Bilateral	55	4	34	19	20	38	22	20	2	3
16	5	Right	56	4	43	23	20				1	
17	12	Bilateral	49	3	51	28	34	48	25	29	6	2
18	12	Left	46	4				33	15	15	3	
19	9	Bilateral	44	4	44	25	20	47	29	29	2	3
20	4	Bilateral	38	4	34	18	18	36	19	16	1	1
21	8	Left	26	3				35	15	16		3
22	9	Right	24	3	33	15	15				3	
23	7	Right	25	3	29	13	12				2	

AI: acetabular index.

DISCUSSION

The main goal of the treatment of DDH is to obtain a painless, stable, non-functional hip with a normal gait and to protect it from early osteoarthrosis. This can only be achieved with a concentrically reduced hip. In a logistic regression analysis where they analyzed the effect of age at initial treatment on the development of AVN, they reported that their model predicted 83.9% accurately and the probability of AVN development was higher in those with advanced age at initial treatment (13). Achieving successful results gets harder as patients get older (4, 8, 14).

According to the consensus among researchers, the earliest age at which Salter's innominate osteotomy can be applied is 18 months (8). If the osteotomy is to be performed at an earlier age, the innominate bone and graft thicknesses are quite insufficient. In this case, the surgical intervention is likely to result in loss of correction (8). Taghi et al. reported that the group with a mean age of 24.7 months at the first operation and undergoing Salter innominate osteotomy had a success rate of 86% according to the Severin score (15). According to Chapchal (16), the age at which the treatment is initiated is the most important factor in determining the treatment protocol. The author reported very successful results in patients between 18 months and 3 years of age and in cases where the acetabular index did not exceed 35°. In another study conducted by Gulman et al. on patient groups of 18 months to 4 years, 4 to 6 years, and over 6 years of age who underwent innominate osteotomy, the researchers reported that the most successful results were obtained in the 18 months to 4 years group (17). Salter, with his 15 years of experience and his study with Dubos (18), obtained excellent and good results in 93.6% of the patients in the 1.5 to 4 years age group, while this rate decreased to 56.7% in the 4 to 10 years age group. According to Salter, the upper age limit for innominate osteotomy is 6 years (18). However, with the addition of femoral shortening, the surgery could be performed on patients between the ages of 8 and 12 years (8). Weinstein et al. (19) operated on 32 hips of 25 patients with a mean age of 4 years and 2 months, where the oldest patient was 8 years and 2 months. They additionally performed femoral shortening in 21 hips. The authors re-

ported radiologically successful results in 75% of their series according to Severin's classification and Type 4 AVN in three patients. Baki et al. (20) treated 15 hips (15 patients) with developmental dysplasia in a single-stage surgery with open reduction and Salter innominate osteotomy via a medial approach, and radiologically classified 10 hips as Class 1, four as Class 2, and one as Class 3 according to Severin's criteria, for patients who were followed up for an average period of 9.6 (range:4 to 14) years postoperatively. The authors also reported that none of their patients had AVN. In Ryan et al.'s study (6) in which the results of the operative treatment of congenital hip dislocation in 18 children (25 hips) were observed, the researchers reported excellent results in seven hips, good results in 11 hips, moderate results in four hips, and poor results in three hips based on Severin's classification. The authors also detected AVN necrosis in the proximal femur in four patients. In their study, Williamson et al. (21) reported that femoral osteotomy and pelvic osteotomy gave better results in patients with congenital hip dislocation over 3 years of age with a long follow-up period. In addition, the same patient group had better radiological results on the fifth year final follow-up radiographs when compared to the patients who underwent femoral osteotomy alone. In another study, Konya et al. reported that Tönnis and Steel osteotomies offer satisfactory short-term results in the surgical treatment of adult patients with mild to moderate dysplasia (22). In our study, the CE angle of patients who were operated on before the age of 8 years as higher at the final follow-up. In addition, our radiological results were better in patients who were operated on before the age of 8 years. In the 4 to 8 years age group, the success rate had risen to 85%. Worse results were obtained in patients over 8 years of age (28.5%).

The prevalence of AVN in the 4 - 8 years group ranges between 3% and 60% (8). In a systemic review of comparative studies, they reported that the complication rate for Salter innominate osteotomy was 9.4% and AVN was the most common complication (23). In another study, they reported that combining Salter innominate osteotomy with anterior open reduction has the lowest rate of AVN, and best clinical and radiological results in walking ages (24). It has been asserted that femoral shortening facilitates reduction in children over 3 years of age (8). Schoenecker and Strecker (25) have shown that this procedure reduces the incidence of AVN when performed on older children. The same authors compared femoral shortening with direct traction and demonstrated that femoral shortening was more effective in preventing AVN in their small series. Karakaş et al. (4) performed femoral shortening, varisation, and derotation osteotomy together with innominate osteotomy in their study where they did not apply any preoperative traction to any patient. The authors reported AVN in 7.27% of the cases (4 hips) following single-stage surgery performed on 55 hips and recounted that femoral shortening prevented excessive pressure that may develop in the femoral head, thereby reducing the AVN incidence. McKay, on the other hand, reported AVN in 15% of their series and stated that patients with bilateral DDH had better results in terms of osteonecrosis after single-stage surgery in patients younger than 5 years of age (26). Gulman et al., on the other hand, reported an AVN rate of 63.3% in their series, 34.6% of which were Type 2, Type 3, and Type 4 (17). In another study, Tuhanioglu et al. observed AVN in 11.11% of the cases in the Salter osteotomi group in their series (27). In our study, AVN of the femoral head was observed in two patients; according to Bucholz and Ogden's classification, one was Type 1 and one was Type 3 AVN. One patient who developed redislocation refused to undergo surgery again. Osteosynthesis was performed on one patient with a fracture that was detected on the femoral osteotomy line. This patient did not have any radiological problems. Infection, implant failure, or wound problems were not encountered in any patient. Although the selection of a small group of patients with Tönnis grade 4 hip may be considered a limitation of this study, our study is different from previous studies because it investigated the efficacy of a uniform treatment method in patients with Tönnis grade 4 hip involvement (28, 29)

In conclusion, the most important finding of our study is that radiological success in the middle term is highly dependent on the age of the

child. We also concluded that in DDH patients who were aged 4 to 8 years and were treated with a single-stage surgery with open reduction, pelvic osteotomy, and femoral shortening, successful results were obtained in the middle term according to Severin's classification, whereas radiological success was significantly low in the middle term in children aged 8 years and over.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

COVİD-19 PANDEMİSİNDE BİR ÜNİVERSİTE HASTANESİNDE DOKTOR VE HEMŞİRELERDE TÜKENMİŞLİK SENDROMU

BURNOUT SYNDROME AMONG DOCTORS AND NURSES DURING THE COVID-19 PANDEMIC IN A UNIVERSITY HOSPITAL

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ÖZET

AMAÇ: Tükenmişlik sendromu sağlık çalışanlarında önemli bir sorundur. Covid-19 pandemisinde sağlık çalışanları emsalsiz bir çaba ile mücadele etmişlerdir. Bu çalışmanın amacı, Covid-19 pandemisinde Afyonkarahisar Sağlık Bilimleri Üniversitesinde çalışan sağlık çalışanlarında mesleki tükenmişlik düzeylerini araştırmaktır.

GEREÇ VE YÖNTEM: Bu çalışma 01 Şubat - 01 Mart 2021 tarihleri arasında Afyonkarahisar Sağlık Bilimleri Üniversitesi'nde gerçekleştirilmiştir. Örnek hesaplamada G* power paket programı kullanılmıştır. Katılımcıların demografik verileri ve iş hayatına ilişkin 20 parametreden oluşan anket formu kullanılmıştır. Tükenmişlik ölçeği olarak Maslach Tükenmişlik Envanteri kullanılmıştır.

BULGULAR: Bu çalışmaya toplam 312 sağlık çalışanı katılmıştır. Katılımcıların 139'u erkek (%44.6), 173'ü kadın (%55.4) idi. Katılımcıların yaş ortalaması 30.7± 7.28 idi. Katılımcıların 138'i doktor (%44.2), 174'ü hemşire (%55.8) idi. Katılımcıların 110'u Covid servis veya Covid yoğun bakım ünitesinde (%35.3), 202'si (%64.7) diğer bölümlerde çalışıyordu. Ortalama duygusal tükenme puanı 19.21 ± 7.28, duyarsızlaşma puanı 7.31 ± 7.19 ve kişisel başarı puanı 20.05 ± 3.88 idi. Bu sonuçlar, sağlık çalışanlarının duygusal tükenme ve kişisel başarı alt boyutlarına göre yüksek düzeyde tükenmişlik, duyarsızlaşma alt boyutuna göre ise orta düzeyde tükenmişlik yaşadıklarını göstermektedir.

SONUÇ: Bu çalışmanın sonuçları, gelecekte önleme protokollerinin oluşturulması ve sağlık profesyonellerinin pandemi karşısında eğitilmesi için çok değerlidir. Çalışmamızın sonuçlarına göre doğrudan Covid-19 hastaları ile çalışan risk gruplarının yakından takip edilmesi ve gerektiğinde psikolojik destek verilmesi önemlidir. Ayrıca sağlık çalışanlarında iş doyumunun artırılması ve tükenmişliğin azaltılması için çalışma koşullarında düzenlemelerin yapılması oldukça önemlidir.

ANAHTAR KELİMELER: Pandemi, Covid-19, Tükenmişlik, Sağlık çalışanları

ABSTRACT

OBJECTIVE: Burnout syndrome is an important problem among healthcare workers. During the Covid-19 pandemic, healthcare professionals have struggled with an unprecedented effort. The aim of this study is to investigate occupational burnout levels among healthcare professionals working at Afyonkarahisar Health Sciences University during the Covid-19 pandemic.

MATERIAL AND METHODS: This study was carried out at the Afyonkarahisar Health Sciences University between February 1st and March 1st, 2021. G* power package software was used in the sample calculation. A questionnaire form consisting of 20 parameters on demographic data and work life was used. Maslach Burnout Inventory was used as the burnout scale.

RESULTS: A total of 312 healthcare professionals participated in this study. 139 of the participants were men (44.6%) and 173 were women (55.4%). The mean age of the participants was 30.7± 7.28. 138 of the participants were doctors (44.2%) and 174 were nurses (55.8%). 110 of the participants were working in a covid ward or covid intensive care unit (ICU) (35.3%) and 202 were working in other departments (64.7%). The mean subscale scores were 19.21±7.28 for emotional exhaustion, 7.31±7.19 for depersonalization, and 20.05±3.88 for personal accomplishment. These results show that healthcare workers experience high levels of burnout according to the emotional exhaustion and personal accomplishment subscales and moderate burnout according to the depersonalization subscale.

CONCLUSIONS: The results of this study are very valuable for establishing future prevention protocols and educating healthcare professionals in the face of a pandemic. Based on our findings, we suggest closely monitoring risk groups that work directly with Covid-19 patients and providing psychological support when necessary. Also, making the necessary arrangements in working conditions is crucial to increase job satisfaction and reduce burnout in healthcare workers.

KEYWORDS: Pandemic, Covid-19, Burnout, Healthcare workers

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INTRODUCTION

The Covid-19 outbreak started in Wuhan and quickly expanded all over the world, turning into a pandemic. Healthcare professionals have been working very selflessly and under difficult conditions during this process. The pandemic has changed the lives and attitudes of healthcare professionals as well as all people (1). The pandemic has had some psychological effects on the general population, particularly on healthcare professionals (2, 3). Healthcare workers were exposed to the intimidation of infection, which was defined as fatal, causing a sense of threat and uncertainty (4). Healthcare workers have been struggling with this disease with unprecedented effort. Recent studies show that working under the pressure of COVID-19 has a remarkable effect on healthcare workers (5, 6). Burnout is defined as the disconnection of professionals from the original meaning and purpose of their profession, where they can no longer really care about the people they serve. It includes a person's psychological withdrawal from their job in response to excessive stress and dissatisfaction, especially in cases where the human factor has a key place in terms of quality of service. There are studies in the literature on burnout syndrome in healthcare workers, but only a few during the Covid pandemic (7 - 9). In this research, we intended to evaluate burnout syndrome in healthcare workers during the Covid pandemic at the Faculty of Medicine at Afyonkarahisar Health Sciences University.

MATERIALS AND METHODS

This study was conducted at the Afyonkarahisar Health Sciences University between February 1st and March 1st, 2021. All nurses and doctors who volunteered to participate in the study were included. Participants were grouped as those working in the covid ward or covid intensive care unit and those working in other departments.

Sample Size Calculation

There were 813 doctors and nurses at our hospital. 351 of them were doctors and 462 were nurses. The minimum sample size was calculated as 250, considering the effect size as medium (0.3), type I error rate= 0.05 and power = 95% using the G* power package software. According to this calculation, at least 107 doctors and 142 nurses should be included in the study.

Survey Form

A survey form consisting of 20 parameters on sociodemographic data and work life was used. Maslach Burnout Inventory is a 22-item 5-point Likert-type questionnaire containing the following subscales: emotional exhaustion (EE), depersonalization (DP), and personal accomplishment (PA). Of the 22 items, 9 are for evaluating emotional exhaustion, 5 for depersonalization, and 8 for personal accomplishment. The values used to evaluate burnout levels for each subscale are given in **Table 1** (10).

Table1: Maslach Burnout Inventory subscale scores

Subscale	High	Medium	Low
EE	≥18	12-17	0-11
DP	≥10	6-9	0-5
PA	≥26	22-25	0-21

EE: Emotional Exhaustion DP: Depersonalization PA: Personal Accomplishment

A total burnout level cannot be obtained, as each factor is considered separately. High levels of emotional exhaustion and depersonalization and low levels of personal accomplishment are characteristic of burnout. Individuals suffering from burnout are expected to have high emotional exhaustion and depersonalization scores and low personal achievement scores. The score ranges are 0-36 for the emotional exhaustion subscale, 0-20 for the depersonalization subscale, and 0-32 for the personal accomplishment subscale. **Table 2** shows the assessment of burnout syndrome subscales.

Table 2: Burnout syndrome level assessment chart

Burnout Level	EE score	DP score	PA score
Low	Low	Low	High
Medium	Medium	Medium	Medium
High	High	High	Low

EE: Emotional Exhaustion DP: Depersonalization PA: Personal Accomplishment

Ethical Committee

This study was approved by the Afyonkarahisar Health Sciences Clinical Research Ethics Committee (dated 08.01.2021, numbered 2021/32). The study complied with the principles of the Declaration of Helsinki.

Statistical Analysis

During the evaluation of this study, frequency, percentage, and arithmetic mean and standard deviation were used as descriptive statistics. Categorical data were analyzed using Pearson's chi-squared test. Quantitative data were analyzed using the Mann-Whitney test. Statistical significance was set at $p<0.05$. Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) 22.0 package software.

RESULTS

A total of 312 healthcare professionals participated in this study. 139 of the participants were men (44.6%) and 173 were women (55.4%). The mean age of the participants was 30.7± 7.28. 138 of the participants were doctors (44.2%) and 174 were nurses (55.8%). 64 of the doctors were specialists and 74 were residents. 110 were working in a covid ward or covid intensive care unit (ICU) (35.3%) and 202 were working in other departments (64.7%). Chronic disease was present in 63 (20.2%) of all participants. **Table 3** summarizes the sociodemographic characteristics and work life information of the healthcare workers.

Table 3: Sociodemographic characteristics and work life questionnaire

Sociodemographic characteristics and work life questionnaire	n (%)
Professional category	
Specialist	64 (20,5%)
Resident	74 (23,7%)
Nurse	174 (55,8%)
Department	
Covid ward or intensive care unit	110 (35,3%)
Other departments	202 (64,7%)
Sex	
Female	173 (55,4%)
Male	139 (44,6%)
Marital Status	
Single	150 (48,1%)
Married	162 (51,9%)
Chronic disease	
No	245 (78,5%)
Yes	67 (21,5%)
Child	
No	181 (58%)
Yes	131 (42%)
Working time	
1-5 years	166 (53,2%)
6-10 years	59 (18,9%)
>10 years	87 (27,9%)
Working shifts	
Day	80 (25,6%)
Night	33 (10,6%)
Day+ Night	199 (63,8%)
Monthly working time	
<160 hours	57 (18,3%)
160-184 hours	141 (45,2%)
185-217 hours	69 (22,1%)
>217 hours	45 (14,4%)
Reason for choosing your profession	
Voluntarily	180 (57,7%)
By family request	49 (15,7%)
For job opportunities	69 (22,1%)
The influence of the society	14 (4,5%)
Is your monthly income sufficient for living?	
No	85 (27,2%)
Yes/partially	167 (53,5%)
Yes/totally	60 (19,2%)
Are you considering changing your profession?	
I will change it if conditions allow	99 (31,7%)
At the first opportunity	43 (13,8%)
I will carry on as long as I can	109 (34,9%)
I will continue until retirement	61 (19,6%)
Need for psychiatric help before	
Yes/Received	67 (21,5%)
Yes/Have not received	38 (12,2%)
No	207 (66,3%)
Satisfaction with work-life	
Yes	64 (20,5)
Partially	180 (57,7%)
No	68 (21,8%)
Do you have difficulties in obtaining medical supplies?	
Always	68 (21,8%)
Rarely	156 (50%)
Mostly	50 (16%)
No	38 (12,2%)

The mean subscale scores were 19.21±7.28 for emotional exhaustion, 7.31±7.19 for depersonalization, and 20.05±3.88 for personal accomplishment. These results show that healthcare workers experience high levels of burnout according to the emotional exhaustion and personal accomplishment subscales and moderate burnout according to the depersonalization subscale.

Considering professions, emotional exhaustion was found to be significantly higher in nurses (p=0.030). Emotional exhaustion was significantly higher in the covid ward or covid ICU workers (p=0.023). There was no significant correlation between other sociodemographic parameters and emotional exhaustion, depersonalization, and personal accomplishment. **Table 4** summarizes participant's level of burnout by sociodemographic characteristics.

Table 4: Participant's level of burnout by sociodemographic characteristics

Sociodemographic characteristics	Emotional Exhaustion				Depersonalization				Personal Accomplishment			
	Low	Medium	High	P	Low	Medium	High	P	Low	Medium	High	P
Professional category												
Specialist	15	10	39	0.030	22	22	20	0.120	37	20	7	0.030
Resident	6	16	52		15	30	29		58	14	2	
Nurse	24	50	100		61	68	45		103	50	21	
Department												
Covid ward or ICU	10	11	89	0.023	28	40	42	0.056	72	26	12	0.582
Other departments	61	89	52		70	80	52		126	58	18	
Sex												
Female	22	35	116	0.059	54	63	56	0.584	109	50	14	0.469
Male	23	41	75		44	57	38		89	34	16	
Marital Status												
Single	24	43	83	0.115	53	48	49	0.075	94	38	18	0.366
Married	21	33	108		45	72	45		104	46	12	
Child												
No	27	44	110	0.957	58	59	64	0.520	119	41	21	0.080
Yes	18	32	81		40	41	50		79	43	9	
Residential												
With family	23	39	125	0.023	52	78	57	0.392	120	54	13	0.275
Alone	22	31	60		43	37	33		69	28	16	
With friends	0	6	6		3	5	4		9	2	1	

Table 5 illustrates participants' level of burnout by work life. Emotional exhaustion was higher in those working during day and night shifts ($p<0.0001$). Significant correlations were found between monthly working time and emotional exhaustion and depersonalization (p=0.004, p=0.043). Emotional exhaustion was lower in those who chose their profession willingly (p=0.047.) Emotional exhaustion was higher in those who thought that their monthly income was not enough to make a living (p=0.002).

Emotional exhaustion and depersonalization were significantly higher in those considering changing their profession ($p<0.0001$). Personal accomplishment was lower in those considering changing their profession (p=0.048). Emo-

tional exhaustion and depersonalization were significantly higher and personal accomplishment was significantly lower in those who were not satisfied with their work life (p<0.0001, p<0.0001, p<0.0001). Emotional exhaustion and depersonalization were significantly higher in those having difficulty obtaining medical supplies (p<0.0001, p<0.0001). There was no significant correlation between other demographic or work life parameters and emotional exhaustion, depersonalization, and personal accomplishment.

Table 5: Participant's level of burnout by work life

Work life characteristics	Emotional Exhaustion				Depersonalization				Personal Accomplishment			
	Low	Medium	High	P	Low	Medium	High	P	Low	Medium	High	P
Working time												
1-5 years	22	39	105	0.437	49	61	56	0.230	112	38	16	0.539
6-10 years	7	19	33		15	28	16		35	18	6	
>10 years	16	18	53		34	31	22		51	28	8	
Working shifts												
Day	21	22	37	<0.0001	29	30	21	0.067	47	26	7	0.458
Night	0	4	29		4	13	16		22	10	1	
Day+ Night	24	50	125		65	77	57		129	48	22	
Monthly working time												
<160 hours	9	22	26	0.004	18	23	16	0.043	34	17	6	0.330
160-184 hours	27	33	81		57	44	40		82	44	15	
185-217 hours	6	15	48		14	31	24		52	13	4	
>217 hours	3	6	36		9	22	14		30	10	5	
Reason for choosing your profession												
Voluntarily	35	46	99	0.047	66	68	46	0.180	100	59	21	0.014
By family request	6	12	31		13	18	18		32	12	5	
For job opportunities	4	14	51		17	26	26		56	9	4	
The influence of the society	0	4	10		2	8	4		10	4	0	
Is your monthly income sufficient for living?												
No	7	17	61	0.002	21	39	25	0.450	57	21	7	0.344
Yes/ partially	21	41	105		55	60	52		107	41	19	
Yes/ totally	17	18	25		22	21	17		34	22	4	
Are you considering changing your profession?												
I will change it if conditions allow	5	22	72	<0.0001	25	38	36	<0.0001	71	19	9	0.048
At the first opportunity	2	6	35		4	15	24		26	15	2	
I will carry on as long as I can	17	28	64		38	47	24		72	26	11	
I will continue until retirement	21	20	20		31	20	10		29	24	8	
Satisfaction with work-life												
Yes	31	22	11	<0.0001	40	19	5	<0.0001	21	26	17	<0.0001
Partially	13	48	119		51	75	54		125	45	10	
No	1	6	61		7	26	35		52	13	3	
Do you have difficulties in obtaining medical supplies?												
Always	3	20	45	<0.0001	14	33	21	<0.0001	46	18	4	0.001
Rarely	27	47	82		54	59	43		104	36	16	
Mostly	0	3	47		7	23	20		36	12	2	
No	15	6	17		23	5	10		12	18	8	

DISCUSSION

Burnout syndrome is an issue that should be emphasized because it affects the work performance of 25-60% of healthcare workers, causes a decrease in employee participation, and deteriorates the quality of the service provided (11, 12). The purpose of this study is to disclose how the Covid-19 pandemic affects healthcare workers using the Maslach burnout inventory.

Frontline healthcare workers face challenges due to increased workload, busy work schedule, and increased likelihood of exposure to positive cases. Mental health effects can also be seen in healthcare professionals who actively care for COVID-19 patients. Studies interested in mental health during the COVID-19 pandemic show that healthcare workers deal with strains such as risk of infection, family distress, and moral quandaries (13, 14). Personal protection, the safety of loved ones, the death of one's own colleagues, working overtime, worrying about household needs, and ethical concerns about sharing ventilators between patients can have a negative impact on the psychological state of healthcare workers. A study carried out in China reported that a significant ratio of healthcare workers directly involved in diagnosis, treatment, or nursing care of patients with suspected or confirmed Covid-19, experienced symptoms of depression, anxiety, insomnia, and distress (13). Another study in Italy notified that the perception of risk and anxiety levels of healthcare workers were higher than the general population during the COVID-19 pandemic (15). Naushad et al. reported that healthcare workers, especially those working in emergency departments, ICUs, and infectious disease services have a higher risk of developing adverse psychiatric effects (16). Study by Ünal et al. reported a high frequency of anxiety because of uncertainty, anger, and hopelessness by the community's neglect of precautions, striving to create a more hygienic environment at home, being adversely impacted by news of colleagues getting infected (17). In our study, in accordance with the literature, emotional exhaustion and depersonalization levels were found high and personal achievement levels were low in those who worked directly with COVID-19 patients.

One study conducted in Sweden in 2010 showed that the rate of burnout in work life is generally higher in women than in men (18). Lai et al. stated that being a woman was associated with higher anxiety, depression, and distress (13). Unlike many burnout syndrome studies conducted before the pandemic, we found no correlation between burnout syndrome and sex or age (19 - 21). These findings suggest that the effect of the pandemic on mental health is a gender-neutral situation.

In our current study, we found that emotional exhaustion was significantly higher in nurses. Regarding the other studies carried out in this area, our findings are compatible with the literature. In a study conducted during the pande-

mic, desperation and anxiety levels were found to be higher in nurses than doctors (22). Zhang et al. also reported that nurses felt more anxious and nervous than other professionals (23). In a study conducted by Şahin and Kulakaç, the anxiety scores of nurses were found significantly higher (24). Our finding in this regard is consistent with the literature; this may be because of the working conditions of nurses were affected more than other healthcare professionals during the pandemic and nurses had more physical contact with patients than doctors, especially in inpatient services. Besides, the physical fatigue, stress, and negative mental state experienced by nurses due to the intense tempo during the pandemic may reduce their job satisfaction, causing burnout.

Studies have shown that emotional exhaustion and depersonalization levels are much less in healthcare workers with children than those without children (25, 26). Arpacıoğlu et al. stated that that emotional exhaustion and depersonalization levels are significantly higher in healthcare workers without children (27). In our study, unlike these, we found no correlation between having a child and emotional exhaustion, depersonalization, or personal accomplishment.

In a study from China, nurses who worked longer in quarantine areas tended to show higher burnout (23). Studies conducted before the Covid-19 and during the Covid-19 pandemic both have shown that longer working hours have negative effects on burnout (28, 29). Consistent with the literature, here, there was a significant correlation between monthly working time and emotional exhaustion and depersonalization.

The strengths of the study were that the number of participants was calculated using the G* power package software, the scales were filled in face-to-face interviews, and all the participants completed the forms.

The cross-sectional design and the use of self-report scales are the limitations of this study. The other missing part of our study was that burnout syndrome was not evaluated in our hospital before covid pandemic, so a comparison between before and after covid could not be made.

The findings obtained here are valuable for establishing future prevention protocols and educating healthcare workers in the face of a pandemic. Based on our results, closely monitoring risk groups that work directly with Covid-19 patients and providing psychological support when necessary are very important. Also, arrangements should be made in the healthcare workers' working conditions to increase their job satisfaction and reduce their burnout.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

BAŞ VE BOYUN SKUAMÖZ HÜCRELİ KANSERİNDE TÜMÖR VE LENFADENOPATİ BT HİSTOGRAM PARAMETRELERİ İLE TÜMÖR EVRESİ VE HPV DURUMU ARASINDAKİ İLİŞKİ

THE RELATIONSHIP BETWEEN TUMOR AND LYMPHADENOPATHY CT HISTOGRAM PARAMETERS AND TUMOR STAGE AND HPV STATUS IN HEAD AND NECK SQUAMOUS CELL CARCINOMA

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ÖZET

AMAÇ: Bu çalışmada baş ve boyun skuamöz hücreli kanserinde (BBSHK) tümör ve metastatik lenfadenopati bilgisayarlı tomografi (BT) histogram parametreleri ile tümör evresi ve *Human papilloma virüs* (HPV) durumu arasındaki ilişkinin araştırılması hedeflenmiştir.

GEREÇ VE YÖNTEM: Çalışmamızda 'Kanser Görüntüleme Arşivi' veri tabanında kayıtlı 'Baş ve Boyun Skuamöz Hücreli Kanseri' isimli çalışmaya ait anonimize veri seti ve bu çalışmaya kayıtlı olguların anonimize BT görüntüleri kullanılmıştır. Tedavi öncesi 1.3 mm kesit kalınlığında kontrastlı boyun BT incelemesi bulunan ve HPV durumu bilinen olgular çalışmaya dahil edilmiştir. 215 tümör ve 197 lenfadenopatiden histogram analizi gerçekleştirilmiştir. Lezyonların en geniş boyuta ulaştığı aksiyel kesit belirlenerek bu kesitte lezyon sınırları nekrotik-kistik alanları da içerecek şekilde çizilmiş ve bu alan üzerinden histogram parameterleri [ortalama, varyans, çarpıklık, kurtozis, 1.persentil (P), 10.P, 50.P, 90.P ve 99.P] hesaplanmıştır. Histogram parametreleri ile tümörlerin T (tümör), N (lenf nodu) ve TNM (tümör-lenf nodu-metastaz) evresi ve HPV durumu karşılaştırılmıştır.

BULGULAR: Çalışmaya 178 erkek, 37 kadın olgu dahil edilmiştir (medyan yaş 57 yıl). Tümör histogram parametrelerinden ortalama değer, varyans, 10.P, 50.P, 90.P ve 99.P değerleri ile lenfadenopati histogram parametrelerinden çarpıklık değeri farklı T evreleri arasında istatistiksel anlamlı fark göstermiştir (p değerleri sırasıyla 0.05, 0.038, 0.032, 0.047, 0.046, 0.022 ve 0.008). N0 evre kanserlerin tümör 10.P değerinin N3 evre kanserlerden istatistiksel anlamlı yüksek olduğu bulunmuştur (p:0.028). Tümör ve lenfadenopatiye ait histogram parametrelerinden hiçbiri farklı TNM evreleri arasında istatistiksel anlamlı fark göstermemiştir (p değerleri 0.073-0.792). Tümör varyans değeri ve 50.P değeri HPV pozitif tümörlerde HPV negatif tümörlere göre istatistiksel anlamlı düşük bulunmuştur (p değerleri sırasıyla 0.035 ve 0.048).

SONUÇ: BT histogram parametreleri farklı T evresi, N evresi ve HPV durumuna sahip BBSHK arasında istatistiksel anlamlı fark göstermiştir. Heterojeniteyi gösteren varyans değeri T evresi yüksek tümörler ile HPV negatif tümörlerde daha yüksek bulunmuştur.

ANAHTAR KELİMELER: Baş ve boyun skuamöz hücre karsinomu, Human papilloma virüs, Bilgisayarlı tomografi, Histogram analizi

ABSTRACT

OBJECTIVE: This study aimed to evaluate the association between computed tomography (CT) histogram parameters of the tumor and lymphadenopathy and tumor stage and *Human papillomavirus* (HPV) status in head and neck squamous cell carcinoma (HNSCC).

MATERIAL AND METHODS: Data archive and CT images from the 'HNSCC' study, which are publicly available on 'The Cancer Imaging Archive' website, were used in this study. Patients who had a pretreatment contrast-enhanced neck CT examination with a slice thickness of 1.3 mm and whose HPV status were known were included in the study. Histogram analysis was performed on 215 tumors and 197 lymphadenopathies. Tumor and lymphadenopathy boundaries, including cystic and necrotic areas, were manually drawn from a single axial CT slice where the lesion size was the largest. Then, histogram parameters (mean, variance, skewness, kurtosis, 1st percentile (P), 10th P, 50th P, 90th P, 99th P) were calculated from the corresponding areas. Histogram parameters were compared with T (tumor), N (lymph node), and TNM (tumor-lymph node-metastasis) stage and HPV status of tumors.

RESULTS: 178 males and 37 females were included in this study (median age 57 years). There were significant differences in mean, variance, 10th P, 50th P, 90th P, and 99th P values of the tumor and skewness value of lymphadenopathy between T stages (p: 0.05, 0.038, 0.032, 0.047, 0.046, 0.022 ve 0.008, respectively). We found that the 10th P value of the tumor was significantly higher in the N0 stage than in the N3 stage (p:0.028). There were no significant differences in histogram parameters between TNM stages (p:0.073-0.792). Variance and 50th P values of the tumor were significantly lower in HPV positive tumors than in HPV negatives (p: 0.035 ve 0.048, respectively).

CONCLUSIONS: CT histogram parameters showed significant differences between T stage, N stage, and HPV status in HNSCC. Variance value reflecting the heterogeneity was found higher in HPV negative tumors and high T stages.

KEYWORDS: Head and neck squamous cell carcinoma, Human papilloma virüs, Computed tomography, Histogram analysis

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GİRİŞ

Baş ve boyun skuamöz hücreli kanseri (BBSHK) dünya genelinde yılda >500.000 yeni vakanın ve >180.000 ölümün kaynağı olan ve oral kavite, orofarinks, nazofarinks, hipofarinks ve larinks tümörlerini içeren heterojen bir tümör grubudur (1). Onkojenik virüs enfeksiyonu, sigara ve alkol tüketimi BBSHK için risk faktörleri arasında bulunmaktadır. BBSHK tümör evresine bağlı olarak cerrahi, radyoterapi ve kemoradyoterapi ile tedavi edilmektedir (2). Tümör evresinin belirlenmesi amacıyla hastaların çoğuna tedavi öncesinde bilgisayarlı tomografi (BT) başta olmak üzere çeşitli görüntüleme yöntemleri uygulanmaktadır. Görüntüleme yöntemleri AJCC (American Joint Committee on Cancer staging system) TNM (tümör-lenf nodu-metastaz) evrelemesinin ana bileşenleri olan tümör boyutu ve yayılımı gibi bilgileri sağlamaktadır (3).

Artan tümör evresi ile birlikte prognozun kötüleştiği bilinmektedir. Tümör evresinin yanı sıra bazı ek faktörler de BBSHK'de prognoz ile ilişkilidir. Bu faktörlerden en bilinenlerden biri tümörün *Human papilloma virüs* (HPV) durumudur. HPV pozitif BBSHK HPV negatif kanserlerden klinik ve biyolojik olarak farklılıklar göstermektedir. HPV pozitif BBSHK'nin kemoradyoterapi yanıtının daha iyi olduğu gösterilmiştir. HPV pozitif BBSHK tanılı hastaların yaklaşık %80'i 5 yıldan uzun süre yaşarken bu oran HPV negatif BBSHK hastalarında %50'lere düşmektedir (4, 5). HPV pozitif ve negatif BBSKH'lerinin görüntüleme özellikleri de farklılıklar göstermektedir. Belirsiz sınırlı, heterojen ve çoğunlukla komşu kaslara invazyon gösteren HPV negatif BBSHK'nin aksine HPV pozitif kanserlerin iyi sınırlı ve daha homojen oldukları ve lenf nodu metastazlarının sıklıkla kistik özellikte olduğu gösterilmiştir (6-8). HPV enfeksiyonunun tanısında kabul gören yöntemler viral DNA'nın in situ hibridizasyonla saptanması veya immünohistokimyasal yöntemlerle p16 protein ekspresyonunun gösterilmesidir (9).

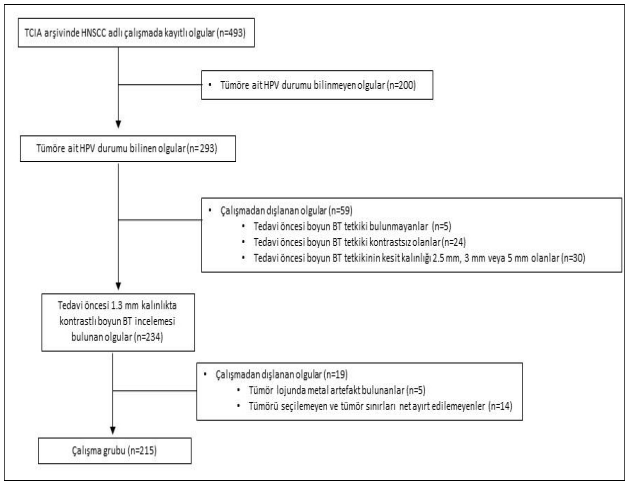
Son dekadlarda hızla gelişen bir alan olan radyomiks/tekstür analizi dokudan insan gözü ile ayırt edilemeyen çok sayıda sayısal verinin çıkarılmasını sağlayan matematiksel bir modeldir (10). BBSHK'de BT ve manyetik rezonans görüntüleme (MRG) ile yapılan çalışmalarda tümörün radyomiks/tekstür analizinin HPV durumu da dahil olmak üzere bazı moleküler özellikler ve tümör derecesini belirlemede kullanılabileceği gösterilmiştir (11 - 27). Bu çalışmalar primer tümörden radyomiks/tekstür analizi üzerine yoğunlaşmış olup HPV durumunun ve tümör evresinin belirlenmesinde tümör ile birlikte lenfadenopatiden de analizin yapıldığı bir çalışma bulunmamaktadır. Bu çalışmada BBSHK'de tümör ve metastatik lenfadenopatiden gerçekleştirilecek BT tekstür analizinin histogram parametreleri ile tümör evresi (T evresi, N evresi ve TNM evresi) ve HPV durumu arasındaki ilişkinin araştırılması hedeflenmiştir.

GEREÇ VE YÖNTEM

Çalışma Grubu

Çalışmamızda 'Kanser Görüntüleme Arşivi (The Cancer Imaging Archive-TCIA-)' veri tabanında kayıtlı 'Baş ve Boyun Skuamöz Hücreli Kanserleri (Head and Neck Squamous Cell Carcinoma-HNSCC-)' isimli çalışmaya ait anonimize veri seti ve bu çalışmaya kayıtlı olguların anonimize BT görüntüleri kullanılmıştır (28, 29). Çalışmaya kayıtlı 493 olgudan tümöre ait HPV durumu bilinen 293 olgunun (HPV DNA in situ hibridizasyonu veya p16 protein ekspresyonu değerlendirilmiş olgular) BT görüntüleri TCIA kurallarına uygun olarak indirilmiştir (30). BT görüntüleri 'Radiant DICOM Viewer 2020.2.3' programı ile açılarak değerlendirilmiştir. BT görüntülerinin kalitesi vizüel olarak değerlendirilmiştir. Düşük kaliteli tetkikler, hareket artefaktı veya metalik artefakt bulunan tetkikler ve kontrast fazı uygun olmayan tetkikler çalışmadan dışlanmıştır.

Çalışmada standardizasyonun sağlanması ve parsiyel volüm artefaklarından kaynaklanacak ölçüm hatalarının önüne geçilmesi amacıyla tedavi öncesinde (kemoterapi, radyoterapi veya cerrahi) kontrastlı boyun BT incelemesine sahip olan olgulardan BT kesit kalınlığı 1.3 mm olan 234 olgunun görüntüleri çalışma kapsamında değerlendirilmiştir **(Resim 1)**. Çalışma grubunu oluşturan kontrastlı boyun BT incelemelerinde 120 mL kontrast madde intravenöz olarak 3 mL/sn hızında verilmiş ve gecikme zamanı 90 sn olarak ayarlanmıştır.



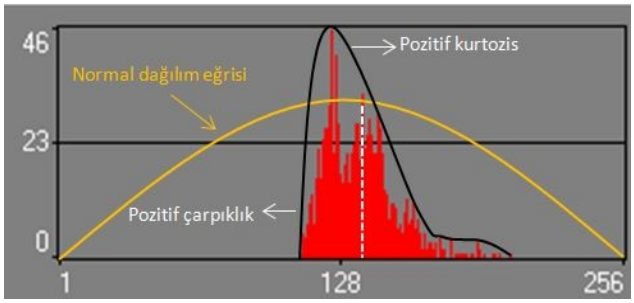
Resim 1: Çalışmaya dahil edilme kriterlerini gösteren akış şeması

Görüntü Analizi

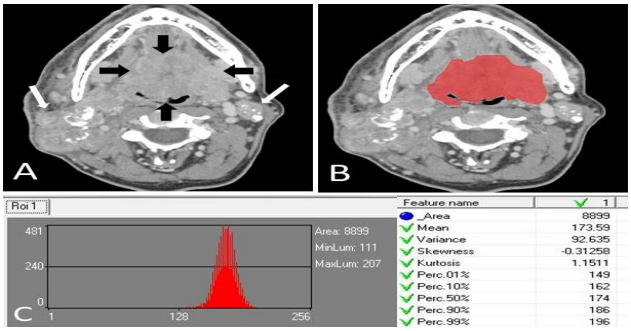
Her olgunun BT görüntüleri 5 yıllık radyoloji deneyimine sahip tek gözlemci (S.A) tarafından aynı pencere ayarlarında (pencere seviyesi 23 ve pencere genişliği 389) değerlendirilmiş ve tümörün en geniş boyuta ulaştığı aksiyel görüntü belirlenerek kaydedilmiştir. Benzer şekilde lenfadenopatisi bulunan hastalarda aynı pencere ayarlarında en büyük lenfadenopatinin en geniş boyuta ulaştığı aksiyel görüntü belirlenip bu görüntü kaydedilmiştir. Kaydedilen görüntüler 'MaZda v4.6' programı ile açılarak tümör sınırları ve lenfadenopati sınırları nekrotik ve kistik alanları da içerecek şekilde manuel olarak çizilmiştir.

Tümör veya lenfadenopati sınırları çizilirken lezyonların içerisine giren majör vasküler yapılar, kalsifikasyonlar ve nekrotik lezyonlar için hava değerleri ölçümün dışında bırakılmıştır. Belirlenen alanlar üzerinden lezyonlara ait histogram özellikleri [ortalama, varyans, skewness-çarpıklık-, kurtozis, 1.persentil(P), 10.P, 50.P, 90.P ve 99.P] hesaplanmış ve her olgu için ayrı ayrı kaydedilmiştir **(Resim 2 ve 3)**.

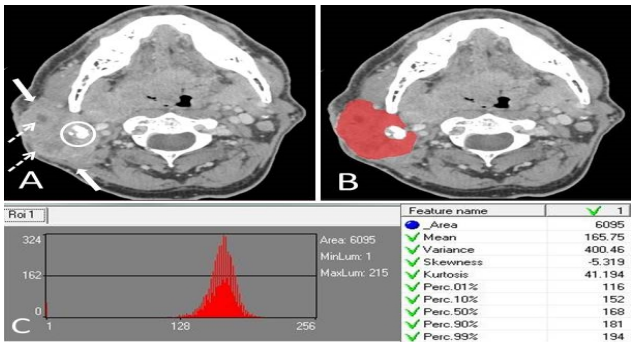
Tümör lojunda metal artefakt bulunan 5 olgu ile primer tümörü seçilemeyen veya tümör sınırları net olarak ayırt edilemeyen 14 olguda tümör histogram analizi yapılamamıştır. Sonuç olarak toplam 215 tümörden histogram analizi gerçekleştirilmiştir (Resim 1). 215 olgu içerisinde N0 evre tümörü bulunan 18 olguda lenfadenopati histogram analizi yapılmamış olup toplam 197 lenfadenopatiden histogram analizi gerçekleştirilmiştir **(Resim 4)**.



Resim 2: Histogram parametrelerinin şematik gösterimi. Sarı renkli eğri normal dağılımı, siyah renkli eğri ölçüm sonucu elde edilen histogram eğrisini göstermektedir. Kesikli beyaz çizgi histogram eğrisinin ortalama değeridir. Histogram eğrisi normal dağılım eğrisine göre sağa çarpık (pozitif çarpıklık) ve yukarı doğru sivridir (pozitif kurtozis). Eğrideki tüm değerlerin ortalama değere göre dağılımları varyans olarak ifade edilmektedir (daha geniş bir aralıkta dağılım daha yüksek varyansı ifade eder). Değerler persentil çizelgesinde denk geldikleri persentil değeri ile ifade edilir (örneğin 10. P).



Resim 3: HPV pozitif dil kökü skuamöz hücreli kanseri tanısı alan, T evresi evre 4, N evresi evre 2 ve TNM evresi evre 4 olarak saptanan 30 yaşında erkek hasta. **(A)** Tedavi öncesi kontrastlı boyun BT incelemesinde dil kökünde orta hattın her iki tarafına uzanım gösteren, orofarinks hava sütununu daraltan, heterojen kontrastlanan kitle izleniyor (siyah oklar). Her iki tarafta seviye 2'de kalsifikasyonlar içeren lenfadenopatiler görülüyor (beyaz oklar). **(B)** Tümörün en geniş boyuta ulaştığı aksiyel kesitten MaZda v4.6 programı ile yapılan iki boyutlu segmentasyonu gösteren görüntü. (**C)** B görüntüsünde belirlenen alana ait histogram eğrisi ve histogram parametrelerinin kantitatif değerleri



Resim 4: (A) Resim 2'deki hastanın daha inferiordan geçen aksiyel BT görüntüsünde 8x5 cm boyutunda konglomere lenfadenopati izleniyor (oklar). Lenfadenopati içerisinde kalsifikasyon (daire) ve kistik-nekrotik alanlar (kesikli oklar) mevcut. **(B)** Lenfadenopatinin en geniş boyuta ulaştığı aksiyel kesitten MaZda v4.6 programı ile yapılan iki boyutlu segmentasyonu gösteren görüntü. Kistik-nekrotik alanlar ölçüme dahil edilmişken kalsifikasyonun ölçüm alanı dışında bırakıldığına dikkat ediniz. **(C)** B görüntüsünde belirlenen alana ait histogram eğrisi ve histogram parametrelerinin kantitatif değerleri.

Etik Kurul

Afyonkarahisar Sağlık Bilimleri Üniversitesi Tıbbi Etik Kurulu'nın 03.12.2021 tarih ve 2021/13 sayılı kararı ile bu çalışma için etik kurul onayı alınmasına gerek bulunmadığına karar verilmiştir.

İstatistiksel Analiz

Analizler SPSS v.22.0 (IBM Inc, Armonk, NY, USA) programında yapılmıştır. Sayısal verilerin normal dağılıma uyup uymadıklarına Kolmogrov-Smirnov ve Shapiro-Wilk testlerinin genel değerlendirilmesi sonucunda karar verilmiştir. Çalışmanın tanımlayıcı analizleri normal dağılıma uyan sayısal veriler için ortalama±standart sapma, normal dağılıma uymayan sayısal veriler için ortanca ve minimum-maksimum değerler, kategorik veriler için ise sıklık ve yüzde şeklinde belirtilmiştir. Farklı T, N ve TNM evrelerine sahip olan tümörlerin sayısal verileri normal dağılıma uyan veriler için One-way ANOVA testi ile, normal dağılıma uymayan veriler için Kruskal Wallis testi ile karşılaştırılmıştır. Bu karşılaştırmalarda istatistiksel anlamlılık saptanan veriler için post hoc testi olarak One-way ANOVA testi için Tukey testi, Kruskal Wallis testi için Dunn'un post hoc testi kullanılmıştır. HPV pozitif ve negatif gruplar arasında kategorik veriler ki-kare testi ile karşılaştırılmıştır. HPV pozitif ve negatif gruplar arasında sayısal verilerin karşılaştırılmasında normal dağılıma uyan veriler için bağımsız gruplarda t testi, normal dağılıma uymayan veriler için Mann-Whitney U testi kullanılmıştır. Histogram parametrelerinin HPV pozitifliğini ve yüksek tümör evresini öngörme durumları lojistik regresyon analizi ile değerlendirilerek parametreler için Odds oranları (Odds ratio-OR-) ve %95 güven aralıkları (%95 GA) hesaplanmıştır. Tümör ve lenfadenopati histogram parametreleri ile tümör evresi ve HPV durumu arasındaki ilişki lineer regresyon analizi ile değerlendirilmiştir. P<0.05 değeri istatistiksel anlamlılık olarak kabul edilmiştir.

BULGULAR

Çalışmaya BBSHK bulunan 215 olgu dahil edilmiştir (178 erkek, 37 kadın). Medyan yaş 57 yıldır (minimum-maksimum: 29-87 yıl). Olguların 79'unu (%37) hiç sigara içmeyenler oluştururken 86'sı (%40) eski sigara içicisi ve 50'si (%23) aktif sigara içicisidir. Tümör orijinleri dil kökü, tonsil, glossofaringeal sulkus, yumuşak damak ve orijini bilinmeyen tümörler olarak kategorize edildiğinde bu gruplarda bulunan olgu sayıları sırasıyla 113, 83, 7, 3 ve 9'dur. Tümörlerin T evreleri T1: 40, T2: 90, T3: 49 ve T4:36 olgu; N evreleri N0: 18, N1: 19, N2: 172 ve N3: 6 olgu; TNM evreleri ise evre 2: 10, evre 3: 37 ve evre 4: 168 olgu olarak bulunmuştur. 183 tümör HPV pozitif, 32 tümör HPV negatiftir **(Tablo 1)**.

Tablo 1: Demografik veriler ve tümör karakteristikleri

Parametre	n = 215
Cinsiyet	
Erkek	178 (%83)
Kadın	37 (%17)
Yaş (yıl)	57 (29-87)
Sigara İçme durumu	
Hiç içmemiş	79 (%37)
Eski içici	86 (%40)
Aktif içici	50 (%23)
Tümör orijini	
Dil kökü	113 (%53)
Tonsil	83 (%39)
Glossofaringeal sulkus	7 (%3)
Yumuşak damak	3 (%1)
Orijini bilinmeyen	9 (%4)
T Evresi	
T1	40 (%18)
T2	90 (%42)
T3	49 (%23)
T4	36 (%17)
N Evresi	
N0	18 (%8)
N1	19 (%9)
N2	172 (%80)
N3	6 (%3)
TNM evresi	
Evre 2	10 (%5)
Evre 3	37 (%17)
Evre 4	168 (%78)
HPV durumu	
Pozitif	183 (%85)
Negatif	32 (%15)

Yaş ortanca ve parantez içinde minumum-maksimum değerler şeklinde, diğer veriler olgu sayısı ve parantez içinde yüzde olarak verilmiştir.

Farklı T evrelerine ait kanserlerin tümör ve lenfadenopati histogram parametreleri karşılaştırıldığında tümör parametrelerinden varyans, 10.P, 50.P, 90.P ve 99.P değerleri ile lenfadenopati parametrelerinden çarpıklık değerinin farklı T evreleri arasında istatistiksel anlamlı fark gösterdiği bulunmuştur (p değerleri sırasıyla 0.038, 0.032, 0.047, 0.046, 0.022 ve 0.008) **(Tablo 2)**.

Tablo 2: T evresine göre gruplar arasında istatistiksel anlamlı fark gösteren parametreler

Parametre		T Evresi				p
		T1	T2	T3	T4	
	Ortalama ᵝ	171 (132-207)	177 (145-211)	175 (151-203)	174 (156-199)	0.05 ᵃ
	Varyans ᵝ	136 (18-724)	134 (33-573)	147 (54-586)	193 (46-523)	0.038 ᵃ
Tümör	10.P *	153±15	160±11	159±12	157±9	0.032 ᵇ
	50.P ᵝ	172 (135-208)	177 (144-207)	178 (152-204)	175 (156-203)	0.047 ᵃ
	90.P ᵝ	186 (150-238)	190 (163-235)	192 (164-222)	191 (168-225)	0.046 ᵃ
	99.P ᵝ	196 (159-250)	200 (167-256)	203 (173-234)	201 (179-243)	0.022 ᵃ
Lenfadenopati	Çarpıklık ᵝ	-0.4308 (-5.0353-1.1175)	-0.4002 (-2.4821-0.85664)	0.7588 (-0.95312-5.4956)	0.1594 (-068218-3.857)	0.008 ᵃ

Normal dağılıma uyan sayısal parametreler * ortalama±standart sapma, normal dağılıma uymayan sayısal parametreler ᵝ ortanca (minimum-maksimum değer) olarak verilmiştir.
ᵃ: Kruskal Wallis testi, ᵇ: One way ANOVA testi

Lojistik regresyon analizinde bu parametreler için hesaplanan OR değerleri (%95 GA) sırasıyla şu şekildedir: 1.001 (0.999-1.003, p:0.224), 1.013 (0.993-1.034, p:0.195), 1.026 (1.004-1.048, p:0.018), 1.023 (1.005-1.042, p:0.011), 1.019 (1.004-1.035, p:0.013), 0.964 (0.669-1.389, p:0.843). Farklı T evrelerinin tümör ortalama değerleri arasında sınırda istatistiksel anlamlılık

saptanmıştır (p: 0.05). Lojistik regresyon analizinde tümör ortalama değeri için OR: 1.024 (%95 GA: 1.003-1.046, p:0.024) hesaplanmıştır. Tümör ve lenfadenopatiye ait diğer histogram parametreleri farklı T evrelerine göre istatistiksel anlamlı fark göstermemiştir (p değerleri 0.145- 0.827).

Post hoc analiz sonuçlarına göre farklı T evreleri arasında istatistiksel anlamlı fark gösteren tümör histogram paremetrelerinden ortalama değer T2 tümörlerde T1 tümörlere göre; varyans T4 tümörlerde T1 ve T2 tümörlere göre; 10.P değeri T2 tümörlerde T1 tümörlere göre; 50.P değeri T2 ve T3 tümörlerde T1 tümörlere göre; 90.P ve 99.P değerleri T2, T3 ve T4 tümörlerde T1 tümörlere göre istatistiksel anlamlı yüksek saptanmıştır. T3 tümörlerin lenfadenopati çarpıklık değeri T1, T2 ve T4 tümörlerin lenfadenopati çarpıklık değerlerinden istatistiksel anlamlı yüksek bulunmuştur (p değerleri için **Tablo 3**'e bakınız).

Tablo 3: Tablo 2'nin post hoc analiz sonuçları

Karşılaştırılan T evreleri	P değerleri						
	Tümör						Lenfadenopati
	Ortalama [a]	Varyans [a]	10P [b]	50P [a]	90P [a]	99P [a]	Çarpıklık [a]
T1-T2	**0.045**	0.874	**0.022**	**0.016**	**0.035**	**0.039**	0.900
T1-T3	0.095	0.398	0.103	**0.009**	**0.01**	**0.006**	**0.011**
T1-T4	0.108	**0.024**	0.475	0.096	**0.024**	**0.008**	0.463
T2-T3	0.652	0.240	0.987	0.579	0.398	0.281	**0.003**
T2-T4	0.706	**0.006**	0.693	0.702	0.544	0.284	0.484
T3-T4	0.892	0.124	0.892	0.427	0.889	0.928	**0.002**

[a]: Dunn'un post hoc testine ait p değerleri, [b]: Tukey post hoc testine ait p değerleri
Koyu yazılan p değerleri istatistiksel anlamlılığı göstermektedir.

Farklı N evrelerine ait kanserlerin tümör ve lenfadenopati histogram parametreleri karşılaştırıldığında yalnızca tümör 10.P değeri farklı N evreleri arasında istatistiksel anlamlı fark göstermiştir (p:0.048). Post hoc analiz sonuçları N0 evre tümörlerin tümör 10.P değerinin N3 evre tümörlerin tümör 10.P değerinden istatistiksel anlamlı yüksek olduğunu ortaya koymuştur (161±9.47 vs 145±20.15, p:0.028). Tümör ve lenfadenopatiye ait diğer histogram parametreleri farklı N evrelerine göre istatistiksel anlamlı fark göstermemiştir (p değerleri 0.110-0.631). Lojistik regresyon analizinde tümör 10.P değeri için OR: 0.976 (%95 GA: 0.950-1.002, p:0.065) hesaplanmıştır.

Tümör ve lenfadenopati BT histogram parametrelerinden hiçbiri farklı TNM evreleri arasında istatistiksel anlamlı fark göstermemiştir (p değerleri 0.073-0.792). HPV pozitif tümöre sahip olguların %87'si, HPV negatif tümörlerin %59'u erkek cinsiyet olup cinsiyet dağılımında gruplar arasında istatistiksel anlamlı fark bulunmuştur (p<0.001). HPV pozitif tümörlerde en sık görülen tümör orijini %57 ile dil kökü iken HPV negatif tümörlerde %53 ile tonsildir (p: 0.004). En sık görülen T evresi HPV pozitif tümörlerde %45 ile T2 tümörlerken HPV negatif tümörlerde %34 ile T3 tümörlerdir (p:0.008) **(Tablo 4)**.

Tablo 4: HPV pozitif ve negatif gruplarda demografik verilerin ve tümör evrelerinin karşılaştırması

Parametre	HPV pozitif (n:183)	HPV negatif (n:32)	p
Cinsiyet			<0.001[a]
Erkek	159 (%87)	19 (%59)	
Kadın	24 (%13)	13 (%41)	
Yaş (yıl)	57 (38-81)	58 (29-87)	0.562[b]
Sigara İçme durumu			0.062[a]
Hiç içmemiş	70 (%38)	9 (%28)	
Eski içici	72 (%39)	14 (%44)	
Aktif içici	41 (%23)	9 (%28)	
Tümör orijini			0.004[a]
Dil kökü	104 (%57)	9 (%28.2)	
Tonsil	66 (%36)	17 (%53)	
Glossofaringeal sulkus	6 (%3.3)	1 (%3.1)	
Yumuşak damak	1 (%0.4)	2 (%6.3)	
Orijini bilinmeyen	6 (%3.3)	3 (%9.4)	
T Evresi			0.008[a]
T1	36 (%20)	4 (%13)	
T2	82 (%45)	8 (%25)	
T3	38 (%21)	11 (%34)	
T4	27 (%14)	9 (%28)	
N Evresi			0.260[a]
N0	13 (%7)	5 (%16)	
N1	19 (%10)	0	
N2	146 (%80)	26 (%81)	
N3	5 (%3)	1 (%3)	
TNM evresi			0.449[a]
Evre 2	7 (%4)	3 (%9)	
Evre 3	32 (%17)	5 (%16)	
Evre 4	144 (%79)	24 (%75)	

Yaş ortanca ve parantez içinde minumum-maksimum değerler şeklinde, diğer veriler olgu sayısı ve parantez içinde yüzde olarak verilmiştir.
[a]: Ki-kare testi
[b]: Mann-Whitney U testi

Tümör 50.P değeri HPV pozitif tümörlerde HPV negatif tümörlere göre istatistiksel anlamlı düşük bulunmuştur [176 (minimum-maksimum: 144-207) vs 181(minimum-maksimum: 135-208), p:0.048]. Tümör varyans değeri HPV pozitif tümörlerde HPV negatif tümörlere göre istatistiksel anlamlı düşük saptanmıştır [139.94 (minimum-maksimum: 33.39-571.24) vs 183.90 (minimum-maksimum: 17.77-477.79), p:0.035]. Lojistik regresyon analizinde tümör 50.P değeri için OR: 1.65 (%95 GA: 1.027-2.67, p: 0.039), tümör varyans değeri için OR: 1.002 (0.999-1.004, p:0.238) heaplanmıştır.

TARTIŞMA

Bu çalışmada BBSHK'de BT histogram parametreleri ile HPV durumu ve tümör evresi arasındaki ilişki araştırılmıştır. Lojistik regresyon analizinde tümör histogram parametrelerinden ortalama değer, 50.P, 90.P ve 99.P değerlerinin T evresi ile, tümör 50.P değerinin HPV durumu ile istatistiksel anlamlı ilişki gösterdiği bulunmuştur. N0 evre tümörlerin 10.P değeri N3 evre tümörlerden istatistiksel anlamlı yüksek saptanmakla birlikte lojistik regresyon analizinde tümör 10.P değeri ile N evresi arasında istatistiksel anlamlı ilişki bulunmamıştır. TNM evresi ile BT histogram parameterleri arasında istatistiksel anlamlı ilişki saptanmamıştır.

BBSHK'de tümörün boyutu, yayılımı ve invazyon derinliği; metastatik lenf nodu varlığında lenf nodunun boyutu, unilateral veya bilateral oluşu ve ekstanodal yayılım varlığı; uzak metastaz bulunması gibi faktörleri göz önüne alarak belirlenen TNM evresi prognozla direk olarak ilişkilidir (3). Bu özelliklerin yanı sıra HPV pozitifliği gibi birçok faktör BBSHK'de prognozu etkilemektedir. Son yıllarda gelişmekte olan bir alan olan radyomiks/tekstür analizi görüntü pikselleri arasında insan gözü ile ayırt edilemeyecek değişiklikleri saptamaya ve görüntüden birçok sayısal özellik çıkarmaya imkan veren matematiksel bir modeldir (10). BBSHK ile ilgili yapılmış çalışmalarda BT ve MRG radyomiks/tekstür özelliklerinin HPV durumu, p53 mutasyonu, tümör derecesi, perinöral invazyon, lenfovasküler invazyon ve ekstrakapsüler yayılımı saptamada kullanılabileceği ortaya konmuştur (11 - 27). Bu özelliklerin saptanmasında altın standart yöntem histopatolojik değerlendirme olmakla birlikte biyopsi yapmanın zor olduğu hastalarda veya tümörün heterojen olduğu durumlarda radyomiks/tekstür analizi ile noninvaziv değerlendirme yapılması klinik fayda sağlayabilir. Radyomiks analizinin noninvaziv bir yöntem olmasının yanında bir diğer avantajı histopatolojik değerlendirmenin aksine dokunun küçük bir örneği yerine tüm dokuyu değerlendirmeyi mümkün kılmasıdır (10).

Diğer kanser türlerinde olduğu gibi BBSHK'de de artan T ve N evreleri kötü prognoz ile ilişkilidir. Artan T ve N evrelerinin tümör ve lenf nodu perfüzyonununda değişikliklere ve sonuç olarak intratümöral hipoksi ve nekroz gelişimine neden olarak daha heterojen mikroçevreye yol açtığı bildirilmiştir (24). Heterojen mikroçevrenin farklı T ve N evresine sahip tümörlerin radyomiks/tekstür parametrelerinde değişikliklere neden olabileceği gösterilmiştir (21, 23). Ren ve ark. MRG radyomiks özelliklerinin (21) ve Parmar ve ark. BT radyomiks özelliklerinin (23) BBSHK'de tümör evresini belirlemede yüksek tanısal performans gösterdiğini bulmuşlardır (eğri altında kalan alan sırasıyla 0.853 ve 0.80). Romeo ve ark. BT tekstür çalışmalarında primer tümörün tekstür özelliklerinin N evresini %90 doğrulukla tahmin ettiğini göstermişlerdir (22). Çalışmamızda T1 tümörlerin ortalama değeri ve 10.P değeri T2 tümörlerden, 50.P değeri T2 ve T3 tümörlerden, 90.P ve 99.P değerleri ise T2, T3 ve T4 tümörlerden istatistiksel anlamlı düşük bulunmuştur (p değerleri için Tablo 3'e bakınız). Bu sonuçlar düşük T evresine sahip tümörlerin daha düşük dansite değerleri ile karakterize olduğunu göstermektedir. Çalışmamızda değerlerin ortalamadan uzaklıklarını gösteren varyans değeri T4 tümörlerde T1 ve T2 tümörlere göre istatistiksel anlamlı yüksek saptanmış olup (p değerleri sırasıyla 0.024 ve 0.006) bu bulgu yüksek T evresine sahip tümörlerin daha heterojen olduğunu göstermektedir. Histogram eğrisinin asimetrisini gösteren ve heterojeniteyle ilişkili olan çarpıklık değeri T3 tümörlerin metastatik lenfadenopatilerinde T1, T2 ve T4 tümörlerin lenfadenopatilerine göre istatistiksel anlamlı yüksek saptanmıştır (p değerleri sırasıyla 0.011, 0.003 ve 0.002). Bu sonuç T3 tümörlerin T1 ve T2 tümörlere göre daha heterojen olduğunu göstermektedir. T3 tümörlerde lenfadenopati çarpıklık değerinin T4 tümörlerden yüksek bulunması çelişkili bir bulgudur. Bu sonucun olası nedenleri araştırıldığında T3 tümörlerin %77'sinin T4 tümörlerin ise %75'inin HPV pozitif tümörler olduğu görülmüştür. Dolayısıyla bu sonucun HPV durumu ile ilişkili olma ihtimali düşüktür. Çalışmada histopatolojik korelasyon yapmak mümkün olmadığından bu sonucun nedeni net olarak aydınlatılamamıştır.

Tedavi ve prognozu etkilediği için BBSHK'de tümörün HPV durumunun bilinmesi önem arzetmektedir. HPV enfeksiyonunun prevalansı orofaringeal skuamöz hücreli kanserlerde (dil, ağız tabanı ve bukkal mukoza) %50.6 iken orofarinks dışı BBSHK'de prevalans %4.1 ile 23.7 arasında değişmektedir (31, 32). Histopatolojik olarak HPV negatif BBSHK matür sitoplazmaya sahip poligonal hücrelerden oluşan, infiltratif patern gösteren ve stromal desmoplastik reaksiyonla birlikte olan keratinize paternde görülürken; HPV pozitif tümörler belirgin nükleollü iğsi tipte hiperkromatik nükleus içeren hücrelerden oluşan, sık mitotik aktivite ve komedonekroz gösteren ancak stromal reaksiyona neden olmayan non-keratinize paterne sahiptir (33). HPV pozitif ve negatif tümörler arasındaki bu histopatolojik farklılıklar görüntülemede radyomiks özelliklerine de yansıyabilir. Nitekim birçok çalışmada BT radyomiks analizinin non-invaziv olarak HPV durumunu belirleyebileceği gösterilmiştir (13-

17, 19, 23 - 27). Buch ve ark. BBSHK'de yaptıkları BT tekstür çalışmasında histogram özelliklerinden medyan değer ve entropinin HPV pozitif ve negatif tümörler arasında istatistiksel anlamlı fark gösterdiğini bulmuşlardır (13). Fujita ve ark. non-orofaringeal BBSHK'de histogram parametrelerinden ortalama ve ortanca değeri HPV pozitif tümörlerde istatistiksel anlamlı daha düşük bulmuşlardır (14). Leijenaar ve ark. BT radyomiks çalışmalarında HPV pozitif tümörlerin HPV negatiflere göre daha az kontrast tuttuğunu ve daha düşük minimum dansite değeriyle karakterize olduklarını göstermiştir (16). Bizim çalışmamızda da tümör 50.P değeri HPV pozitif tümörlerde HPV negatif tümörlere göre istatistiksel anlamlı düşük bulunmuştur (p:0.048). Bogowicz ve ark. BT radyomiks çalışmalarında HPV pozitif tümörlerin varyasyon katsayısının daha düşük olduğunu yani bu tümörlerin daha homojen olduğunu göstermişlerdir (24). Çalışmamızda varyans değeri HPV pozitif tümörlerde negatif tümörlere göre istatistiksel anlamlı düşük bulunmuştur (p:0.035). Bu sonuç HPV pozitif tümörlerin daha homojen olduğunu göstermektedir.

HPV negatif tümörlerin lenf nodu metastazları sıklıkla kistik özelliktedir. İntranodal kistik değişikliklerin primer tümörün HPV durumunu saptamada %87 duyarlılığa sahip olduğu bildirilmiştir (8). Çalışmamızda lenfadenopati histogram parametrelerinden hiçbiri HPV durumu ile istatistiksel anlamlı ilişki göstermemiştir. Bu sonuç metastatik lenfadenopatilerden sadece en büyük olanın değerlendirilmiş olması, lenf nodunun tüm hacmi yerine tek bir kesitten analiz yapılmış olması ve nekrotik alanlar içeren lenfadenopatilerin sayısal değerlerinin kistik lenfadenopatilerin sayısal değerleriyle örtüşme göstermesine bağlı olabilir.

Çalışmamızın bazı limitasyonları mevcuttur. Tümör ve lenfadenopatilerin histogram özelliklerinin tek gözlemci tarafından ölçülmüş olması nedeniyle ölçümlerin gözlemciler arası tekrar edilebilirliği değerlendirilememiştir. Bu çalışmada tümörün şekil özellikleri (boyut, sınır özellikleri, invazyon gibi) değerlendirmeye alınmamıştır. Ancak TNM evrelemesinde T evresi belirlenirken tümör boyutu ve komşu yapılara invazyon göz önüne alınmaktadır. Ayrıca HPV pozitif tümörlerin negatiflere göre daha düzgün sınırlı oldukları bilinmektedir. Dolayısıyla sonraki çalışmalarda tümörün şekil özelliklerinin de değerlendirilmesi çalışmaların doğruluğunu artıracaktır. Çalışmada farklı orijine sahip tümörler değerlendirilmiştir ve bu durum heterojeniteye neden olmuştur. Sadece aynı orijine sahip tümörlerin değerlendirilmesi çalışmaların tekrar edilebilirliğini artırabilir. Çalışmamızda tümör ve lenfadenopati BT histogram parametreleri tek kesitten ölçülmüş ve lenfadenopatisi bulunan olgularda sadece en büyük lenfadenopati değerlendirilmiştir. Analizin lezyonların tüm hacmini kapsayacak şekilde yapılması ve örneklenen lenfadenopati sayısının artırılması durumunda farklı sonuçlar ortaya çıkabilir. Bu çalışmada parsiyel volüm artefaktlarından kaynaklanacak ölçüm hatalarını önlemek amacıyla kesit kalınlığı 1.3 mm seçilmekle birlikte veri setindeki tümör boyutları geniş bir aralıkta dağılım gösterdiğinden küçük tümörlerin analizleri parsiyel volüm artefaktlarından etkilenmiş olabilir. Son olarak çalışmada anonimize veri setinin kullanılması nedeniyle bazı verilere (histopatolojik veriler gibi) erişmek mümkün olmamıştır.

Sonuç olarak bu çalışmada BBSHK'de BT histogram parametrelerinin farklı T evresi, N evresi ve HPV durumuna sahip tümörler arasında istatistiksel anlamlı fark gösterdiği ve T evresi yüksek tümörler ile HPV negatif tümörlerin daha heterojen iç yapıda olduğu bulunmuştur. Sonuçlarımız daha fazla sayıda morfolojik özelliğin tekstür analizine etkisinin araştırılacağı, daha geniş ve homojen hasta gruplarında yapılacak çalışmalar açısından yol gösterici olabilir.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

MEATUS ACUSTICUS INTERNUS MORFOMETRİSİ VE HACMİNİN BELİRLENMESİ

DETERMINATION OF MORPHOMETRY AND VOLUME OF THE INTERNAL AUDITORY CANAL

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ÖZET

AMAÇ: İç kulak yolu olarak da bilinen meatus acusticus internus (MAI), iç kulağı fossa cranii posterior'a bağlayan bir kemik kanaldır. Ortalama uzunluğu yaklaşık 1 cm'dir. MAI'nin kenarına porus acusticus internus (PAI) denir ve bu açıklığın kenarı künt ve yuvarlaktır. Nervus (n) facialis, n. vestibulocohlearis, arteria ve vena labirinti gibi önemli oluşumlar MAI'nin içinden geçer. Ayrıca MAI, temporal lob üzerindeki cerrahi müdahalelerde morfometrinin doğru belirlenmesinde hayati önem taşımaktadır. Bu nedenle bu çalışmada MAI'nin morfometrisinin ve hacminin belirlenmesi amaçlanmıştır.

GEREÇ VE YÖNTEM: Çalışma, 10-90 yaş arası normal popülasyondan rastgele 210 kişinin BT görüntüleri üzerinde gerçekleştirildi. MAI'nin morfometrik ölçümleri (lateral açı (LA), anteroposterior (AP) kanal uzunluğu, PAI çapı, PAI'den aquaductus vestibularis'e kadar olan mesafe (AV)) yapıldı. Ayrıca bu çalışmada MAI'nin şekli ve hacmi belirlendi. Olgular yaşlarına göre 10-14, 15-20, 21-30, 31-40, 41-50, 51-60 ve 61 yaş olmak üzere 7 farklı alt gruba ayrıldı.

BULGULAR: Bu çalışmada 210 hastanın BT görüntüleri analiz edildi. MAI'nin ortalama uzunluğu 9.5±1.6 mm, AP çapı 6.3±1.5 mm, giriş kısmından AV'ye olan mesafe 15.1±6.64mm, volüm 290±120 mm^3 ve LA 50±14º idi.

SONUÇ: Sonuç verileri cinsiyete göre karşılaştırıldığında, erkeklerde sağ AP çapının, kadınlarda sağ MAI uzunluğunun ve her iki taraf LA'nın daha yüksek olduğu istatistiksel olarak anlamlı bulundu. Ayrıca MAI hacimleri yaş gruplarına göre karşılaştırıldığında 10-14 yaş grubunun diğer yaş gruplarına göre daha küçük olduğu belirlendi.

ANAHTAR KELİMELER: Meatus acusticus internus, Anatomi, Radyoloji, Lateral açı

ABSTRACT

OBJECTIVE: The internal auditory canal (IAC) also known as internal acoustic meatus is a bone channel that connects the internal ear to the posterior cranial fossa. The mean length is approximately 1 cm. The edge of the IAC is called internal acoustic pore (IAP), and the edge of this aperture is blunt and rounded. Important formations such as facial nerve, vestibulocochlear nerve, labyrinth artery and labyrinth vein pass through the IAC. In addition, on the precise determination of the morphometry in surgical interventions on the temporal lobe, MAI is vital. Therefore, in this study, it was aimed to determine the morphometry and volume of MAI.

MATERIAL AND METHODS: The study was carried out on the CT images of 210 individuals randomly from the normal population between the ages of 10-90. Morphometric measurements of IAC (lateral angle (LA), canal length, anteroposterior (AP), diameter of IAP, distance from IAP to vestibular aqueduct (VA)) were performed. In addition, the shape and volume of IAC was determined in this study. Cases were divided into 7 different subgroups, 10-14, 15-20, 21-30, 31-40, 41-50, 51-60 and 61 years old, depending on their age.

RESULTS: In this study, CT images of 210 patients were analyzed. The mean length of the MAI was 9.5±1.6mm, the AP diameter was 6.3±1.5mm, the distance from the entrance part to the VA was 15.1±6.64mm, the volume was 290±120mm^3, and the LA was 50±14º.

CONCLUSIONS: When the outcome data were compared by gender, it was found statistically significant that the right AP diameter was higher in men, the length of the right MAI and both sides LA were higher in women. In addition, when the volumes of MAI were compared by age groups, it was determined that the 10-14 age group was smaller than the other age groups.

KEYWORDS: Internal auditory canal, Anatomy, Radiology, Lateral angle

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INTRODUCTION

The internal auditory canal (IAC) also known as internal acoustic meatus is a bone channel that connects the internal ear to the posterior cranial fossa. In the petrous part of the temporal bone, IAC extends laterally to the back in the anterior upper part of the jugular foramen, perpendicularly to the sagittal plane of the skull and parallelly to the long axis of the external acoustic meatus (1). IAC, with a mean length of 1 cm, forms an angle of about 45 degrees with the long axis of petrous part (2). The edge of the IAC is called internal acoustic pore (IAP), and the edge of this aperture is blunt and rounded. Important formations such as facial nerve, vestibulocochlear nerve, labyrinth artery and labyrinth vein pass through the IAC (1, 3, 4).

The anatomic location of the IAC is of great importance for surgical interventions to the posterior cranial fossa. The majority of surgical interventions to the temporal bone are performed on the posterior surface of the petrous part (5). Considering the surrounding structures and functions of them, tumor, trauma, inflammatory disease, infection and surgical interventions that may occur in this region poses a great risk for IAC (6 – 8). Therefore, the anatomical structure of IAC, the distance of IAP to various parts in the cranium, the morphological appearance of IAC and the volume it occupies are very important in terms of clinical approaches (9, 10). However, there is not sufficient anatomical data in literature in this regard. The most of the data obtained is based on research on clinical cases. In some studies, only dry skulls or dry temporal bone samples were used (2, 6, 11, 12).

Due to the developments in radiological imaging techniques in recent years, imaging methods such as magnetic resonance imaging (MRI) and computed tomography (CT) are used extensively to elucidate the anatomy of IAC (7, 13 – 16). It was determined that the studies using CT or MRI in the literature are related to the distance of IAC to various parts of the temporal bone, length of canal, diameters of IAP and shapes of IAC (4, 6, 7, 15, 17). When the literature studies were examined, we believe that there is a great need a study with more comprehensive, more organized and including more parameters related to IAC. It is also an academic necessity knowing of the volume of IAC, which has not been studied much in the literature. In this context, we were aimed to determine the morphometry, lateral angle (LA) and volume of IAC in this study.

MATERIAL VE METHODS

The study was carried out on the CT images of 210 individuals randomly from the normal population between the ages of 10-90 between 2015 and 2021, in Selcuk University Department of Radiology. Scans were performed with a 256-slice MDCT scanner (Siemens Somatom Flash, Erlangen, Germany). Imaging parameters were as follows: kV=120; mA=160; rotation time=0.5 s; collimation=64×0.625; FOV=220 mm. Images that included the IAC were analy -zed retrospectively on a workstation (Snygo Via, Siemens, Germany). In this study, morphometric measurements of IAC (LA, canal length, anteroposterior (AP) diameter of IAP, distance from IAP to vestibular aqueduct (VA)) were performed **(Figure 1)**. In addition, the shape (funnel, cylindrical, bud) and volume of IAC was determined. Cases were divided into 7 different subgroups, 10-14, 15-20, 21-30, 31-40, 41-50, 51-60 and 61 years old, depending on their age (18, 19). Cases whose skull integrity was impaired or who had undergone surgical intervention were excluded from the study. Demographic information of each of individuals in study was noted.

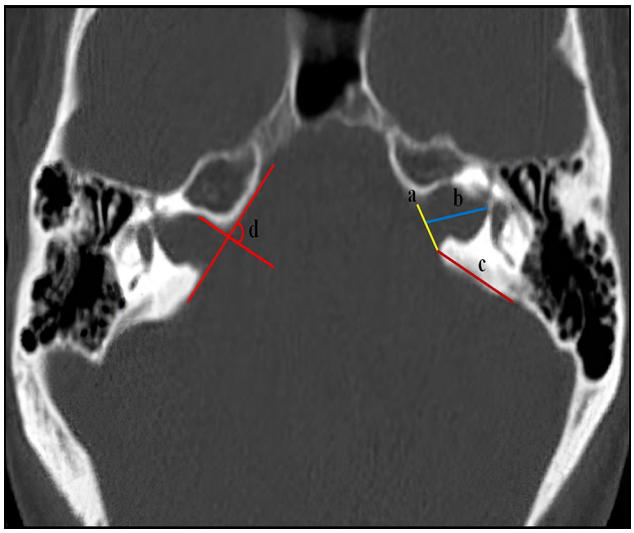

Figure 1: Morphometric measurements of internal auditory canal. (**a**; anteroposterior diameter of internal acoustic pore, **b**; canal length, **c**; distance from internal acoustic pore to vestibular aqueduct, **d**; lateral angle)

Ethical Committee

This study was approved by the local institutional review board Selcuk University (09.11.2021/489).

Statistical Analysis

Statistical analysis of the data was done with SPSS version 19.0 package program (SPSS Inc., Chicago, IL, USA). Statistical analysis included means, standard deviations and minimum (min) and maximum (max) values. Kolmogorov-Smirnov test was used for suitability of the data for normal distribution and it was determined that data was not homogeneous. Mann-Whitney U test was used in comparing the significance of the difference by gender and the sides measurements were evaluated, and the Kruskal Wallis test was used to compare among multiple age groups. The relationship between age groups and evaluation parameters were analyzed with Pearson's Correlation test. The results were evaluated in the 95% confidence interval and the data with p value less than 0.05 was considered statistically significant.

RESULTS

In our study, CT images of 210 cases were examined. 58% of these cases were male and 42% were female. The mean age was 37 ± 16 years. The mean values of diameter of IAP, canal length of IAC, distance of IAP to VA were determined as 6.3 ± 1.5 mm, 9.5 ± 1.6 mm, 17.6 ± 8.3 mm, respectively. The LA of IAC was detected as mean of 50°. The mean volume of IAC was calculated as 290 mm^3. In addition to that, the mean values, min and max of the parameter were given in **Table 1**.

Table 1: Mean, standard deviation, minimum and maximum values of the measurement parameters and volume of IAC

	Female (n:121)			Male (n:89)			Total (n:210)		
	Mean±SD	Min	Max	Mean±SD	Min	Max	Mean±SD	Min	Max
IAP diameter	6.3±0.15	2.4	10.7	6.3±1.5	0.8	10.3	6.3±1.4	0.8	10.7
Canal Length	9.4±0.15	3.8	14.2	9.7±1.7	4.6	15.5	9.5±1.6	3.8	15.5
VA-IAC	16.2±6.7	7.3	10.5	19.4±10.2	1.5	13.7	17.6±8.3	1.5	13.7
Lateral Angle	53±15	17	72	47±12.18	14	71	50±14	14	72
Volume	270±110	50	660	310±130	100	730	290±130	50	730

Internal auditory canal; IAC, internal acoustic pore; IAP, vestibular aqueduct; VA

When the IAC was examined according to the shapes, it was 25% bud shape, 29% funnel shape and 46% cylindrical shape in 420 IAC (210 left/right). When the IACs of each case were evaluated according to sides, it was seen as 77% symmetrical and 23% asymmetrical. It was statistically determined that the incidence of IAC shape patterns by gender and sides were not change (p=0.707; p=0.670 respectively).

In our study, age groups were adjusted as 10 to 14 (beginning of puberty period), 15-20 (end of puberty period), 21-60 (middle age) and above 61 years (geriatric population) according to the development of the temporal bone (18,19). In addition, the middle age group is divided into decades. All measurement data was recorded according to age groups and sides **(Table 2)**.

Table 2: Distribution of mean values of IAC volume and measurement parameters by age groups.

Age Groups		10-14 (n:30)	14-20 (n:30)	21-30 (n:30)	31-40 (n:30)	41-50 (n:30)	51-60 (n:30)	61-90 (n:30)	Genel (n:210)
IAP diameter	R	6.7±1.4	5.6 ±1.5	5.7±1.5	5.7±1.3	5.8±1.5	6±1.3	5.6±0.8	5.9±1.1
	L	7±1.6	6.8±1.3	6.9±1.4	6.8±1.2	6.3±1.3	6.4±1.3	7.2±1.4	6.7±1.4
Canal Length	R	9.6±1.6	9±1.8	9.6±1.5	9.7±1.4	9.2±1.6	9.4±2	9±1.2	9.3±1.6
	L	10±1.3	9.3±1.8	9.9±1.8	10±1.3	9.1±1.4	9.6±1.9	9.6±1.4	9.6±1.4
VA-IAC	R	12.2±2.1	11.1±2.1	12.5±2.7	12.3±2.5	11.9±2.2	12±2.9	11.7±1.9	11.8±9.3
	L	11.6±2.7	11.5±2.2	15.2±16.8	11.8±2.3	11.8±1.9	11.7±1.9	12.5±2.4	12.2±7.1
Lateral Angle	R	50±8	47±11	44±15	51±13	53±11	56±13	51±13	50±13
	L	48±12	48±12	48±15	46±13	55±19	55±13	47±11	50±15
Volume	R	200±100	320±120	300±130	280±100	290±110	360±140	280±90	310±130
	L	200±90	320±130	310±140	270±100	270±100	360±120	300±120	270±110

Internal auditory canal; IAC, internal acoustic pore; IAP, vestibular aqueduct; VA

When the study data was compared by gender, while the right IAP diameter and right IAC volume were statistically significantly higher in males, the right length of IAC canal and the LA of both sides were higher in females (p=0.007; p=0.043; p=0.038, p<0.001; p<0.001 respectively). When comparing the volumes of IAC by age groups, it was revealed that the right and left IAC volume in the 10-14 age group was statistically significantly smaller than other age groups (p<0.001; p<0.001). In addition, when the continuous relationship of morphometry, LA and IAC volume with age was examined, it was found that there were statistically weak positive correlations between age and LA (p<0.001, r=0.259), and between age and volume (p<0.001, r=0.193).

When the study data was compared by gender, while the right IAP diameter and right IAC volume were statistically significantly higher in males, the right length of IAC canal and the LA of both sides were higher in females (p=0.007; p=0.043; p=0.038, p<0.001; p<0.001 respectively). When comparing the volumes of IAC by age groups, it was revealed that the right and left IAC volume in the 10-14 age group was sta-

tistically significantly smaller than other age groups ($p<0.001$; $p<0.001$). In addition, when the continuous relationship of morphometry, LA and IAC volume with age was examined, it was found that there were statistically weak positive correlations between age and LA ($p<0.001$, $r=0.259$), and between age and volume ($p<0.001$, $r=0.193$).

DISCUSSION

Evaluation of preoperative anatomy before surgical applications is important in terms of predicting the complications that may occur during surgical application (20). In this context, it is of great clinical importance due to the neurovascular structures passing through the IAC. It can host several pathological processes that give clinical significance when these structures are involved. Certain pathologies might expand or narrow the IACs (21). In the radiological assessment of such processes, it would seem more desirable to have a reproducible quantifiable objective measure of the IAC rather than relying on the subjective impression of IAC asymmetry or unidimensional measurements of the acoustic pore. Such a quantitative measure could also serve as a baseline for subsequent comparisons when monitoring a disease process (15). For this reason, we evaluated morphometry, angles, and volume of IAC in our study.

The shapes of IAC in literature have been investigated, using different methods and classification types. In most of the literature studies, the types of IAC have been classified in three types as funnel, cylinder, bud. In Thomsen et al.'s study, the IAC of 115 patients were as follows: 70% cylindrical shape, 14% funnel shape and 14% bud shape (22). According to the same methodology used in Kobayashi and Zusho's study, IAC of 300 normal subjects were 72.7% cylindrical shape, 22.8% bud shape and 4.5% funnel shape (23). In Marques et al.'s study, the funnel shape IAC was the most common in both children and adults (74% and 58.3%, respectively), followed by the cylindrical shape (22% and 30.9%, respectively) and the bud shape (4% and 10.8%, respectively) (8). In Amjad et al.'s silicone casts study in 30 paired temporal bones showed that 16.7% of them were cylindrical shape, 43.3% of them funnel shape and 26.7% of them were bud shape (24). In our study, the shape of the IACs was found as 25% bud, 29% funnel and 46% cylindrical. The cylindrical shape was determined the most common shape of IAC in Thomsen et al.'s study, Kobayashi and Zusho's study (22, 23) and our study. However, in Marques et al.'s and Amjad et al.'s studies, it was found pyramid shape predominantly (8, 24) . Yet, the values found by our study are very different from those of the two studies mentioned. Considering that anatomical elements are determined during embryogenesis and that the related attribute is inherited as a polygenic trait, there is diversity among these patterns in different races and ethnic groups. Thus, such differences may be explained with racial heterogeneity.

Several studies examined the dimensions of the IAC using bony skulls and radiographs. One of these, in Marques et al.'s computed tomography study of 110 patients aged 1 to 92 years, the length of canal, IAP diameter, the distance between the canal and the vestibular aqueduct was 9.84±0.22 (9.43-10.2) mm, 4.47±0.10 (4.46-4.48) mm, 11.47±055 (10.7-11.6) in adults respectively and 11.17±0.22 (11.05-11.29) mm, 4.82±0.13 (4.64-5) mm,12.63±0.51 (12.31-12.96) in children respectively (8). Using caliper in 26 temporal bones (13 right and 13 left) from 13 cranium and 41 isolated temporal bones from different skulls, Ozocak et al. found a length of 7.6±1.3 mm (4.4-9.8), IAP diameter of 4.9±0.8 mm (3.5-7.1) and the distance between the canal and the VA 9.8±0.8 mm (8.5-11) (6). Although the values of our study are the same as the method used by Marques et al, it couldn't be compared clearly (8). Because the different age range of the cases causes inconsistency between the measurements. Since the use of temporal bone and caliper in the study of Ozocak et al. could reduce the sensitivity of the measurements, all measurement data is lower than our study (6).

Lateral angle of the IAC is one such measurement that was evaluated in prior studies on cadavers for sexing the temporal bone, with favorable results. Therefore, some of the studies in the literature are as follows. The mean values for the LA of the IAC in Akansel et al.'s CT study were 45.5º ±7.18 (30º-68º) for females

and 41±6.78º (30º-60º) for males (25). In the Noren et al.'s cadaveric study, the mean values for the LA of the IAC were in female 45.5 ±7.1º (30º-68º) and in males 41.6 ± 6.7º (30º–60º) (26). In our study, the values were in female and male 53±15º (17º-72º), 47±12º (14º-71º) respectively. The mean values, ranges and standard deviations of mentioned above were lesser than in values of our study. However, in our study, as in other studies, the difference genders by gender was statistically significant and the mean LA values in females were higher than males.

Some pathologies might expand or narrow the IACs. In the radiological assessment of such procedures, IAC's reproducible quantifiable objective measurement seems more desirable than relying on unidimensional measurements. Assessment of the volume of the IAC could be considered as a more quantitative method when monitoring a disease process (21). There are very few studies on this subject in the literature. In another study, the volumes had been measured by submerging rubber casts of 242 cadaver IACs in water and Papangelou reported that volumes of IAC ranged from 60 to 388 mm^3 (27). Essbaiheen et al. determined that IAC volumes ranged from 74 to 502 mm^3 in males and 78 to 416 mm^3 in females. In addition, they showed that males' IAC volumes were larger than females (15). According to these values, it was determined that the volumes of IAC in Essbaiheen et al. and Papangelou's studies smaller than our study, and the volume of IAC was affected by gender and age in contrast with Essbaiheen et al. and Papangelou's studies. In addition, the volume of IAC in the 10-14 age group was reported to be statistically smaller than other age groups.

In conclusion, in the studies that conducted to determine the morphometry and morphology of IAC in the literature, age, sex, races and differences of methods have led to differences in numerical values. Knowing the clinical importance of the structures passing through the IAC, its proximity to the pontocerebellar angle, and the morphometric dimensions and morphological structure of the IAC in intervention to tumors in this region has great importance. For this reason, the following results were reached in this study where IAC morphometry, LA and volume were evaluated. In similar with the literature, the LA was found statistically significantly larger in females than in males. Thus, it has been reconfirmed that it is an effective measurement method for use in sex determination. Finally, it was determined that the IAC volumes of the 10-14 age group were statistically significantly smaller than other age groups but the IAC volume did not change with age in post pubertal (14-90) age groups. We hope that the results of this study will contribute to the disclosure of our community data and serve as a reference for surgical interventions.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

AKUT KARIN PATOLOJİLERİ İLE ACİL SERVİSE BAŞVURAN GERİATRİK HASTALARDA PROGNOZU ÖNGÖRMEDE KLİNİK KIRILGANLIK ÖLÇEĞİ'NİN ETKİNLİĞİNİN DEĞERLENDİRİLMESİ: PROSPEKTİF ÇALIŞMA

EVALUATION OF THE EFFICACY OF THE CLINICAL FRAILTY SCALE IN THE PREDICTION OF PROGNOSIS IN GERIATRIC PATIENTS PRESENTING TO THE EMERGENCY DEPARTMENT WITH ACUTE ABDOMINAL PATHOLOGIES: A PROSPECTIVE STUDY

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ÖZET

AMAÇ: Klinik kırılganlık indeksi, 1 (çok iyi) ile 9 (ölümcül hasta) arasında değişen bir kırılganlık puanı oluşturmak amacı ile işlev, komorbidite ve biliş dahil olmak üzere belirli alanları değerlendirir. Bu çalışmanın amacı, akut abdominal patolojileri olan geriatrik hastalarda mortaliteyi öngörmede klinik kırılganlık indeksinin etkinliğini araştırmaktır.

GEREÇ VE YÖNTEM: 01.10.2020 - 31.03.2021 tarihleri arasında acil servise akut abdomen patolojisi ile başvuran 65 yaş üstü hastalar çalışmaya alındı. Klinik kırılganlık indeksi hesaplanıp kaydedildi ve 1'den 9'a kadar gruplara ayrıldı. İstatistiksel analiz SPSS 22.0 ile gerçekleştirildi.

BULGULAR: Çalışmamıza 151 hasta dahil edildi ve hastaların %53'ü kadın hasta idi. Yaş ortalaması 75,57±8,078 olup; 22(14,56%) hasta ex oldu. Hastalarımızın klinik kırılganlık indeksi incelemesinde mortal olan grupta CFS istatistiksel anlamlı olarak daha yüksek düzeyde tespit edildi (p<0,001). Hastalarımızın 83 (%55)'ü opere edildi. Opere olan ve opere olmayan grupta klinik kırılganlık indeksinin mortalite ile ilişkisi bakımından istatistiksel olarak anlamlı fark gözlenmemiştir (p=0,613). Yaşın 75 ve üzeri olmasını kriter olarak eklediğimizde mortaliteyi predikte etmede klinik kırılganlık indeksi ile mortalite arasında istatistiksel fark olup olmadığı da araştırıldı. Eğri altında kalan alanlar (EAA) karşılaştırıldığında ise, kırılganlık indeksi ile 75 yaş üstü kriteri ile birlikte olan kırılganlık indeksinde istatistiksel olarak anlamlı fark görülmedi. (Eğri altında kalan alan kırılganlık indeksi ve kırılganlık indeksi-yaş p=0.597, de Longe quality test).

SONUÇ: Klinik kırılganlık indeksi yüksekliği ve klinik kırılganlık indeksi-yaş, mortalite ile genellikle ilişkilidir fakat opere edilmeme, medikal tedavinin yeterli olacağı düşüncesi ya da komorbiditeler nedeni ile risk bilgilendirilmesi nedenli olarak bu durum ortaya çıkabilmektedir. Geriatrik hastalarda kırılganlık indeksi yüksekliği operasyon kararında tek başına yeterli olmayabilir.

ANAHTAR KELİMELER: Geriatrik hastalar, Kırılganlık indeksi, Cerrahi

ABSTRACT

OBJECTIVE: The CFS (Clinical Frailty Score) evaluates specific domains including function, comorbidity, and cognition to generate a frailty score ranging from 1 (very fit) to 9 (terminally ill). The aim of this study was to investigate the efficacy of CFS in the prediction of mortality in geriatric patients with acute abdominal pathologies.

MATERIAL AND METHODS: Patients over 65 years who presented to the emergency department with acute abdominal pathologies between October 1, 2020 and March 31, 2021 were included in the study. Clinical Frailty Score was calculated and categorized into groups from 1 to 9. Statistical analyses were performed using SPSS version 22.0.

RESULTS: The study included 151 patients, of whom 53% were female. The mean age was 75.57±8.078 years. Twenty-two (14.56%) patients died. Clinical Frailty Score was found to be statistically significantly higher in the non-survivor group (p<0.001). Eighty-three (55%) of the patients underwent surgery. There was no statistically significant relationship between Clinical Frailty Score and mortality in the operated and non-operated groups (p=0.613). We added an age of 75 and over as a criterion (Clinical Frailty Score -age) and compared its predictive ability for mortality with CFS. There was no statistically significant difference between Clinical Frailty Score and Clinical Frailty Score-age in terms of the area under the curve values in the prediction of mortality (the area under the curve Clinical Frailty Score and Clinical Frailty Score-age p=0.597, DeLong quality test).

CONCLUSIONS: High Clinical Frailty Score and Clinical Frailty Score-age are generally associated with mortality, but this may occur due to non-operation, the thought that medical treatment will be sufficient, or risk information due to comorbidities. In geriatric patients, an increased Clinical Frailty Score may not be sufficient alone in making a surgery decision.

KEYWORDS: Geriatrics, Fraility index, Surgery

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INTRODUCTION

Elderly patients are considered to be a high-risk surgical group due to many factors such as variable physiological reserve in surgical care and follow-up, increased susceptibility to hypovolemia, anoxia, infections, immobilization, constipation, and comorbidities. In this group, surgical risk assessment should be undertaken meticulously due to the decrease in cardiovascular reserve and glomerular filtration rate and changes in the ventilation/perfusion ratio (1).

Frailty phenotypes have been developed to define geriatric patients in physiological, psychological and social terms even if they do not present with any organic disease, and these phenotypes have been categorized based on factors such as incontinence, delirium, and falling (2 - 3). For this purpose, frailty phenotypes defined by Fried et al. (4) and the Clinical Frailty Score (CFS) developed by Rockwood et al. (5) are used. CFS evaluates specific domains, including function, comorbidity, and cognition to generate a frailty score ranging from 1(very fit) to 9 (terminally ill).

The primary aim of this study was to investigate the efficacy of CFS in the prediction of mortality in geriatric patients with acute abdominal pathologies. The secondary outcome was the efficacy of CFS in predicting mortality in operated and non-operated patients.

MATERIAL VE METHODS

Study Design

This study was planned as a prospective cohort study and conducted in Umraniye Training and Research Hospital, which is a tertiary healthcare center with 836 beds and receives 2.8 million patient presentations a year, of which 600,000 are made to the emergency department. Approximately 35% of emergency department admissions are geriatric patients.

The emergency department of the hospital contains a resuscitation unit, as well as green, red and yellow zones.

Patient Population

Patients over the age of 65 years who presented to our emergency department with acute abdominal pathologies between October 1, 2020 and March 31, 2021 were included in the study. All patients under 65 years, those that were over 65 but that directly applied to one of our outpatient clinics, those that presented to the emergency department with complaints other than acute abdominal pathologies, and those with missing data or unknown outcomes were excluded from the study.

Data Collection

The patients' admission symptoms, vital signs, examination findings, and laboratory test results were recorded. Age, gender, comorbidities (hypertension, diabetes mellitus, coronary artery disease, chronic obstructive pulmonary disease, chronic kidney disease, and congestive cardiac failure), presence of malignancy, operation status, diagnoses during hospitalization, hemogram parameters (white blood cell, neutrophil, lymphocyte, hemoglobin, hematocrit, and red cell distribution width) and clinical outcomes (ward admission, intensive care admission, and discharge) were evaluated. According to the outcomes, the patients were classified as those that were discharged, those that were hospitalized, those that refused treatment, and those admitted to the intensive care unit. The 30-day mortality rate and length of hospital stay (LOHS) were noted. According to the mortality status, the patients were divided into two groups as survivor and non-survivor, and a mortality analysis was performed using the National Death Notification System, which shows deaths from all causes. CFS was calculated and categorized into groups from 1 to 9, and the patients with a CFS of ≥4 were considered to be frail.

Our primary outcome was the relationship of CFS with 30-day mortality, and our secondary outcome was the relationship between CFS and mortality in operated and non-operated patients.

Assessment of CFS

Frailty was evaluated according to CFS. According to this scoring, the patients were classified as follows: CFS 1, very fit (active and motivated patients); CFS 2, well (patients without active disease symptoms); CFS 3, managing well (patients with controllable comorbidities);CFS 4,

apparently vulnerable (patients with disease symptoms); CFS 5, mildly frail (patients with limited dependence on others for outdoor activities, such as shopping and daily living activities, such as housework); CFS 6, moderately frail (patients dependent on others for all outdoor activities and some domestic needs); CFS 7, severely frail (patients dependent on others for all activities); CFS 8, very severely frail (bedridden patients); CFS 9, terminally ill (5). In our study, the threshold fragility was dichotomized as ≥4; however, there are also studies using a CFS cut-off score of 5 (6).

Ethical Committee

For the study, ethical approval was obtained from the local clinical research ethics committee of our hospital (date: Sep 08, 2020; number: B.10.1.TKH.4.34.H.GP.0.01/326).Patients that had a sufficient level of consciousness and the relatives of patients that were not adequately conscious were invited to participate in the study. An informed consent form was signed by the patients or their relatives who agreed to participate in the study.

Statistical Analysis

Statistical analysis was performed using SPSS version 22.0. The conformance of variables to normal distribution was examined by visual (histogram and probability graphs) and analytic methods (the Kolmogorov-Smirnov test). The chi-square test was conducted to evaluate the relationship between categorical data. The Mann-Whiney U test was used to compare non-parametric numerical data between two groups. If there were more than two groups, the Kruskal-Wallis test was used to compare non-parametric numerical data. We also formed a characteristic curve (ROC) for 30-day mortality and obtained the area under the curve (AUC) values for individual variables. The AUC values of the parameters were calculated and tested mutually for significance with the DeLong quality test. $p<0.05$ was accepted as statistically significant.

RESULTS

Of the total 151 patients included in the study, 53% were female. The mean age was 75.57 ± 8.078 years. Twenty-two (14.56%) patients died. **Table 1** shows the baseline characteristics diagnoses and outcomes of the patients in the sample. Of the patients in the non-survivor group, %50 died after admission to the intensive care unit, 22,7 % after admission to wards, 18,2 % after discharge from hospital, 4,5 % after referral to an external intensive care unit within 30 days. There was a statistically significant difference between the survivor and non-survivor groups in terms of clinical outcomes ($p<0.001$).CFS was found to be statistically significantly higher in the non-survivor group ($p<0.001$). A CFS of ≥ 4 was found in 81.81% of the patients in this group ($p<0.001$).

Table 1: Relationship of demographic characteristics, comorbidities, outcomes, and the Clinical Frailty Score with mortality in geriatric patients admitted to the emergency department with acute abdominal pathologies

	Total	**Survivor**	**Nonsurvivor**	**p**
	151(%100)	129(%85,44)	22(%(14.56%)	
Age (mean, ±)	75.57 ± 8.078	75.05 ± 8.013	78.64 ± 7.950	0.055
Gender(n,%)0.444				
Female	80 (53.0%)	70 (54.3%)	10 (45.5%)	
Male	71 (47.0%)	59 (45.7%)	12 (54.5%)	
Comorbidities (n,%)				
HT	121 (80.1%)	103 (79.8%)	18 (81.8%)	0.546
DM	37 (24.5%)	33 (25.6%)	4 (18.2%)	0.456
COPD	37 (24.5%)	30 (23.3%)	7 (31.8%)	0.116
CAD	66 (43.7%)	53 (41.1%)	13 (59.1%)	0.531
CKD	21 (13.9%)	17 (13.2%)	4 (18.2%)	0.065
Malignancy	27 (17.9%)	20 (15.5%)	7 (31.8%)	0.069
Arthritis	37 (24.5%)	35 (27.1%)	2 (9.1%)	
Fever (mean, ±)				
Hearth rate/min(mean, ±)	36.5 ± 0.346	36.46 ± 0.336	36.68 ± 0.349	**0,003**
Systolic TA(mean, ±)	88.43 ± 18.432	86.02 ± 16.179	102.59 ± 24.193	**0.002**
Diastolic TA(mean, ±)	129.75 ± 23.972	131.64 ± 21.981	118.68 ± 31.771	**0.014**
Saturation %(mean, ±)	73.32 ± 13.801	74.44 ± 13.351	66.77 ± 14.880	**0.024**
	95.79 ± 2.822	96.27 ± 1.948	93.00 ± 4.918	**p <0.001**
Blood parameters				
HGB	12.96 ± 10.428	12.41 ± 2.205	16.14 ± 27.105	**0.002**
HTC	37.50 ± 8.588	38.20 ± 8.592	33.40 ± 7.499	**0.006**
Platelet	270.62 ± 122.197	258.32 ± 112.062	342.68 ± 154.098	0.026
RDW	16.17 ± 10.397	15.98 ± 11.164	17.27 ± 3.311	**p<0.001**
Neutrophil	12.18 ± 31.067	12.29 ± 33.520	11.51 ± 6.698	0.145
Lymphocyte	2.59 ± 10.159	2.66 ± 10.885	2.21 ± 3.844	0.641
Urea	53.75 ± 47.918	50.41 ± 49.194	73.32 ± 34.356	**p<0.001**
Creatinine	1.42 ± 2.780	1.44 ± 2.997	1.32 ± 0.676	0.124
AST	78.25 ± 181.948	68.60 ± 117.021	134.77 ± 386.109	0.24
ALT	55.25 ± 100.515	57.08 ± 105.379	44.50 ± 65.861	0.635
LOHS	5.31 ± 5.266	5.04 ±4.942	6.91 ± 6.789	0.373
Diagnosis				**p<0.001**
Acuteappendicitis	4 (2.6%)	4 (3.1%)	0	
Ileus	39 (25.8%)	35 (27.1%)	4 (18.2%)	
Abscess	7 (4.6%)	6 (4.7%)	1 (4.5%)	
Pancreatitis	21 (13.9%)	21 (16.3%)	0	
Cholecystitis	30 (19.9%)	27 (20.9%)	3 (13.6%)	
Hernia	18 (11.9%)	17 (13.2%)	1 (4.5%)	
Multi-trauma	2 (1.3%)	2 (1.6%)	0	
Perforation	5 (3.3%)	3 (2.3%)	2 (9.1%)	
Diverticulitis	2 (1.3%)	2	0	
Mesentericischemia	9 (6.0%)	3 (2.3%)	6 (27.3%)	
GIS bleeding	9 (6.0%)	7 (5.4%)	2 (9.1%)	
Rectussheathhematoma	1 (0.7%)	1 (0.8%)	0	
Malignancy	1 (0.7%)	0	1 (4.5%)	
Anal fissure	1 (0.7%)	0	1 (4.5%)	
Acute abdomen	1 (0.7%)	0	1 (4.5%)	
Fornier gangrene	1 (0.7%)	1 (0.8%)	0	
Operation (n,%)	83 (55%)			
Frailty score	2.751.390	2.53 ± 1.341	4.09 ± 0.811	**p<0.001**
				p<0.001
Frailty score<4	100 (66.23%)	96 (74.41%)	4 (18.18%)	
Frailty score≥4	51 (33.77%)	33 (25.59%)	18 (81.81%)	
Outcome				**p<0.001**
Admission to ward	71 (47.0%)	66 (51.2%)	5 (22.7%)	
Admission to ICU	13 (8.6%)	2 (1.6%)	11 (50.0%)	
Discharge	60 (39.7%)	56 (43.4%)	4 (18.2%)	
Refused treatment	5 (3.3%)	4 (3.1%)	1 (4.5%)	
Referral to external ICU	2 (1.3%)	1 (0.8%)	1 (4.5%)	
LHOS	5.31 ± 5.266	129 (85.44)	22 (14.56%)	**0.397**

(HT, hypertension; DM, diabetes mellitus; COPD, chronic obstructive pulmonary disease; CAD, coronary artery disease; CKD, chronic kidney disease; CCF,congestive cardiac failure; GIS, gastrointestinal system; HGB, hemoglobin; HCT,hematocrit; RDW, red cell distribution width; AST,aspartate aminotransferase; ALT, alanine aminotransferase; GIS, gastrointestinal system; ICU:intensive care unit; LHOS, length of hospital stay.)

Eighty-three (55%) of our patients underwent surgery. The mean age of the operated patients was 74.86 ± 7.827 years, and 43 (51.8%) were female. Fifteen (18.07%) of the operated patients died, 10 (66.7%) after admission to the intensive care unit and five (33.3%) after admission to the wards. There was a significant difference between the operated and non-operated groups in terms of clinical outcomes (p<0.001). CFS was significantly higher among both the operated and non-operated patients in the non-survivor group (p<0.001 and p=0.001, respectively). In the non-survivor group, CFS was ≥4 in 80% of the operated patients (p<0.001) and85.7% of the non-operated patients (p=0.002).There was no statistically significant relationship between CFS and mortality in the operated and non-operated groups (p=0.613). LOHS was statistically significantly higher in the operated group compared to the non-operated group (p=0.002). The baseline characteristics of the operated and non-operated groups are shown in **Table 2**.

Table 2: Relationship of mortality and investigated parameters in operated and non-operated groups

	Non-operated				Operated			
	Total	Survivor	Non-survivor	p	Total	Survivor	Non-survivor	p
Age (mean, ±)	76.3 ± 8.4	76.2 ± 8.3	76.7 ± 9.945	0.91	74.8 ± 7.8	73.9 ± 7.6	79.53 ± 7.05	0.012
Gender (n, %)				0.14				0.896
Female	37(54.4)	35(57.4%)	2 (28.6%)		43 (51.8)	35 (51.5%)	8 (53.3%)	
Male	31(45.6%	26 (42.6%)	5 (71.4%)		40 (48%)	33 (48.5%)	7 (46.7%)	
Comorbidities (n, %)								
HT	54(79%)	49(80%)	5 (71.4%)	0.58	67(80.7%)	54 (79.4%)	13 (86.7%)	0.519
DM	13(19%)	13(21%)		0.17	24 (28.9%)	20 (29.4%)	4 (26.7%)	0.832
COPD	17(25%)	14 (23%)	3 (42.9%)	0.25	20 (24%)	16 (23.5%)	4 (26.7%)	0.797
CAD	33(48%)	30 (49%)	3 (43%)	0.75	33 (40%)	23 (33.8%)	10 (66.7%)	0.019
CKD	9 (13%)	8 (13.1%)	1 (14.3%)	0.93	12(14.5%)	9 (13.2%)	3 (20.0%)	0.5
CCF	11(16%)	11 (18%)		0.22	12 (14.5%)	10 (14.7%)	2 (13.3%)	0.891
Malignancy	10(14.7)	8 (13%)	2 (28.6%)	0.274	17 (20.5%)	12 (17.6%)	5 (33.3%)	0.173
Arthritis	20(29%)	18 (29.5%)	2 (28.6%)	0.959	17 (20.5%)	17 (25.0%)	0	0.03
Fever (mean,±)	36.5±0.36	36.48±0.34	36.81±0.308	0.01	36.5 ± 0.37	36.45 ± 0.330	36.62 ± 0.359	0.075
Hearth rate/min(mean,±)	87.24±19	84.26± 17	113.14±20.37	0.001	89.4± 17.52	87.59 ± 15.245	97.67 ± 24.867	0.161
Systolic TA (mean, ±)	129.18±24	132.1±23.4	103.43±21.35	0.003	129.92±23.5	131.21 ± 20.787	125.8 ± 33.883	0.329
Diastolic TA (mean, ±)	72.49±15	73.59±14.4	62.86 ± 15.963	0.05	74.19 ± 13	75.21 ± 12.377	68.6 ± 14.549	0.128
Saturation % (mean, ±)	95.91±2.5	96.2 ± 1.8	93.43 ± 5.350	0.126	95.74 ± 3.1	96.34 ± 2.070	92.8 ± 4.887	0.001
Blood parameters								
HGB(g/dl)	12.21±2.4	12.4 ± 2.35	10.57 ± 2.999	0.106	13.52±13.8	12.42 ± 2.079	18.73 ± 32.794	0.008
HTC (%)	38.1±10.6	38.6 ± 10.7	34.07 ± 8.577	0.18	36.89±6.5	37.84 ± 6.057	33.09 ± 7.246	0.022
Platelet(103µ/L)	235±100	225.98± 90	315 ± 146.521	0.123	301.71±131	287.34±121.8	355.6 ± 160.800	0.152
RDW	17.4±15.3	17.16± 16	19.53 ± 4.897	0.003	15.18 ± 2.1	14.93 ± 2.176	16.22 ± 1.562	0.004
Neutrophil(103µ/L)	14.14± 45	14.37± 47.5	12.13 ± 7.501	0.18	10.58±10	10.42 ± 10.770	11.23 ± 6.549	0.456
Lymphocyte(103µ/L)	3.79± 15	4.05± 15.7	1.49 ± 0.649	0.65	1.59±2.06	1.40 ± 0.710	2.55 ± 4.647	0.5
Urea(mg/dL)	48.2±32.5	47.55±33.7	53.82 ± 20.771	0.215	58.37± 56.9	52.98 ± 59.931	82.42 ± 36.149	<0.001
Creatinine(mg/dL)	1.62±3.9	1.69± 4.16	1.04 ± 0.612	0.449	1.25 ± 1.14	1.22 ± 1.231	1.46 ± 0.683	0.014
AST(IU/L)	88.16± 140.7	90.23± 147.15	70.14 ± 65.733	0.25	69.65± 209	49.21 ± 77.206	164.93 ± 467.6	0.397
ALT(IU/L)	63.71± 106.5	64.41± 111.9	57.57 ± 36.687	0.254	47.93± 94.8	50.50 ± 99.498	38.40 ± 76.187	0.859
LHOS	3.97± 3.47	4.00± 3.6	3.71 ± 2.289	0.943	6.37±6.15	5.97 ± 5.764	8.40 ± 7.707	0.397
Diagnosis				0.019				0.001
Acute appendicitis	0	0	0		4 (4.8%)	4 (5.9%)	0	
Ileus	18	17 (27.9%)	1 (14.3%)		21 (25.3%)	18 (26.5%)	3 (20%)	
Abscess	0	0	0		7 (8.4%)	6 (8.8%)	1 (6.7%)	
Pancreatitis	18	18 (29.5%)	0		3 (3.6%)	3 (4.4%)	0	
Cholecystitis	14	11 (18.0%)	3 (42.9%)		16 (19.3%)	16 (23.5%)	0	
Hernia	6	6 (9.8%)			12 (14.5%)	11 (16.2%)	1 (6.7%)	
Multi-trauma	2	2 (3.3%)			0	0	0	
Perforation	0	0	0		5 (6.0%)	3 (4.4%)	2 (13.3%)	
Diverticulitis	2	2 (3.3%)			0	0	0	
Mesenteric ischemia	0	0	0		9 (10.8%)	3 (4.4%)	6 (40.0%)	
GIS bleeding	7	5 (8.2%)	2 (28.6%)		2 (2.4%)	2 (2.9%)	0	
Rectus sheath hematoma	0	0	0		1 (1.2%)	1 (1.5%)	0	
Malignancy	0	0	0		1 (1.2%)	0	1 (6.7%)	
Anal fissure	1		1 (14.3%)		0	0	0	
Acute abdomen	0	0	0		0	0	0	
Fornier gangrene	0	0	0		1 (1.2%)	0	1 (6.7%)	
Operation (n,%)	0	0	0		1 (1.2%)	1 (1.5%)	0	
Frailty score	2.72 ± 1.3	2.56 ± 1.24	4.14 ± 0.690	0.001	2.80 ± 1.47	2.50 ± 1.430	4.07 ± 0.884	p<0.001
				p =0.002				p<0.001
Frailty scoref<4	48(70.6%	47 (77.0%)	1 (14.3%)		52 (62.7%)	49 (72.1%)	3 (20.0%)	
Frailty score≥4	20(29.4%	14 (23.0%)	6 (85.7%)		31 (37.3%)	19 (27.9%)	12 (80.0%)	
Outcome			<0.001					<0.001
Admission to ward	0 (0%)				71 (85.5%)	66 (97.1%)	5 (33.3%)	
Admission to ICU	2 (2.9%)		2 (28.6%)		11 (13.3%)	2 (2.9%)	9 (60.0%)	
Discharge	60 (88%)	56 (91.8%)	4 (57.1%)		0 (0%)			
Referral to external ICU	1 (1.5%)	1 (1.6%)			1 (1.2%)	0	1 (6.7%)	
LHOS	3.97±3.47	4.00± 3.59	3.71 ± 2.289		6.41±6.178	5.97±5.764	8.40±7.707	

(HT, hypertension; DM, diabetes mellitus; COPD, chronic obstructive pulmonary disease; CAD, coronary artery disease; CKD, chronic kidney disease; CCF,congestive cardiac failure; GIS, gastrointestinal system; HGB, hemoglobin; HCT,hematocrit; RDW, red cell distribution width; AST,aspartate aminotransferase; ALT, alanine aminotransferase; GIS, gastrointestinal system; ICU:intensive care unit; LHOS, length of hospital stay.)

In the correlation analysis between CFS, mortality and LOHS, a positive correlation was found between CFS and mortality(r=0.41;p<0.001), but no correlation was observed between LOHS and CFS (r=0.025, p=0.762) or between LOHS and mortality (r=0.073, p=0.375) **(Figure1)**.

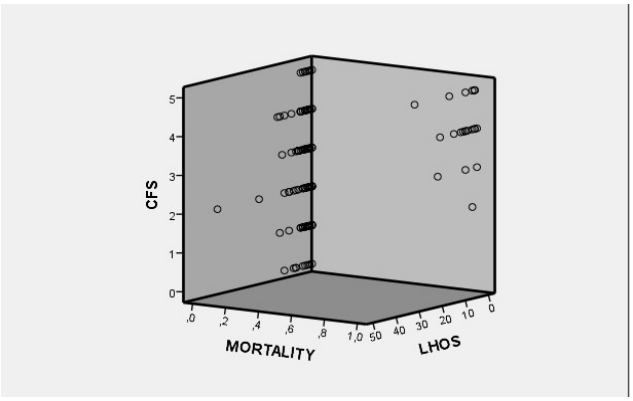

Figure 1: Correlation analysis between CFS, mortality and LOHS

We added the age of 75 years and over as a criterion (CFS-age) and investigated whether there was a statistical difference between CFS and CFS-age in predicting mortality. According to the diagnostic test performance analysis report of CFS and LOHS in predicting mortality, CFS and CFS-age were statistically significant in predicting mortality at a cut-off value of 4 for both [area under the curve (AUC): 0.828 (0.758-0.885) and 0.817 (0.746-875), respectively; p<0.001 for both] **(Table 3)**. When the AUC values of CFS and CFS-age were compared, no statistically significant difference was detected (Delta AUC 0.011; z statistic 0.528;p=0.597, DeLong quality test).

Table 3: Accuracy of the Clinical Frailty Score and Clinical Frailty Score-age in predicting 30-day all-cause mortality

Scores	AUC	95% CI	p	Accuracy	Cut-off value	Sensitivity	Specificity	PPV	NPV	LR+	LR-
CFS	0.828	0.758-0.885	<0.001	56.24	>3	81.82	74.42	35.3	96	3.20	0.24
CFS-A	0.817	0.746-875	<0.001	49.68	>4	63.64	86.05	43.7	93.3	4.56	0.42

(AUC, area under the curve; CI, confidence interval; PPV, positive predictive value; NPV, negative predictive value; CFS:Clinical Frailty Score; CFS-A, Clinical Frailty Score-age)

DISCUSSION

In this study, a statistically significant relationship was found between CFS and mortality in geriatric patients presenting to the emergency department with acute abdominal pathologies regardless of the operation status of the patients. Comorbidities can affect mortality in geriatric patients. It has been found that preoperative and postoperative renal failure is

associated with mortality (7, 8). Since diabetes mellitus affects multiple organs and systems, hypo-hyperglycemia monitoring is extremely important in geriatric patients (8). In addition, postoperative pulmonary complications account for 40% of perioperative mortality. Cardiac complications can predict morbidity and long-term mortality similar to pulmonary complications in major non-cardiac operations (7 - 9). In our study, no statistically significant relationship was observed between mortality and cardiac and pulmonary diseases, kidney pathologies, hypertension, and diabetes. We consider that different results being obtained in the evaluation of the relationship between comorbidities and mortality was effective in the introduction of CFS into clinical practice.

In our study, as predicted, there was a statistically significant relationship between vital signs and mortality, and laboratory parameters were also examined. There was a statistically significant correlation between low hematocrit and high RDW (red cell distribution width) and mortality. Urea elevation was also associated with mortality. Undoubtedly, changes in kidney function and changes in hemogram parameters were effective in making the operation decision. Only 55% of the patients included in our study could be operated on, and the rate of patients who died after discharge in the non-operated group was recorded as 18.2%. We think that the preference of more medical treatment in patients with comorbidities due to the risk of operation caused the absence of a statistically significant relationship between comorbidity and mortality. However, our study included acute abdomen pathologies. The risks of the operated patients related to the operations in question would also differ according to the diagnosis. We observed that there is no mortality in the patients diagnosed with cholecystitis and in the operated group. However, while all patients diagnosed with mesenteric ischemia were operated, the mortality rate was 40% among all patients. Our patients, who were planned to be hospitalized according to the clinical situation at the emergency service admission, were classified according to the admission sites at the first admission, whether they were operated or not. Mortality rate after admission to ward was determined as 22.7%. This patient group was admitted to the intensive care unit during the hospital stay due to the changes in their clinical conditions. Although CFS is evaluated based on clinical opinion, it is an easy and rapid test that is expected to predict patient prognosis (10). The effect of CFS in determining prognosis after cardiac surgical interventions has been discussed in the literature. CFS has been shown to provide supportive data in the prediction of mortality and disability in geriatric patients undergoing aortic valve replacement (11). Rodrigues et al., investigating the relationship between CFS and cardiovascular surgery outcomes, reported that mortality, LOHS, vasopressor requirement, and ventilator follow-up were higher among the patients considered to be frail according to CFS (12). In percutaneous coronary interventions (PCIs), a statistically significant correlation was found between postprocedural mortality and CFS (13). In a study in which patients undergoing PCIs were examined prospectively, a statistically significant relationship was observed between LOHS and CFS. Similarly, Hamonangan et al. found a statistically significant relationship between complications after PCIs and frail patients (14). It has also been suggested that CFS is associated with mortality and postoperative complications following head and neck surgery, and 30-day mortality and admission to the intensive care admission following vascular surgery (15, 16). In our study, 11 (84.61%) of the 13 patients admitted to the intensive care unit died, and a statistically significant relationship was found between CFS and mortality, which is in agreement with the literature. Although we did not observe a statistically significant correlation between LOHS and CFS in all patients, LOHS was significantly higher in the operated group compared to the non-operated group ($p=0.002$).

In a previous study, using different frailty evaluations, it was concluded that the postoperative outcomes of not only cardiac but also oncological and thoracic surgery were negatively affected (17). On the other hand, in meta-analyses, CFS, was found to be superior to the other frailty scales in predicting mortality and prognosis (18). In a geriatric study conducted in Australia with 1,125 patients, a statistically significant relationship was found between mortality and CFS and LOHS, and a statistically significant

difference was observed between respiratory comorbidity and mortality (19). In a study investigating the relationship between CFS and mortality after elective colorectal surgery, Okabe et al. found that CFS was statistically significantly associated with advanced age, postoperative complications, and LOHS (15). In another study, it was determined that discharge could be predicted using the fragility index (20). In a study evaluating patients undergoing elective and emergency surgery, higher CFS was associated with fewer discharges, more postoperative complications, and more deaths (21). CFS dichotomization has been performed in different clinical studies by classifying different values. Similar to our study, Hewitt et al. reviewed emergency surgery admissions and included 2,279 patients in the sample, and reported that LOHS and 30-day mortality were higher among the patients with a CFS of 4 and above (22). In our study, we added age (75 and over) as a criterion and observed no statistically significant difference between CFS and CFS-age in predic ting mortality. This shows that CFS alone has a strong clinical predictive ability for mortality. In our study, the relationship between CFS and mortality was evaluated separately for the operated and non-operated patients, and a significant relationship was found between mortality and CFS in both groups. In a study by Li et al., examining emergency acute abdominal pathologies, CFS was determined to be 3 in 35.1% of the patients, and 4.5% of the patients required a second operation while 13.6% presented to the hospital department for the second time or died after 30 days. The authors noted that there was a statistically significant relationship between the frail status and mortality (23). According to our mortality evaluation, none of the patients that were alive during the 30-day period required an operation.

To the best of our knowledge, the only other study in the literature examining the predictive ability of CFS in the mortality of operated and non-operated geriatric patients belongs to Hewitt et al. The authors evaluated 325 general surgery patients and found that 28% were frail (CFS ≥ 5), and the hospital stay was longer in the frail group (24). In our study, CFS was associated with mortality in both the operated and non-operated groups, and there was no superiority of the CFS-mortality relationship for either group. The operated patients were longer and had a longer hospital stay. In brief, we determined that CFS was associated with mortality, but this parameter alone does not seem to be sufficient in making a decision not to operate on a patient. The use of index calculations alone, such as CFS may not be enough to estimate surgical risk, and bedside expert opinion is essential (25).

Geriatric surgery patients should be carefully examined. Although a high CFS is generally associated with mortality, it may also be caused by the patient not undergoing surgery, considering that medical treatment will be sufficient, or having been informed about risks due to comorbidities. In geriatric patients, an increased CFS may not be sufficient alone in making a surgery decision.

Limitations of the our study, mortality was measured over three months. No distinction was made in the decision of whether or not to perform an operation, with the physicians recommending surgery, admission to wards for medical treatment, or discharge after their examination of the patients. It was not known whether any of the patients underwent surgery after the 30-day period. Lastly, CFS was not evaluated in the postoperative period.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

SERVİKAL İNTRAEPİTELYAL LEZYONLARDA VE YÜKSEK RİSKLİ HPV TİPLERİNDE SERVİKAL KOLPOSKOPİNİN YERİ

CERVICAL INTRAEPITHELIAL LESIONS AND THE PLACE OF CERVICAL COLPOSCOPY IN HIGH RISK HPV TYPES

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ÖZET

AMAÇ: Bu çalışmada, smear sonucu düşük dereceli servikal intraepitelyal lezyon (LSIL), yüksek dereceli servikal intraepiteliyal lezyon (HSIL), önemi belirsiz tipik olmayan yassı hücreler (ASCUS) tespit edilen, servikal muayenede erzoyon saptanan hastalar ve yapılan human papilloma virüs (HPV) testi pozitif olan takiben kolposkopik biyopsi uygulanan hastalarımızda HPV, smear ve biyopsi sonuçları karşılaştırılması amaçlanmıştır.

GEREÇ VE YÖNTEM: Toplamda çalışma grubu olarak 186 hasta dahil edildi. Hastalardan alınan servikal smearlar değerlendirildi. Servikal smear sonucu; ASCUS, LSIL ve HSIL, olan hastalar ile HPV pozitif hastalar kolposkopiye yönlendirildi. HPV tiplerinden 16, 18, 31 ve 33 olanları yüksek riskli, diğerlerini düşük riskli olarak gruplandırdık. Buna göre HPV, smear ve biyopsi sonuçları karşılaştırıldı.

BULGULAR: Çalışmaya dahil edilen 186 hastanın 74'ü (%39,7) menopozdaydı. Kolposkopi yapılan hastaların 103'ünde (%55,3) HPV testi sonucu pozitif saptanması nedenli kolposkopi yapıldı. Bu hastaların 82'si yüksek riskli HPV grubundaydı. ASCUS nedenli 35 (%18,8) olguya, servikal erozyon nedenli 33 hastaya (%17,7), LSIL nedenli 12 hastaya (%6,5) HSIL nedenli 3 hastaya (%1,6) kolposkopi yapıldı. Kolposkopi yapılan hastaların alınan biyopsilerinin patoloji sonuçlarına bakacak olursak 134'ü (%72) benign olarak geldi. Smear sonucu malignite izlenmedi olarak gelen 121 hastanın kolposkopik biyopsi sonuçları değerlendirildiğinde 19 hastada CIN1 (%15,7), 6 hastada CIN2(%5), 2 hastada CIN3(%1,7) saptandı. Smear sonucuna göre LSIL gelen hastaların %25'inde ileri düzeyde epitelyal anomali (CIN 2 ve 3) gözlenirken, HSIL olan hastalarda bu oran %50 olarak tespit edilmiştir. HPV tipleri ile kolposkopik biyopsi sonuçları karşılaştırıldığında yüksek riskli HPV tipleri ile %37,8 oranında CIN 1, 2 ve 3 tespit edilirken, düşük riskli grupta bu oran %9,5 olarak bulunmuştur ($p<0.016$).

SONUÇ: Smear tarama testi olarak kullanılmalıdır ve LSIL veya HSIL varlığında mutlaka kolposkopik biyopsi ile tanının doğrulanması gereklidir. Ayrıca özellikle yüksek riskli HPV tiplerinin pozitifliği tespit edilen olgularda smear sonucundan bağımsız olarak da kolposkopik biyopsinin önemi anlaşılmaktadır.

ANAHTAR KELİMELER: Kolposkopi, Smear, Servikal intraepitelyal lezyon, Human papilloma virüs

ABSTRACT

OBJECTIVE: In our study, patients with low-grade cervical intraepithelial lesion (LSIL), high-grade cervical intraepithelial lesion (HSIL), non-typical squamous cells (ASCUS) of indeterminate significance, and patients with eruption on cervical examination and human papilloma virus (HPV) test. We aimed to compare the results of HPV, smear and biopsy in patients who were positive followed by colposcopic biopsy.

MATERIAL AND METHODS: In total, 186 patients were included as the study group. Cervical smears taken from the patients were evaluated. Patients whose cervical smear results were determined as ASCUS, LSIL and HSIL and HPV positive patients were referred for colposcopy. We grouped the HPV types 16, 18, 31 and 33 as high-risk and the others as low-risk. Accordingly, HPV, smear and biopsy results were compared.

RESULTS: Of the 186 patients included in the study, 74 (39.7%) were in menopause. Colposcopy was performed due to the detection of HPV positivity in 103 (55.3%) of the patients who underwent colposcopy. 82 of these patients were in the high risk HPV group. Colposcopy was performed in 35 patients (18.8%) with ASCUS, 33 patients with cervical erosion (17.7%), 12 patients with LSIL (6.5%) and 3 patients (1.6%) with HSIL. If we look at the pathology results of the biopsies taken from the patients who underwent colposcopy, 134 of them (72%) came as benign. When the colposcopic biopsy results of 121 patients whose smear results were found to be without malignancy, 19 patients had CIN1 (15.7%), 6 patients (5%), and 2 patients CIN3 (1.7%). According to smear results, advanced epithelial anomalies (CIN 2 and 3) were observed in 25% of patients who received LSIL, while this rate was found to be 50% in patients with HSIL. When HPV types and colposcopic biopsy results were compared, CIN 1, 2 and 3 were detected as a rate of 37.8 in the high-risk HPV types , while this rate was 9.5% in the low-risk group ($p <0.016$).

CONCLUSIONS: It was concluded that smearin is a screening test and the diagnosis should be confirmed by biopsy under colposcopy in the presence of LSIL or HSIL. In addition, the importance of colposcopic biopsy is understood, regardless of the smear result, especially in cases with positive HPV types.

KEYWORDS: Colposcopy, Smear, Cervical intraepithelial lesion, Human papilloma virus

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GİRİŞ

Serviks kanseri, üçüncü en sık görülen kadın genital malignitesidir. Diğer genital kanserlerin aksine erken evrede tanısı konabilir ve tedavisi yapılabilir (1, 2). Serviks kanserinin kanser öncülü lezyonlarının saptanmasında smear alınması yaygın bir kullanımdır (2). Smear testinin servikal kanser öncülü lezyonları saptamada sensitivitesi %79-100, spesifitesi ise %30-80 arasından olduğundan, smear testi sadece kanser tarama amacıyla kullanılmaktadır (3, 4). HPV, sıklıkla cinsel ilişki yoluyla bulaşan bir virüs kaynaklı infeksiyondur. Kolay bulaşmasından dolayı yaygın olarak görülür. Kadınlarda kondülom, serviks ve vajina kanserine neden olabilmektedir. Anormal Pap smear test sonuçlarının yönetimi kolposkopik inceleme ile yapılır. Kolposkopik direk biyopsi servikal intraepitelyal lezyonların tanısında standart yöntemdir (5, 6).

Çalışmamızda, smearlerinde düşük dereceli servikal intraepitelyal lezyon (LSIL), yüksek dereceli servikal intraepiteliyal lezyon (HSIL), önemi belirsiz tipik olmayan yassı hücreler (ASCUS) tespit edilen, servikal muayenede erozyon saptanan hastalar ve yapılan human papilloma virüs (HPV) testi pozitif olan takiben kolposkopik biyopsi uygulanan hastalarımızda HPV, smear ve biyopsi sonuçları karşılaştırılması amaçlanmıştır.

GEREÇ VE YÖNTEM

Bu çalışmada, Aralık 2017 - Ocak 2018 tarihleri arasında kliniğimizde patolojik sitoloji bulguları veya şüpheli servikal lezyon veya HPV pozitifliği nedeniyle dış merkezlerden sevk edilen veya bu kliniklerde tanı konulan hastaların verilerini retrospektif olarak gözden geçirdik. Smear veya kolposkopik biyopsi sonuçlarından herhangi birinde eksiklik olan hastalar çalışma dışı bırakıldı. Toplamda çalışma grubu olarak 186 hasta dahil edildi. Hastalardan alınan servikal smearlar değerlendirildi ve Bethesda sistemine göre raporlandı. Yaymada endoservikal hücrelerin varlığı yayılmanın yeterliliğinin bir göstergesidir. Servikal smear sonucu; atipik skuamöz hücreler, bilinmeyen (ASCUS), düşük dereceli servikal intraepitelyal lezyon (LSIL) ve yüksek dereceli servikal intraepitelyal lezyon (HSIL), olan hastalar ile HPV pozitif hastalar kolposkopiye yönlendirildi. HPV tiplerinden 16, 18, 31 ve 33 olanları yüksek riskli, diğerlerini düşük riskli olarak çalışmamızda grupladık. Kolposkopik muayeneler 40 kat büyütme özelliğine sahip, yeşil filtresi olan, binoküler Olympus OCSS-BA marka kolposkop ile yapıldı. Serviks serum fizyolojik ile yıkandıktan sonra atipik damarlanma açısından yeşil filtre ile tarandı, ardından %3'lük asetoasetik asit servikse uygulandı. Bir dakikalık maruziyet sonrası serviks aseto-white görünüm açısından tarandı. Ardından Lugol solüsyonu ile serviks boyandı ve Lugol tutulumu olmayan alanlar kayıt edildi. Aseto-white alan varlığı, atipik damarlanma izlenen bölgelerden ve lugol ile boyanmayan bölgelerden biyopsiler alındı ve alınan materyal patolojiye gönderildi. Patolojik görünüm saptanmayan hastalardan da kontrol biyopsi alındı. Patoloji sonuçlarından en yüksek dereceli lezyon, hastanın patoloji sonucu olarak değerlendirildi.

Hastaların yaşları, obstetrik öyküleri, beden kitle endeksi, menopozal durumları, sigara kullanımı, kontrasepsiyon durumu, kaç kadrandan biyopsi yapıldığı ve kolposkopi sırasında alınan biyopsilerin sonuçları kaydedildi.

Etik Kurul

Bu çalışma için Amasya Üniversitesi Girişimsel Olmayan Etik Kurulu tarafından 02/05/2019-5/28 numaralı etik izin alınmıştır ve çalışma retrospektif olarak planlanmıştır.

İstatistiksel Analiz

Tüm analizler SPSS v26 programında yapıldı (SPSS Inc., Chicago, IL, USA). Nicel verilerin normal dağılıma uygunluk kontrolü Kolmogorov- Smirnov testi ile yapıldı. Normal dağılıma uygun olan sürekli değişkenlerin tanımlayıcı istatistikleri ortalama ± standart sapma şeklinde, diğer değişkenlerin ise ortanca şeklinde verildi. Kategorik verilerin sunumunda sıklık ve yüzde değerleri tercih edildi. Kategorik verilerin analizinde Ki-kare testi kullanıldı. $p<0,05$ değerleri istatistiksel olarak anlamlı kabul edildi.

BULGULAR

Çalışmada bulunan 186 hastanın 74'ü (%39,7) menopozdaydı. 112 hasta (%60,2) reprodüktif dönemdeydi. Çalışmaya dahil edilen hastaların yaş ortalaması 45,79±10,58, parite 3,01±1,47, BMI 27,66±3,27 kg/m^2 idi. Hastaların 97'si (%52,2) herhangi bir korunma yöntemi ile koru-

nuyordu. En sık rahim içi araç (%15,6) ve tubal ligasyon (%12,4) ile hastalar korunuyordu. 89 hasta (%47,8) herhangi bir korunma yöntemi kullanmıyordu. Kolposkopi yapılan hastaların 103'ünde (%55,3) HPV pozitifliği saptanması nedenli kolposkopi yapıldı. ASCUS nedenli kolposkopi yapılan hastalar 35 (%18,8) kişiydi. Servikal erozyon nedenli 33 hastaya (%17,7), LSIL nedenli 12 hastaya (%6,5) HSIL nedenli 3 hastaya (%1,6) kolposkopi yapıldı. Endikasyon nedenli kolposkopi yapılan hastalar **Tablo 1**'de gösterilmiştir.

Tablo 1: Hastaların kolposkopi endikasyonları, smear sonuçları ve patoloji sonuçlarının dağılımı

Parametre	n (%)
Endikasyon	
HPV pozitifliği ve/veya smear sonucuna göre	156 (%82,3)
Şüpheli servikal lezyon	33 (%17,7)
Smear sonucu	**n(%)**
Malignite izlenmedi	121 (%65,1)
HSIL	4 (%2,2)
LSIL	16 (%8,6)
ASCUS	45 (%24,2)
Patoloji sonucu	**n(%)**
Benign*	134 (%72)
CIN1	33 (%17,7)
CIN2	12 (%6,5)
CIN3	7 (%3,8)

HPV: Human papilloma virüs, HSIL: Yüksek dereceli intraepitelyal lezyon, LSIL: Düşük dereceli intraepitelyal lezyon, ASCUS: Önemi belirsiz tipik olmayan yassı hücreler, CIN: Servikal intraepitelyal neoplazi, *: servisit, benign endoservikal doku,skuamöz metaplazi, endoservikal polip; n: Hasta sayısı

Kolposkopi yapılan hastaların alınan biyopsilerinin patoloji sonuçlarına bakacak olursak 134'ü (%72) benign olarak geldi. Benign sonuç olarak servisit, benign endoservikal doku, skuamöz metaplazi, endoservikal polip tanılarını aldık. Kolposkopi sonrası patoloji sonuçlarının dağılımı da Tablo 1'de gösterilmiştir.

Kolposkopi yapılan hastaların 103'üne HPV nedenli kolposkopi yapılmıştı. Bu hastaların 82'si yüksek riskli HPV grubundaydı. 83 hastaya HPV taraması yapılmamıştı.

Smear sonuçları ile kolposkopik biyopsi sonuçları **Tablo 2**'de gösterilmektedir. Smear sonucu malignite izlenmedi olarak gelen 121 hastanın kolposkopik biyopsi sonuçları değerlendirildiğinde 94 hastanın kolposkopik biyopsi sonucu benign olarak gelirken 19 hastada CIN1 (%15,7), 6 hastada CIN2 (%5), 2 hastada CIN3 (%1,7) saptandı.

Smear sonucuna göre LSIL gelen hastaların %25'inde ileri düzeyde epitelyal anomali (CIN 2 ve 3) gözlenirken, HSIL olan hastalarda bu oran %50 olarak tespit edilmiştir (Tablo 2). ASCUS saptanan olgularda ise bu oran %10,3 olarak gözlenmiştir. Hastalara kolposkopi esnasında asetoasetik asit ve lugol uygulanarak uygun biyopsi alanları tespit edilmeye çalışılmıştır.

Toplam 171 hastada asetoasetik asit kullanılırken asetowhite alan pozitifliği olan 123 hastanın %31'inde servikal intraepitelyal neoplazi saptanmıştır.

Tablo 2: Smear sonuçları ile kolposkopik biyopsi sonuçlarının karşılaştırılması

Smear sonucu	Patoloji sonucu n (%)				Toplam
	Benign	CIN1	CIN2	CIN3	
Malignite izlenmedi	94 (%77,7)	19 (%15,7)	6 (%5)	2 (%1,7)	121 (%100)
HSIL	2 (%50)	0 (%0)	1 (%25)	1 (%25)	4 (%100)
LSIL	6 (%37,5)	6 (%37,5)	2 (%12,5)	2 (%12,5)	16 (%100)
ASCUS	32 (%72)	8 (%17,7)	3 (%6,5)	2 (%3,8)	45 (%100)
Toplam	134 (%72)	33 (%17,7)	12 (%6,5)	7 (%3,8)	186 (%100)

HSIL: Yüksek dereceli intraepitelyal lezyon, LSIL: Düşük dereceli intraepitelyal lezyon, ASCUS: Önemi belirsiz tipik olmayan yassı hücreler, CIN: Servikal intraepitelyal neoplazi, n: Hasta sayısı

Hastaların HPV sonuçları ile smear ve kolposkopik biyopsi sonuçları ayrı ayrı karşılaştırılmıştır. Smear sonuçları ile HPV test sonuçlarının karşılaştırılmasında düşük ve yüksek riskli HPV tipleri açısından belirgin bir farklılık tespit edilememiştir **(Tablo 3)**. Bunun yanısıra; HPV tipleri ile kolposkopik biyopsi sonuçları karşılaştırıldığında yüksek riskli HPV tipleri ile %37,8 oranında CIN 1, 2 ve 3 tespit edilirken, düşük riskli grupta bu oran %9,5 olarak bulunmuştur ($p<0.016$, Tablo 3). Ayrıca düşük riskli grupta CIN 3 düzeyinde lezyon hiç gözlenmemiştir.

Tablo 3: HPV test sonuçlarının smear ve biyopsi sonuçları ile karşılaştırılması

HPV Tipi	Smear sonucu; n (%)					
	Malignite izlenmedi	HSIL	LSIL	ASCUS	Toplam	p
Düşük riskli HPV grubu	18 (%85,7)	0 (%0)	1 (%4,8)	2 (%19,5)	21 (%100)	
Yüksek riskli HPV grubu	69 (%84,1)	1 (%1,2)	3 (%3,7)	9 (%11)	82 (%100)	0.861
	Patoloji sonucu; n(%)					
	Benign	**CIN1**	**CIN2**	**CIN3**	**Toplam**	**p**
Düşük riskli HPV grubu	19 (%90,5)	1 (%4,8)	1 (%4,8)	0 (%0)	21 (%100)	
Yüksek riskli HPV grubu	51 (%62,2)	19 (%23,2)	8 (%9,8)	4 (%4,9)	82 (%100)	0.016

HPV: Human papilloma virüs, HSIL: Yüksek dereceli intraepitelyal lezyon, LSIL: Düşük dereceli intraepitelyal lezyon, ASCUS: Önemi belirsiz tipik olmayan yassı hücreler, n: Hasta sayısı

TARTIŞMA

Bu çalışmada kliniğimize başvuran, pap smear sonucu LSIL, HSIL ve ASCUS tespit edilen ayrıca HPV testi pozitif olarak saptanan hastalara uygulanan kolposkopik biyopsilerin patolojik sonuçlarını ve bunların ilişkilerini sunmayı amaçladık. Çalışmamızda LSIL bulunan hastalarda CIN II-III %25 oranında gözlenirken HSIL bulunan hastalarda ise CIN II-III %50 oranında tespit edilmiştir. Beklendiği şekilde yüksek grade sahip intraepitelyal lezyonlarda ve HPV pozitifliği durumlarında daha ileri derecede intraepitelyal neoplazi saptanmıştır. Pap smear sonucunda elde edilen

patolojik bulguların ve de özellikle yüksek riskli HPV pozitifliği durumlarının kolposkopik incelemeyle değerlendirilmesi gerekmektedir.

CIN, tedavisiz bırakılırsa serviks kanserine ilerleme potansiyeline sahip bir lezyondur. Bu dönüşüm sitolojik anormalliğin türünün derecesi ile koreledir (7, 8). Saptanan düşük dereceli displazilerin regrese olması yüksek ihtimalken, yüksek dereceli olanlar servikal kansere ilerleme oranı çok yüksektir. Smear taramasının ana hedefi CIN III olgularının tespit edilmesidir (9). Sadece kolposkopik gözlem ile CIN olgularının üçte biri atlanabilmektedir. Dolayısıyla klinik pratikte kolposkopik biyopsi CIN tanısında altın standarttır (8,10 - 12).

LSIL ile human papilomavirus (HPV) enfeksiyonu birlikteliği sıktır. Yapılan bir çalışmada LSIL lezyonlarında HPV DNA pozitif olma oranı %76,6 oranındadır . ASCUS'a göre daha ileri bir lezyondur. Bu lezyona kolposkopik biyopsi gereklidir. LSIL saptanan hastalarda yapılan kolposkopik biyopside CIN II ve daha yüksek gradeli lezyon görülme sıklığı %12-16'dır (13). Çalışmamızda LSIL bulunan hastaların, kolposkopi altında alınan biyopsilerinde; CIN II-III %25 oranında tespit ettik ve bu oranlar literatür verilerine göre bir miktar yüksek olarak gözlenmiştir.

HSIL serviks kanseri açısından çok yüksek risklidir (14). Bir çalışmada HSIL bulunan hastalarda CIN II- III saptanma oranı %53-66 olarak saptanmıştır (15). Çalışmamızda HSIL saptananların biyopsi sonucunda histopatolojik olarak CIN II-III %50 oranında bulunmuştur. Biyopsilerin %50'sinde ise CIN I ve daha hafif lezyonlar tespit edilmiştir ve bu oranlar literatür ile uyumlu görünmektedir.

Saha ve Thapa (16) Pap smear sonucu patolojik olan olgulara kolposkopik biyopsi yapmış ve patolojileri karşılaştırmışlardır. Smear sonucu LSIL gelen olguların yaklaşık %90'ında CIN I mevcuttu. HSIL'de ise CIN II-III oranı %66 bulunmuştur. Bizim çalışmamızda LSIL gelen hastaların %37,5'inde CIN I, HSIL gelen hastalarda ise CIN II-III görülme oranı %50 olarak gözlenmiştir. Bu çalışmanın sonucunda LSIL ve HSIL tanılı hastalara kolposkopik muayene önerilmiştir.

Literatüre bakıldığında Pap smear sitolojik incelemenin CIN I lezyonları saptamada sensitivitesi %50-75, spesifitesi ise %80, CIN II-III lezyonlar için ise %55-90 ve %96 olarak görülmektedir (3). Ülkemizden yapılan bir çalışmadaysa kolposkopinin LSIL'yi belirlemedeki sensitivitesi %100, spesifitesi %40, pozitif prediktif değeri %40, negatif prediktif değeri %100 olarak tespit edilmiştir (17). Aynı çalışmada kolposkopinin HSIL'yi belirlemedeki sensitivitesi %87, spesifitesi %50, pozitif prediktif değeri %77, negatif prediktif değeri ise %66 olarak bildirilmiştir. Bizim yaptığımız çalışmada smear sonucu LSIL gelen hastalarımızda yaptığımız kolposkopi altında biyopsi sonuçlarının CIN I'i belirlemedeki sensitivitesi %77, spesifitesi %33, pozitif prediktif değeri %39 bulundu. Smear sonucu HSIL olan hastalarımızda yaptığımız kolposkopi altında biyopsi sonuçlarının CIN II-III belirlemesinde ki spesifitesi %67, sensitivitesi %80, pozitif prediktif değeri %50 bulundu.

Serviks kanseri ile HPV ilişkisi ispatlanmıştır ve bu maligniteye sahip olanların neredeyse tamamında HPV DNA testi pozitifliği gösterilmiştir (18). Dünya genelinde HPV DNA prevalanslarının çok değişken olduğu görülmüştür (19 - 21). HPV enfeksiyonunun prevalansı, kullanılan yöntem, alınan örneğin kalitesi, çalışmadaki hasta grubu ve o grubun sosyoekonomik düzeyi gibi faktörlere göre değişmektedir.

Ülkemizde yapılan beş farklı bölgeden normal servikal sitolojiye sahip 587 (15- 68 yaş) kadında HPV pozitifliği %17,9 olarak bulunmuştur (22). Çalışmamızda HPV 16 ve/veya 18 saptanan hastaların %62,2'sinde, diğer HPV türleri saptanan hastaların ise %90,5'inde normal patolojik inceleme sonuçlarına rastlanmıştır. Çalışmamızda hastaların düşük veya yüksek riskli HPV pozitifliği olma durumları ile smear ve biyopsi sonuçları ayrı ayrı karşılaştırılmıştır. Bu değerlendirmede HPV tipleri ile smear sonuçları arasında tespit edilen patoloji açısından istatistiksel bir fark bulunamazken; HPV tipleri ile biyopsi sonuçlarının karşılaştırılmasında ise daha yüksek riskli HPV pozitifliği olan hastalarda daha ileri lezyonların gözlendiği tespit edilmiştir. Bu durum da özellikle yüksek riskli HPV pozitifliği olan hastalarda sadece smear incelemesinin yeterli olmadığı smear incelemesinden bağımsız olarak bu olgularda servikal biyopsinin net şekilde önerilmesi gerektiğini ortaya koymaktadır (23). Çalışmamızda smear sonuçları ile serviks biyopsi sonuçları karşılaştırıldığında; malignite izlenmeyen hastaların %77,7'sinde patoloji sonucu benign

olarak gelirken %6,7'sinde CIN II-III gözlenmiştir. En sık görülen patolojik smear sonucu ise ASCUS olarak tespit edilmiştir (%24,2). Branca ve ark. tarafından yapılan bir çalışmada (24) da çalışmamızla paralel bir şekilde en sık servikal smear sonucu ASCUS (%37), ikinci sırada LSIL (%26) ve ardından HSIL (%4,9) tespit edilmiştir.

Çalışmamız sonucunda; smearin bir tanı testi olmadığı, LSIL veya HSIL varlığında mutlak kolposkopik biyopsi ile tanının doğrulanması gerektiği anlaşılmaktadır. Ayrıca özellikle yüksek riskli HPV tiplerinin pozitifliği tespit edilen olgularda smear sonucundan bağımsız olarak da kolposkopik biyopsinin önemi anlaşılmaktadır. Anormal sitoloji sonucu içeren smear testi sonucunda serviksin kolposkopi yardımı ile muayenesi; lezyon tespiti ve uygun yerden biyopsi alınmasına yardımcı olur ve böylece var olan bir hastalığı atlamamış olur ayrıca gereksiz müdahalelerden kaçınmış oluruz.

Sonuç olarak serviks kanserini uygun aralıklarla yapılan smear kontrolleri ile erken dönemde saptayıp tedavi edebilmek mümkün görünmetedir. Tüm toplum serviks kanserine karşı bilgilendirilmelidir. Servikal tarama programları belirli aralıklarla uygun olan tüm popülasyonu kapsamalı ve serviks kanseri tespit edilecek en erken dönemde tespit edilmelidir.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

COVID-19 SÜRECİNDE CERRAHİ HEMŞİRELERİNİN MENTAL SAĞLIĞI VE UYKU KALİTESİ

MENTAL HEALTH AND SLEEP QUALITY OF SURGICAL NURSES DURING THE COVID-19 PROCESS

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ÖZET

AMAÇ: Yeni Korona virus (COVID-19) salgının ortaya çıkışı, her yaştan bireyler olmak üzere cerrahi hemşirelerinin mental sağlığını oldukça etkilemiştir. Bu çalışma COVID-19 salgını sırasında Türk cerrahi hemşirelerinin öz bildirimlerine dayalı olarak mental sağlık ve uyku kalitelerini araştırmayı amaçlamıştır.

GEREÇ VE YÖNTEM: Çalışma verileri, 10 Mayıs - 10 Haziran 2020 tarihleri arasında 453 cerrahi hemşiresinin katılımıyla web tabanlı çevrimiçi kartopu yöntemiyle toplanmıştır. Verilerin toplanmasında Hemşire Bilgi Formu, Yaygın Anksiyete Bozukluğu-7 (GAD-7) ölçeği, CES-Depresyon Ölçeği (CES-D) ve Pittsburg Uyku Kalitesi İndeksi (PSQI) ile kullanılmıştır.

BULGULAR: Cerrahi hemşirelerin %77,3'ünün COVID-19'lu hastaya bakım verdiği ve %2'sinin COVID-19 hastalığını geçirdikleri saptanmıştır. Cerrahi hemşirelerin %76,2'si pandemi sürecinden olumsuz etkilendiğini ve %56,2'si kendisine virüs bulaşmasından korktuğunu ifade etmiştir. Cerrahi hemşirelerinin, CES-D puan ortalaması 27,8±12,5, GAD-7 puan ortalaması 8,7±5,1 ve *PSQI* puan ortalamasının 10,4±3,5 olduğu belirlenmiştir. *PSQI* ile CES-D ve GAD-7 düzeyleri arasında pozitif yönde ve orta büyüklükte bir ilişki olduğu bulunmuştur (sırasıyla; r=0,558; r=0,554; p<0,001).

SONUÇ: Hemşirelerin depresyon belirtileri gösterdiği, hafif düzeyde anksiyete yaşadıkları ve kötü uyku kalitesine sahip olduğu belirlenmiştir. Hemşirelerin kötü uyku kalitesinin anksiyete ve depresyon belirtileri ile ilişkili olduğu bulunmuştur.

ANAHTAR KELİMELER: Mental sağlık, Anksiyete, Stres, Depresyon, COVID-19

ABSTRACT

OBJECTIVE: The outbreak of new coronavirus disease (COVID-19) has affected the mental well-being of individuals of all ages, especially surgical nurses. This study aimed to explore the association between self-reported mental health and subjective sleep quality of the Turkish surgical nurses during the COVID-19 pandemic.

MATERIAL AND METHODS: Data were collected from N = 453 surgical nurses using online snowball sampling through social media between May 10 and June 10, 2020, during the COVID-19 pandemic. The data were collected using the Nurse Information Form, the Generalized Anxiety Disorder-7 Scale (GAD-7), and the Center for Epidemiologic Studies Depression Scale (CES-D), and The Pittsburgh Sleep Quality Index (PSQI).

RESULTS: While 77.3% of them were determined to provide care to patients with COVID-19, and 2.0% of them had a positive COVID-19 test. A total of 76.2% of surgical nurses were stated to be negatively affected by the pandemic process and 56.2% of them were scared of infecting someone else with the virus. Surgical nurses had a mean GAD-7score of 8.7±5.1, a mean CES-D score of 27.8±12.5, and a mean PSQI score of 10.4±3.5. A positive and moderate level of relationship was found between PSQI and CES-D and GAD-7 levels (r=0.558; r=0.554; p<0.001, respectively).

CONCLUSIONS: The surgical nurses were found to show signs of depression, had mild anxiety and had poor sleep quality. The poor sleep quality of the surgical nurses was found to be associated with anxiety and depression symptoms.

KEYWORDS: Mental health, Anxiety, Stress, Depression, COVID-19.

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INTRODUCTION

Coronavirus disease (COVID-19), discovered first in Wuhan, China at the end of 2019, is an infectious disease caused by a coronavirus (1) and in Turkey, the first case was reported to be seen on March 10, 2020 (2). As of 18 February 2021, While The World Health Organization (WHO) reported 109,594,835 confirmed cases and 2,424,060 deaths worldwide (1), the Ministry of Health in Turkey reported a total of 2,609,359 confirmed cases with 27,738 deaths and it is projected that COVID-19 cases will continue in the coming years (2, 3). Out of more than 1.1 million healthcare professionals in our country, those who tested positive for COVID-19 passed the 120 thousand and the total number of deaths from these cases was reported to be 216 (3). To meet the intensive care needs associated with COVID 19 in Turkey, all the second tertiary care hospitals with adult intensive care beds were converted to a "pandemic hospital". During the pandemic period in Turkey, elective surgeries were suspended in hospitals, and even the operating rooms and surgical ICUs were converted into COVID-19 ICUs. Operating room or surgical nurses, working in different areas, also were assigned to provide care for patients receiving treatment in COVID-19 inpatient units and ICUs and in need of respiratory support (4). Surgical nurses, especially used to providing bedside nursing care to their patients, had to follow their patients in distance from outside the room during the pandemic process. This situation is known to challenge surgical nurses by creating “feelings of inadequacy” (4, 5).

During the COVID-19 pandemic process, nurses worked in pandemic wards and ICUs in 16 and 24-hour day and night shifts for at least two months. In the first two months of the pandemic, nurses used two weeks of leave after the two-week work period. Nurses and other healthcare professionals were not only exposed to the stress of the pandemic at the highest level and but also had to cope with the psychological consequences for a long time. Facing the COVID-19 virus, a novel infectious disease infecting millions of people worldwide and without any known cure, is causing stress to individuals, especially healthcare professionals. This increased stress can cause high levels of anxiety and ultimately affect the sleep quality and problem-solving skills of nurses negatively, and cause deterioration in their quality of life (6). Psychological distress, disruptions in sleep quality, can be significant for nurses and other healthcare professionals who provide direct care to patients with COVID-19. It is important to best support nurses, identify the psychological. This study aimed to examine the anxiety, depression levels, and sleep quality of the surgical nurses during the COVID-19 pandemic, their relations with each other, and the factors affecting them.

MATERIALS AND METHODS

Study Design and Participants

For this descriptive and cross-sectional study, an online questionnaire using a snowball sampling method and send via social media was used. The population of this study consisted of surgical nurses working in either public or private health institutions in the 15 largest cities of Turkey. While calculating the number in the sample of the study, similar studies (100-294 participate) conducted were taken as a reference (3, 7, 8).

The study included 453 surgical nurses who accepted to participate in the study without performing a sample selection, over the age of 18, working in surgical wards. The online questionnaire opened on 10 May 2020 for the participants and closed on 10 June 2020. The nurses who, during the COVID-19 pandemic process, were on leave, on sick leave, or retired were asked not to participate in the questionnaire.

Instruments

1. The Nurse Information Form, prepared by the researchers consists of 18 questions about surgical nurses' socio-demographic features (age, gender, marital, education, etc.), institutional information (health institution, working year, unit of work, etc.) and information on the COVID-19 process (9).

2. The Center for Epidemiologic Studies Depression Scale (CES-D) is a brief self-report scale developed by the American National Institute of Mental Health to assess depressive symptoms. The CES-D consists of 20 items, 4-point Likert type, and each item is scored from 0 (never-ra-

rely) to 3 (mostly-all the time). The total score can range from 0 to 60, and higher scores indicate depression. A score of 16 and above is considered a clinical sign of depression according to American standards. The Cronbach alpha value of the scale is 0.88 (10). The validity and reliability of the CES-D scale in Turkish was performed by Tatar and Saltukoğlu (2010). The Cronbach alpha coefficient was found to be 0.89. Therefore, a score of 16 points or above is a sign of depression according to Turkey norms (11). The Cronbach's alpha internal consistency of CES-D was found to be 0.748. The Cronbach alpha coefficient for this study was found to be 0.921.

3. The Generalized Anxiety Disorder-7 Scale (GAD-7), developed by Spitzer et al. (2006), consists of 7 items with a 4-point Likert type. It is a brief self-report questionnaire that evaluates generalized anxiety disorder. It is a scale that evaluates experiences in the last 2 weeks (0 = not at all, 1 = several days, 2 = more than half of the days, 3 = nearly every day). Points of 5, 10, and 15 total scores that can be obtained from the scale are the cut-off points for mild, moderate, and severe anxiety, respectively. The GAD diagnosis of patients with a total score of 10 or more should be investigated and confirmed by other methods (12). The Turkish validity and reliability study was performed by Konkan et al. (2013). The Cronbach Alpha coefficient of the Turkish version of the scale was found to be 0.852 (13). The Cronbach's alpha internal consistency of GAD-7 was found to be 0.797. The Cronbach alpha coefficient for this study was found to be 0.920.

4. The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse et al. in 1989, is a self-report scale measuring sleep quality to define good and poor sleep in one month. A PSQI score greater than 5 was determined to have a sensitivity of 89.6% and a specificity of 86.5% in distinguishing between good and bad sleepers (14). The scale consists of a total of 24 questions, 19 of which are self-assessment questions, and 5 of which have answers of the bed partner or roommate of the individual. These five questions are not considered during the calculation of the index score (7). PSQI contains seven components. Each item is scored from 0 to 3. The sum of the seven component scores gives the total index score which ranges from 0 to 21. Higher total scores indicate poor sleep quality (15).

The Turkish validity and reliability study of the PSQI was performed by Ağargün et al. (1996). The Cronbach's alpha internal consistency of PSQI was found to be 0.726. The cutoff value indicating poor sleep quality in Turkish society is ≥ 5 (16). The Cronbach alpha coefficient for this study was found to be 0.725.

Procedure

The online questionnaire forms were shared with the surgical nurses online on the web due to the pandemic conditions. For four weeks, the questionnaire forms were shared via social media such as WhatsApp, Instagram, Facebook, and nurses were invited to participate (https://docs.google.com/forms/d/e/1faıpqlscx5zz-bpvw2skkotaldk0lfwcoxa8c61rfjqft_ylxtxıwqa/viewform?vc=0&c=0&w=1). The data of the study were obtained based on the self-report of the nurses. Standardizations were made while creating the online form for the surgical nurses participating to answer the questionnaire only once. Online data was checked daily. The time to complete the online questionnaire was about 15 minutes. A total of 51 questionnaires that were either not fully completed or were spent more than 30 minutes to complete were excluded from the study.

Ethical Committe

Written permission (12-32-51 numbered and 05.11.2020 dated) was obtained from the Health Ministry, COVID-19 Scientific Research Evaluation Commission, and ethical permission (2020/05- E.23370) from Afyon Kocatepe University Social and Human Sciences Scientific Publication Ethics Committee. The participants in the study approved the consent form by clicking the " I accept " statement to proceed with the online questionnaire.

Statistical Analysis

IBM SPSS Statistics 22 (IBM SPSS, Turkey) program was used in the data analysis. In the evaluation of the data, The Kolmogorov-Smirnov test for the normal distribution of the variables, descriptive statistics (mean, standard deviation, frequency, and percentage), Independent two-sample t-test, One-way analysis of variance, Logistic regression, and Pearson's correlation coefficient was used. The statistically significant alpha level was accepted as $p<0.05$.

RESULTS

Sociodemographic Characteristics of Surgical Nurses and Their Status Related to COVID-19

The mean age of the surgical nurses was 32.67 ± 8.09 years, 84.1% of them were women, 52.1% were married and 74.4% had undergraduate degrees. It was found that 45% of the nurses had more than 10 years of working experience, 44.6% were working in the intensive care unit and 65.5% were working in the day-night shift. A total of 80.8% of the surgical nurses were found to have four or more night shifts per month, 77.3% provided care to patients with COVID-19, 70.2% received training about COVID-19, and 2.0% tested positive for COVID-19. A total of 76.2% of nurses stated to be negatively affected by the pandemic process and 56.2% of them were scared of infecting someone else with the virus **(Table 1)**.

Table 1: Distribution according to surgical nurses' some individual characteristics (n=453)

	Group	n	%
Gender	Female	381	84.1
	Male	72	15.9
Marital Status	Single	217	47.9
	Married	236	52.1
Education	Collage	43	9.5
	University	337	74.4
	Master	73	16.1
Hospital	State	348	76.8
	University	64	14.1
	Private	41	9.1
Unit	Surgical Ward and Operating Room	157	27.4
	Intensive Care Unit	202	44.6
	Emergency Unit	94	20.8
Working Years	< 5 years	147	32.5
	5-10 years	102	22.5
	>10 years	204	45.0
Shift Types	Day (08.00-16.00)	105	23.2
	Night (16.00-08.00)	51	11.3
	Day and night	297	65.5
Night Shift	No	50	11.0
	1-3 times	37	8.2
	≥ 4 times	366	80.8
COVID-19	Yes	350	77.3
	No	100	22.1
COVID 19' Training	Next month	3	0.7
	Yes	318	70.2
COVID-19 Test	No	135	29.8
	Yes, COVID 19 (+)	9	2.0
	Yes, COVID 19 (-)	295	65.1
	No test	149	32.9
Negatively affect the Pandemic	Yes	345	76.2
	No	16	3.5
	Partly	92	20.3
Causes of Fear about Pandemic	Risk of contamination	93	20.5
	Stay away from my family	73	16.1
	Not being able to see my kids	20	4.4
	Risk of transmission	254	56.2
	Other	13	2.8
	Total	453	100.0
	Age (Mean ±SD)	32.67 ± 8.09	

Surgical nurses had mean score of 8.7±5.1 (min=0, max= 21) from the GAD-7, 27.8±12.5 (min=0, max=57) from the CES-D and 10.4 ± 3.5 (min=1, max= 21) from the PSQI (Table 2). The nurses were observed to experience sleep onset latency the most (3.4 ± 1.3; min = 0 - max = 3). A total of 83.7% of the nurses were determined to have a depressive mood along with somatic symptoms of depression. Furthermore, 38.0% of them were found to have anxiety symptoms **(Table 2**).

Table 2: Descriptive statistics of the GAD-7, CES-D and PSQI Scales (n=453)

Scale	Subscales and Groups	Min-Max cut-off points	¥Mean± SD ψn (%)
GAD-7	Total GAD-7	0-21	8.7±5.1¥
	No anxiety	< 10	281 (62.0)ψ
	Anxiety	≥ 10	172 (38.0)ψ
CES-D	Total CES-D	0-57	27.8±12.5¥
	No symptoms	< 16	74 (16.3)ψ
	Symptoms	≥ 16	379 (83.7)ψ
PSQI	C1; Subjective sleep quality	2-4	2.8±0.6¥
	C2; Sleep latency	1-6	3.4±1.3¥
	C3; Sleep duration	0-3	1.2±1.1¥
	C4; Habitual sleep efficiency	0-3	0.1±0.5¥
	C5; Sleep disturbances	0-3	2.4±0.7¥
	C6; Use of sleep-promoting medications	0-3	0.2±0.7¥
	C7; Daytime dysfunction	1-3	0.2±0.7¥
	Total PSQI	2-21	10.4±3.5¥
	Good sleep PSQI	< 5	15 (3.3)ψ
	Bad sleep	> 5	438 (96.7)ψ

GAD-7: Generalized Anxiety Disorder-7; CES-D: Center for Epidemiologic Studies Depression; PSQI: Pittsburgh Sleep Quality Index; SD: Standard Deviation

Relations of Sociodemographic Characteristics With Mental Health and Sleep Quality

There was a statistically significant difference in terms of GAD-7, CES-D and PSQI mean scores of women compared to men ($p<0.05$). Women had higher GAD-7, CES-D and PSQI mean scores than men. The married surgical nurses had higher PSQI mean scores compared to unmarried surgical nurses and this difference was statistically significant ($t = 2.037$, $p = 0.042$). Between another variables (age, educational status, years of experience) and GAD-7, CES-D, and PSQI mean scores were not found statistically significant difference. There was a statistically significant difference between the CES-D and PSQI mean scores according to the type of shift the surgical nurses had ($p <0.05$) and the surgical nurses working in the day shift had higher mean scores.

There was a statistically significant difference between those who had in-service training on COVID-19 and those who did not, in terms of GAD-7, CES-D and PSQI mean scores ($p <0.05$). Those who do not have in-service training had higher GAD-7, CES-D and PSQI mean scores. The relations of potential impact factors with GAD-7, CES-D, and PSQI are being a woman was a risk factor associated with anxiety (OR = 3.01, % 95 CI: 1.58-5.75) and depression (OR = 2.75, % 95 CI: 1.43–5.28) levels. Working at Not having night shift was a risk factor associated with depression (OR = 0.37, % 95 CI: 0.16–0.84) in-service training on COVID-19 was a risk factor for anxiety (OR = 0.51, % 95 CI: 0.33-0.80) levels **(Table 3)**.

Table 3: Comparison according to individual characteristics of anxiety, depression levels and sleep quality of surgical nurses (n=453)

	Variables	GAD-7 Mean ±SD	CES-D Mean ±SD	PSQI Mean ±SD
Age	≤ 30	8.4±4.9	27.8±12.6	10.5±3.6
	> 30	8.9±5.2	27.8±12.3	10.3±3.3
		p=0.308	p=0.999	p=0.528
Gender	Female	9.0±5.0 (3.01ψ)	29.0±12.1(2.75ψ)	10.6±3.5
	Male	6.7±4.8	21.7±12.7	9.3±3.1
		p<0.001*	p<0.001*	p=0.003*
Marital Status	Single	8.6±5.0	28.5±12.6	10.8±3.5
	Married	8.7±5.2	27.1±12.3	10.1±3.4
		p=0.747	p=0.221	p=0.042*
Education	Collage	8.6±5.4	26.5±12.4	10.7±3.9
	University	8.6±5.0	27.9±12.3	10.3±3.4
	Master	9.0±5.1	27.9±13.4	10.8±3.6
		p=0.880	p=0.785	p=0.411
Hospital	State	8.7±5.2	28.1±12.9	10.4±3.5
	University	9.0±5.0	27.5±10.7	10.6±3.1
	Private	8.2±4.5	25.9±11.6	10.3±3.9
		p=0.723	p=0.577	p=0.856
Unit	Surgical ward and operating room	9.0±4.8	28.9±11.9	10.4±3.6
	Intensive care unit	8.5±5.0	27.2±12.7	10.5±3.3
	Emergency unit	8.5±5.1	27.4±12.9	10.2±3.6
		p=0.623	p=0.423	p=0.757
Working years	< 5 years	8.1±4.4	27.1±11.8	10.4±3.5
	5-10 years	8.7±5.4	28.1±13.4	10.4±3.5
	>10 years	9.0±5.3	28.2±12.5	10.4±3.5
		p=0.286	p=0.718	p=0.996
Shift types	Day (08.00-16.00)	8.7±5.2	26.3±11.4	10.0±3.4
	Night (16.00-08.00)	7.6±4.5	24.9±11.5	9.0±3.0
	Day and Night	8.9±5.1	28.8±12.9	10.8±3.5
		p=0.293	p=0.044*	p=0.002*
Night shift (in months)	No	8.2±5.3	27.2±12.5	10.0±3.3
	1-3 times	9.4±4.9	25.0±9.7	10.1±3.5
	≥ 4 times	8.7±5.1	28.2±12.7	10.5±3.5
		p=0.553	p=0.307	p=0.550
COVID-19 clinic	Yes	8.9±5.2	28.2±12.9	10.5±3.4
	No	8.0±4.7	26.8±11.1	10.1±3.7
	Next month	8.0±3.4	20.0±8.1	10.0±3.6
		p=0.361	p=0.337	p=0.603
In-service training with COVID-19	Yes	8.2±4.8 (0.51ψψ)	26.5±12.0	10.2±3.4
	No	9.8±5.6	31.0±12.9	11.0±3.5
		p=0.005*	p<0.001*	p=0.020*

GAD-7; Generalized Anxiety Disorder-7; CES-D: Center for Epidemiologic Studies Depression; PSQI: Pittsburgh Sleep Quality Index; *P <0.05; ψ Logistic regression OR result for women with respect to men; ψ ψ Logistic regression OR result of training objectives regarding COVID-19 compared to those who could not

The Relationship of Depression and Anxiety With Sleep Quality

Pearson's correlation coefficient was used to determine the relationship of anxiety and depression levels in participants with sleep quality. It was observed that there was a moderate positive relationship between the sleep quality of the surgical nurses and both their depression levels (r =0.558, p<0.001) and anxiety levels (r= 0.554, p<0.001). A moderate positive relationship was determined to be between the anxiety and depression levels of the nurse (r=0.554, p<0.001) **(Table 4)**.

Table 4: Relationships between anxiety, depression levels and sleep quality of surgical nurses

	GAD-7		CES-D		PSQI	
	r	p	r	p	r	p
GAD-7	1		0.745	<0.001	0.554	<0.001
CES-D	0.745	<0.001	1		0.558	<0.001
PSQI	0.554	<0.001	0.558	<0.001	1	

GAD-7; Generalized Anxiety Disorder-7; CES-D: Center for Epidemiologic Studies Depression; PSQI: Pittsburgh Sleep Quality Index; r:Pearson correlation coefficient

DISCUSSION

The results showed anxiety, a prevalence of depression, and deterioration in sleep quality among surgical nurses who provided care to suspicious or confirmed COVID-19 patients in this study. Among the surgical nurses in this study, mild anxiety was prevalent (38%) and worrying depression (83.7%), and deteriorated sleep quality (96.7%). The scores obtained from GAD-7, CES-D, and PSQI were all correlated with each other, emphasizing that anxiety and depression have a major impact on sleep disorders and the effect on positive or negative sleep quality when perceived levels of anxiety and depression increase or decrease.

More than half of the nurses participating in the this study provided care to patients diagnosed with COVID-19, and 2.0% of them were infected with COVID-19. It has been reported in the literature that the rate of transmission of infection among healthcare professionals in the world is between 3.8-29% (17).

In this present study, the anxiety level was determined to be moderate among surgical nurses during the pandemic process. The moderate level of anxiety prevalence among nurses in our study sample was significant (33.23%), but not higher than in studies with nurses in general (7, 18). The fact that high levels of depression symptoms were observed among the nurses participating in the study was worrying. As a result of the studies conducted with different scales with validity in the pandemic process, nurses were observed to experience depression symptoms at a higher level, anxiety at a mild/ moderate level and very severe symptoms were less common among the participants (19 - 21). Similar to the results of these studies, we can state that the anxiety and depression disorders observed in nurses are related to the COVID-19. Having compared the study findings with national and international studies conducted before the pandemic, the mean score and prevalence of depression among nurses before the pandemic was seen to be quite low, while the mean scores of anxiety were at a low level (22, 23). Healthcare professionals can be expressed to feel uneasy and anxious especially when they were unable to explain or control the increasingly suspected or diagnosed cases that had an impact on their psychology. Besides, in process of the COVID-19 pandemic, nurses had to isolate themselves from their loved ones after shifts. A study conducted in Australia identified social distance due to restrictions as an extra element of stress to the work-related challenges caused by the pandemic (24). However, surgical nurses

are known to experience a variety of difficulties due to their experience and skills during the pandemic process, as well as differences in patient care and work environment. Working with a constantly changing team, formed by different doctors, nurses, etc. every month, leads to difficulties in team communication, harmony, and cooperation (4). The limited experience of surgical and operating room nurses in the care of COVID-19 patients is thought to cause them to have difficulties and their stress levels to increase.

The PSQI mean score of surgical nurses in this study was 10.4 and the reported prevalence of poor sleep quality was (96.7%), and the mean PSQI value was found to be higher compared to the mean values of front-line nurses in other studies (7, 18, 19). The possible reason for the high prevalence of sleep disorder among nurses in our study might be related to the fact that this study happened a lot of uncertainties about COVID-19 in the first three months.

In this present study, the gender variable, potentially, was determined to be a predictive factor of depression, anxiety, and sleep quality among surgical nurses. In this study, the prevalence rate of anxiety and depression was found to be higher in female nurses, probably reflecting the already established gender variable for anxiety and depressive symptoms. This finding is coherent with similar studies (19 - 21). Overall, these findings showed that during the pandemic women were more vulnerable to symptoms of anxiety, depression and sleep disorders than men, as noted in earlier studies (21, 25) and therefore they experience more sadness and anxiety (20). However, there are also studies with results different from these results (6, 8, 15).

As a result of the sub-analysis for the present study, depression, anxiety, and sleep quality were seen to be negatively affected among surgical nurses who worked in the COVID-19 ward and did not receive COVID-19 preventive training, as another potential predictive factor. In the different studies, nurses working in COVID-19 wards and the lack of training about COVID-19 to was highlighted stated to be a factor in the deteriorating psychological health of nurses (26 -28). In similarly with recent studies conducted with healthcare workers during the COVID-19 pandemic (18, 29, 30), this present study was found a positive association between sleep difficulties and symptoms of anxiety and depression among surgical nurses. In this study, a moderate relationship of anxiety and depression levels in participants with sleep quality was found, and in this sense, it was observed that anxiety and depression were the parameters that showed the highest correlation with sleep quality. The number of infected people is increasing day by day, and at the time of this study, the bed occupancy rate of pandemic hospitals was 70% and the occupancy rate has been increasing. So, during the pandemic nurses and physicians were continuously working long hours and have to do more night shifts which may have disrupted their circadian rhythm and led to break-out sleep qualities (30). In addition, nurses' insomnia and sleep difficulties during the COVID-19 pandemic are important because of their negative effect on cognition, patients monitoring, caring performance, and communication inter health workers team (30). The present study had some limitations. The first limitation was that the presence of any psychological issues of the participants was not questioned, and participants with psychological problems, albeit at a small rate, we're likely to be involved in the study. Second, the data presented here and related analyses were derived from a cross-sectional study design, it is difficult to make causal inferences. Third, it was difficult to apply a more stringent sampling method during the pandemic, therefore the snowball sampling method was used to include the participants in the study. Forth, the possibility of a selection bias could be considered due to people being unable or unwilling to participate in the online questionnaire even though they received the questionnaire link. The reliability of the study findings was limited to the responses given by surgical nurses.

The surgical nurses were determined to show symptoms of depression during the COVID-19 pandemic process, experience moderate levels of anxiety and have poor sleep quality in the present study. The anxiety and depression symptoms of the surgical nurses were found to be

associated with poor sleep quality. Hereby, this study has presented an overall picture of the psychological state of surgical nurses in Turkey and these data have the potential to contribute to future research. Detecting the psychological issues of surgical and operating room nurses during periods of pandemics, applying supportive therapies for those problems, and improving working conditions can better the quality of health services.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

PROFLAKTİK SALPİNGO-OOFOREKTOMİ YAPILAN AİLEVİ MEME VE OVER KANSER SENDROMLU HASTALARDA KLİNİK BULGULAR FARKLI MIDIR ?

ARE THE CLINICAL FINDINGS DIFFERENT IN PATIENTS WITH FAMILIAL BREAST AND OVARIAN CANCER SYNDROME WHO UNDERWENT PROPHYLACTIC SALPINGO-OOPHORECTOMY ?

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ÖZET

AMAÇ: Bu çalışmanın amacı; BRCA1/2 (breast cancer1/2) gen mutasyonu nedeniyle proflaktik cerrahi (bilateral salpingo-ooforektomi; BSO) yapılan kadınlarda demografik ve tıbbi özelliklerin BRCA1 ve BRCA2 gen mutasyonu taşıyıcıları arasında karşılaştırılmasıdır.

GEREÇ VE YÖNTEM: Kliniğimizde son 5 yıl içerisinde BRCA1/2 gen mutasyonu saptanmış ve proflaktik cerrahi (BSO) yapılmış olan 24 kadın çalışmaya alındı. BRCA1 ve BRCA2 gen mutasyonu saptanan hastalar yaş, gebelik ve doğum sayısı, vücut kitle indeksi (VKİ), Ca125 değeri, infertilite ve meme kanseri öyküsü, cerrahi şekli ve postop patoloji sonuçları açısından karşılaştırıldı.

BULGULAR: Çalışmaya alınan hastaların yaş ortalaması 45,5±5,8, VKİ 27,6±5,4kg/m^2, Ca125 değeri 17,9±14,1İÜ/ml saptanmış olup hastaların %79,2'sinde meme kanseri öyküsü mevcuttu. Hastaların %62,5'inde BRCA1 ve %37,5'inde BRCA2 gen mutasyonu mevcuttu. BRCA1 ve BRCA2 grupları arasında yapılan karşılaştırmada yaş, gebelik ve doğum sayısı, VKİ, Ca125 değeri, infertilite ve meme kanseri öyküsü, cerrahi şekli ve postoperatif patoloji sonuçları açısından her iki grup arasında istatistiksel olarak anlamlı fark saptanmadı (p>0,05). Postoperatif patolojik değerlendirme neticesinde bir hastada over kanseri (BRCA1 grubunda) saptandı.

SONUÇ: BRCA1 ve BRCA2 gen mutasyonu olan hastalarda demografik ve tıbbi özellikler açısından fark bulunmayıp, nihai patoloji sonucunda malignite çıkabileceği akılda tutulmalıdır.

ANAHTAR KELİMELER: BRCA1, BRCA2, Over, Kanser, Proflaksi

ABSTRACT

OBJECTIVE: The aim of this study was comparison of demographic and medical characteristics among BRCA1 and BRCA2 gene mutation carriers in women who underwent prophylactic surgery (bilateral salpingo-oophorectomy; BSO)due to BRCA1/2 (breast cancer1/2) gene mutation.

MATERIAL AND METHODS: Twenty-four women who were found to have BRCA1/2 gene mutations in our clinic in the last 5 years and had undergone prophylactic surgery (BSO) were included in the study. Patients with BRCA1 and BRCA2 gene mutations were compared in terms of age, number of pregnancies and births, body mass index (BMI), Ca125 value, history of infertility and breast cancer, type of surgery and postoperative pathology results.

RESULTS: The mean age of the patients included in the study was 45.5±5.8, BMI was 27.6±5.4kg/m^2, Ca125 value was 17.9±14.1IU/ml, and 79.2% of the patients had a history of breast cancer. A total of 62.5% patients had BRCA1 and 37.5% had BRCA2 gene mutations. There was no statistically difference found between the two groups in terms of age, number of pregnancies and births, BMI, Ca125 value, history of infertility and breast cancer, type of surgery and postoperative pathology (p>0.05). As a result of the postoperative pathological evaluation, ovarian cancer was detected in one patient (in the BRCA1 group).

CONCLUSIONS: There is no difference in terms of demographic and medical characteristics between patients with BRCA1 and BRCA2 gene mutations, and it should be kept in mind that malignancy may be found as a result of the final pathology.

KEYWORDS: BRCA1, BRCA2, Over, Cancer, Prophylaxis

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GİRİŞ

Over kanseri, jinekolojik kanser ölümlerinin en sık ikinci nedenidir. Hastalık genellikle ileri evrede teşhis edilir ve hastalığın 5 yıllık sağ kalım oranı %50'den azdır (1). Tüm over kanserlerinin yaklaşık %10'nu herediter olup en sık "kalıtsal ailevi meme ve over kanseri sendromu" görülmektedir. Kalıtsal ailevi meme ve over kanseri sendromundan BRCA1 ve BRCA2'deki gen mutasyonları sorumlu olup, epitelyal over kanseri vakalarının %14'ünde bu mutasyonlar mevcuttur (2).Yaşam boyu meme kanseri riski %15.2 iken, BRCA1 veya BRCA2 mutasyonu barındıran kadınlarda bu oranın %69-72 civarında olduğu tahmin edilmektedir (3). Ortalama yaşam boyu over kanseri riski %1.3 iken, 80 yaşına kadar over kanserinin kümülatif yaşam boyu riski BRCA1 mutasyon taşıyıcıları için %44-49 ve BRCA2 mutasyon taşıyıcıları için %17-21'dir (4, 5). BRCA1 ve 2 mutasyon taşıyıcısı olan kadınlar meme ve over kanseri açısından yüksek risk altında oldukları için; bu popülasyonda kanser için risk azaltıcı stratejiler geliştirilmiştir. Meme kanseri riskini azaltmak için; 18 yaşından başlayan meme kanseri farkındalığı eğitimi, 25 yaşından başlayarak 6-12 ayda bir klinik meme muayenesi, 25-29 yaş arasında yıllık meme manyetik rezonans görüntülemesi yapılması, 30 yaşından sonra yıllık mamografi taraması ve proflaktik bilateral mastektomi (PBM) yapılması önerilmektedir. Over kanseri riskini azaltmak için; 30-35 yaşından sonra her 3 ila 4 ayda bir ultrasonografi ve Ca125 değerlendirmesi, fertilite arzusu tamamlanınca veya 35-40 yaşından sonra proflaktik BSO (PBSO) yapılması önerilmektedir (6). PBSO yapılması ile over kanseri riski %3,5-4,3'e düşerken, meme kanseri riski ise %30-40'a düşmektedir (7). PBSO yapılması için tercih edilecek cerrahi yöntem laparotomiye kıyasla daha az morbidite nedeniyle laparoskopi olmalıdır (8).

BRCA1 mutasyonu olan kadınlarda over kanseri görülme riski BRCA2 mutasyonu olan kadınlara göre 3,6 kat daha fazladır (4). Aynı zamanda BRCA1/2 mutasyon taşıyıcılarında uterin kanser riskinin arttığı öne sürülmektedir (9). Bununla birlikte BRCA1 ve BRCA2 mutasyonu olan kadınlarda demografik verilerin karşılaştırılması ile ilgili literatürde yeterli veri bulunmamaktadır.

Bizim hipotezimiz BRCA1 mutasyonu olan kadınlarda over kanseri riski daha fazla olduğu için, BRCA1 ve BRCA2 mutasyonu olan kadınlarda demografik ve tıbbi özellikler açısından farklılıklar olacağıdır. Bu çalışmanın amacı; BRCA1 ve BRCA2 mutasyonu olan ve bu nedenle PBSO yapılan hastaların demografik ve tıbbi özellikler açısından karşılaştırılmasıdır.

GEREÇ VE YÖNTEM

Çalışmaya Mayıs 2016 - Mayıs 2021 tarihleri arasında hastanemizde meme kanseri tanısı alıp bu nedenle tedavi gören ve "kalıtsal ailevi meme ve over kanseri sendromu" açısından yüksek riskli olması nedeniyle yapılan değerlendirme neticesinde BRCA1 ve BRCA2 mutasyonu saptanmış, tedavi ve takibinin kliniğimiz tarafından gerçekleştirildiği; PBSO yapılan 24 kadın alındı.

Kalıtsal ailevi meme ve over kanser sendromu açısından yüksek riskli olduğu için BRCA1/2 taraması yapılma kriterleri; (1) erken gelişen meme kanseri (<40yaş) ve bir veya daha fazla birinci/ikinci derece akrabasında meme kanseri öyküsü olması, (2) meme kanseri (>40yaş) ve iki veya daha fazla birinci/ikinci derece akrabasında meme kanseri öyküsü olması, (3) bilateral meme kanseri olması, (4) ailesinde meme ve over kanseri birliktelik öyküsü olması şeklinde belirlendi. Çalışmaya alınan hastalar BRCA1 ve BRCA2 olmak üzere iki gruba ayrıldı. Hastane medikal veri sisteminden çalışmaya alınan hastaların yaş, gebelik ve doğum sayısı, vücut kitle indeksi (VKİ), Ca125 değeri, menopoz durumu, infertilite ve meme kanseri öyküsü, preoperatif pelvik ultrasonografi sonuçları, cerrahi şekli, frozen çalışılma durumu ve postoperatif patoloji sonuçları elde edildi. BRCA1 ve BRCA2 grupları yukarıda belirtilen demografik ve tıbbi veriler açısından karşılaştırıldı.

Etik Kurul

Çalışmaya başlamadan önce Sağlık Bilimleri Üniversitesi İzmir Tepecik Eğitim ve Araştırma Hastanesi etik kurulundan onay (No: 2021/05-47, Tarih:17/05/2021) alınıp Helsinki Etik İlkeleri ve İyi Klinik Uygulamaları Bildirgesine uygun olarak çalışma tamamlandı.

İstatistiksel Analiz

İstatistiksel analiz için SPSS (SPSS Statisticsversion22.0, SPSS inc.) istatistik yazılımı kullanıldı.

İstatistiksel karşılaştırmalar parametrik değerler için t testi, kategorik değişkenler için Pearson ki-kare ve Fisher's Exact testi ile yapıldı. Kategorik değişkenler sayı ve yüzde (n; %), sayısal değişkenler ortalama ± standart sapma (ortalama ± SD) olarak gösterildi. P<0.05 istatistiksel olarak anlamlı kabul edildi.

BULGULAR

Çalışmaya alınan 24 hastanın 19'unda (%79.2) meme kanseri öyküsü mevcuttu. Hastaların 15'inde (%62.5) BRCA1 ve 9'unda (%37.5) BRCA2 gen mutasyonu mevcuttu. BRCA1 ve BRCA2 grupları arasında yapılan karşılaştırmada yaş, gebelik ve doğum sayısı, VKİ, Ca125 değeri, infertilite ve meme kanseri öyküsü, cerrahi şekli ve postoperatif patoloji sonuçları açısından her iki grup arasında istatistiksel olarak anlamlı fark saptanmadı (p>0.05), **(Tablo 1)**.

Tablo 1: Hastaların demografik ve tıbbi özelliklerinin dağılımı

	BRCA-1 (n=15)	BRCA-2 (n=9)	Toplam hasta (n=24)	P*
Yaş (yıl)	44.6±4.3	46.8±7.8	45.5±5.8	0.905
Gravida	1.6±0.8	1.8±0.8	1.7±0.7	0.345
Parite	1.6±0.8	1.8±0.8	1.7±0.7	0.345
VKİ (kg/m²)	27.2±5.7	28.3±5.2	27.6±5.4	0.633
Ca125 (İÜ/ml)	16.4±10.7	20.4±19.0	17.9±14.1	0.976
İnfertilite öyküsü	1 (6.7)	0	1 (4.2)	1
Postmenopoz	2 (13.3)	3 (33.3)	5 (20.8)	0.326
Meme Ca öyküsü	13 (86.7)	6 (66.7)	19 (79.2)	0.326
Preop over kisti	1 (6.7)	0	1 (4.2)	1
Cerrahi				0.511
TAH+BSO	2 (13.3)	0	2 (8.3)	
TLH+BSO	13 (86.7)	9 (100)	22 (91.7)	
Frozen çalışma	2 (13.3)	0	2 (8.3)	0.511
Patoloji				1
Benign	14 (93.3)	9 (100)	23 (95.8)	
Malign	1 (6.7)	0	1 (4.2)	

VKİ; vücut kitle indeksi, TAH+BSO; total abdominalhisterektomi ve bilateralsalpingooforektomi, TLH+BSO; total laparoskopikhisterektomivebilateralsalpingooforektomi.
* P değeri BRCA-1 ve BRCA-2 grupları arasındaki karşılaştırmanın sonucudur.

Cerrahi olarak tüm hastalara PBSO yapılırken histerektomi de uygulandı. Cerrahi yöntem olarak BRCA1 grubunda 13 hastaya, BRCA2 grubunda tüm hastalara laparoskopik cerrahi uygulanmış olup, tüm hastalar değerlendirildiğinde laparoskopik cerrahi oranı %91.7 olarak saptandı. İntraoperatif frozen inceleme; BRCA1 gen mutasyonu olan iki hastaya yapılmış olup her ikisinde de malignite izlenmedi. Postoperatif patolojik değerlendirme neticesinde bir hastada malignite (BRCA1 grubunda) saptandı. Bu hasta postoperatif kontrole gelmemiş olup, postoperatif patoloji bulgusunda ise over yüzeyinden ekzofitik büyüme gösteren, 2 mm boyutunda invaziv alan içeren düşük dereceli seröz karsinom tanısı mevcuttu. Hastada ameliyattan 5 ay sonra karın şişliği nedeniyle yeniden kliniğe başvurduğunda ileri evre over kanseri (peritonitis karsinomatoza) saptandı. Hastaya optimal sitoredüksiyon + hipec işlemi uygulandı. Hasta daha sonra 6 kür kemoterapi (karboplatin + paklitaksel) tedavisi almış olup; son kemoterapi tedavisi bittikten 1 yıl sonra PET-CT'de batın sağ alt kadran pelvis giriminde ve pelvis orta hatta anteriorda izlenen kitlesel lezyonlar nedeniyle nüks olarak değerlendirildi.

TARTIŞMA

Yapılan bu çalışma sonucunda BRCA1 ve BRCA2 mutasyon taşıyıcısı olan kadınlar arasında demografik ve tıbbi bulgular açısından fark saptanmamıştır. BRCA1 ve BRCA2 mutasyon taşıyıcısı olan 305 kadının değerlendirildiği bir çalışmada BRCA1 ve BRCA2 mutasyon oranları sırasıyla %56 ve %44 olarak saptanmıştır (10). Aynı çalışmada yaş, gebelik sayısı, VKİ, menopoz durumu ve yapılan proflaktik cerrahi şekli gibi demografik ve tıbbi veriler açısından iki grup arasında fark tespit edilmemiştir. Subgrup analizinde PBSO yapılan hastaların yapılmayanlara göre yaş ortalaması daha yüksek olup, gebelik sayısı daha fazla ve meme kanseri öyküsü daha sık bulunmuştur (10). Kalıtsal ailevi meme ve over kanseri sendromu olanlarda, BRCA1 mutasyon taşıyıcılığı oranı BRCA2 mutasyonuna göre daha fazla olup demografik ve tıbbi özellikler açısından fark bulunmamaktadır (10).

Kalıtsal ailevi meme ve over kanseri sendromu açısından yüksek riskli olan hasta popülasyonunda yapılan BRCA mutasyon taramalarında BRCA1 mutasyonu BRCA2 mutasyonuna göre daha yüksek oranda görülmektedir (11, 12). Ülkemizde meme kanseri olan hastalarda BRCA mutasyon taraması yapılan bir çalışmada BRCA1 mutasyonu daha yüksek oranda saptanmışken, meme ve over kanseri olan 1419 hastanın değerlendirildiği başka bir çalışmada ise BRCA2 mutasyonu daha yüksek oranda saptanmıştır (13, 14). Bizim çalışmamızda BRCA1 mutasyonu daha yüksek oranda saptanmış olup literatür ile benzerlik göstermektedir.

BRCA1/2 mutasyon taşıyıcılarında uterus kanser riskinin arttığı öne sürülmektedir. Histerektomi olmaksızın PBSO uygulanan 1083 hastanın dahil edildiği bir çalışmada takip sürecinde 8 hastada uterus kanser vakası olduğu gözlenmiştir. Histolojik alt tiplerine bakıldığında ise 1 hasta-

da leiomyosarkom, 2 hastada endometrioid tip adenokarsinom, 5 hastada ise seröz/seröz benzeri endometrial karsinom olduğu görülmüştür (15). Bizim çalışmamızda BRCA1/2 mutasyonu olan tüm hastalara PBSO ile birlikte histerektomi de yapılmış olup, uterus kanser vakasına rastlanılmamıştır.

PBSO için laparoskopi; düşük intraoperatif ve postoperatif komplikasyon oranı ile kısa hastanede kalış süresi nedeniyle tercih edilen cerrahi yöntem olmaktadır. 159 hastanın dahil edildiği bir çalışmada PBSO için hastaların 154'üne (%96,8) laparoskopi, 5'ine (%3,2) laparotomi uygulanmıştır. Laparoskopik olarak başlanan 1 hastada intraoperatif major komplikasyon nedeniyle laparotomiye geçilmiştir (16). Bizim çalışmamızda ise; 24 hastanın 22'sine (%91,7) laparoskopik, 2'sine (%8,3) laparotomik PBSO uygulanmış olup intraoperatif komplikasyon görülmemiştir.

BRCA1 ve BRCA2 gen mutasyonu olan kadınlarda uygulanan PBSO sırasında maligniteye rastlanabilmektedir. Finch ve ark. 490 PBSO uyguladıkları hastanın 11'inde (%2,2) okult kanser saptamıştır. Bu kanser olgularının 7'si over, 3'ü tuba kanseri olup birinde ise sadece batın sitolojisinde malignite saptanmıştır. Malignite saptanan hastaların %81'inde BRCA1 ve %9'unda BRCA2 mutasyonu olduğu görülmüştür (17). Başka bir çalışmada 1390 BRCA1 ve BRCA2 mutasyonu saptanan hastaya PBSO yapılmış olup hastaların %3,3'ünde okult kanser saptanmıştır. Bu kanser olgularının dağılımı %58,6 over, %39,1'i tuba ve %2,3'ü ise peritoneal kanser şeklindedir. Okult kanser saptanan hastaların %95,6'sında BRCA1 ve %4,4'ünde ise BRCA2 gen mutasyonu olduğu görülmüştür (18). Bizim çalışmamızda sadece bir hastada (%4,2) okult over kanseri saptanmış olup bu hastanın BRCA1 mutasyon taşıyıcısı olduğu görülmüştür. PBSO sonrası primer peritoneal kanser görülme oranı %1,4-2,3 oranında, ortalama 5-6 yıl sonra ve sıklıkla BRCA1 mutasyon taşıyıcılarında görülebilmektedir (17,18). Çalışmamızda okult over kanseri saptanan hastada 5 ay sonra peritonitis karsinomatoza saptanmış olup bu durum primer periton kanserinden ziyade hastanın postoperatif kontrolü yapılmadığı için primer kanserin persistansı olarak düşünülmüştür.

Çalışmamızın limitasyonu, olgu sayısının az ve izlem süresinin kısa olması; güçlü yönü ise ülkemizde bu yönde yapılmış ilk çalışma olması nedeniyle ülkemiz verilerini yansıtması açısından öncü bir çalışma olması şeklinde sıralanabilir.

Sonuç olarak; BRCA1 ve BRCA2 gen mutasyonu taşıyıcısı olan kadınlarda demografik ve tıbbi özellikler açısından fark bulunmamaktadır. Bununla birlikte nihai patoloji sonucunda okult kanser çıkabileceği ve proflaktik cerrahi yapılsa bile primer periton kanseri olasılığı akılda tutulmalıdır. Ülkemizdeki verilerin daha iyi yansıtılması için daha fazla vaka sayısına sahip çalışmalara ihtiyaç duyulmaktadır.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

COVİD-19 SALGININDA SAĞLIK ÇALIŞANLARINDA DEPRESYON, ANKSİYETE, STRES, TRAVMA DÜZEYİ VE D TİPİ KİŞİLİK: VAKA - KONTROL ÇALIŞMASI

DEPRESSION, ANXIETY, STRESS, TRAUMA LEVEL, AND TYPE D PERSONALITY AMONG HEALTHCARE PROFESSIONALS DURING COVID-19 PANDEMIC: CASE-CONTROL STUDY

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ÖZET

AMAÇ: Bu çalışmanın amacı COVİD-19 salgınında sağlık çalışanlarında depresyon, anksiyete, stres, virüs korkusu, travma belirti düzeylerini ve D Tipi kişilik ile ilişkisini değerlendirmektir.

GEREÇ VE YÖNTEM: Çalışmaya bir Devlet Hastanesi'nde çalışan 50 sağlık çalışanı (22 hemşire, 11 ebe, 4 tıbbi sekreter, 7 sağlık memuru ve 6 doktor) ve kontrol grubu olarak benzer ölçütleri karşılayan, bir özel şirketin müşteri ilişkileri çağrı merkezindeki 89 çalışan dahil edildi. Katılımcılara sosyo-demografik anket formu, Depresyon Anksiyete Stres Ölçeği-21 (DASS-21), D Tipi Kişilik Ölçeği (DKÖ), Olayların Etkisi Gözden Geçirilmiş Formu (OEÖ), Vizüel Analog Skala uygulandı.

BULGULAR: Sağlık çalışanı ve kontrol grubu arasında depresyon, anksiyete, stres, travma ve virüs korkusu açısından anlamlı bir fark bulunamadı. Ölçek kesme puanlarına göre sağlık çalışanları grubunda %8 oranında depresyon, %24 oranında anksiyete, %16 oranında stres, %94 oranında travma; kontrol grubunda %20,22 oranında depresyon, %31,46 oranında anksiyete, %22,47 oranında stres, %84,26 oranında travma belirtilerinin olduğu saptandı. D Tipi kişiliği olanlarda olmayanlara göre depresyon, anksiyete, stres ve travma puanları anlamlı olarak daha fazlaydı (sırasıyla p<0,001, p=0,001, p<0,001, p<0,001). Ayrıca D Tipi kişilik puanıyla depresyon, anksiyete, stres, travma arasında ve travma ile depresyon, anksiyete, stres arasında pozitif korelasyon saptandı.

SONUÇ: Çalışma sonuçlarımız, hem sağlık çalışanlarında hem de kontrol grubunda belirli düzeyde depresyon, anksiyete, stres ve travma olduğunu, ayrıca D Tipi kişilik özelliklerinin daha yüksek depresyon, anksiyete, stres düzeyi ve travmayla ilişkili olduğunu göstermektedir.

ANAHTAR KELİMELER: Anksiyete, COVID-19 virüs, Psikolojik stres, Kişilik, Sağlık çalışanı

ABSTRACT

OBJECTIVE: The aim of this study was to assess the depression, anxiety, stress, fear of viruses, trauma symptom levels and their relationship with Type D personality in healthcare professionals during the COVID-19 pandemic.

MATERIAL AND METHODS: 50 healthcare professionals (22 nurses, 11 midwives, 4 medical secretaries, 7 medical officers and 6 physcians) working at A State Hospital and 89 employees in a customer relations call center of a private company, as the control group, who met similar criteria were included in the study. Socio-demographic questionnaire form, Depression Anxiety and Stress Scale-21 (DASS-21), Type D Scale (DS14), Impact of Event Scale - Revised Form (IES-R) , and Visual Analogue Scale were applied to the participants.

RESULTS: No significant difference was found between the healthcare professionals and the control group in terms of depression, anxiety, stress, trauma and fear of virus. According to the cut-off scores of the scales, in the group of healthcare professionals, 8% had depression, 24% had anxiety, 16% had stress, and 94% had trauma; in the control group, it was found that 20.22% had depression, 31.46% had anxiety, 22.47% suffered from stress, and 84.26% had trauma. In those with Type D personality, depression, anxiety, stress and trauma scores were significantly higher compared to those without Type D personality (p<0.001, p=0.001, p<0.001, p<0.001, respectively). Also, it was determined that there was a positive correlation between Type D personality score and depression, anxiety, stress and trauma, and between trauma and depression, anxiety, and stress.

CONCLUSIONS: Our study results demonstrated that there was a certain level of depression, anxiety, stress and trauma in both healthcare professionals and the control group, and that Type D personality characteristics were associated with higher levels of depression, anxiety, stress and trauma.

KEYWORDS: Anxiety, COVID-19 virus, Psychological stress, Personality, Healthcare professional

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GİRİŞ

Dünya Sağlık Örgütü, enfeksiyonların ve ölümlerin dünya çapında artarak devam etmesinden dolayı Mart 2020'de COVID-19'u bir pandemi olarak değerlendirmeye başlamıştır. İlk vakalar Aralık 2019'da Çin'in Vuhan kentinden bildirilmiştir.

COVID-19 enfeksiyon semptomları ateş, öksürük, yorgunluk, burun tıkanıklığı, baş ağrısı gibi üst solunum yolu enfeksiyonu belirtileri olabilir, ancak pnömoni, akut solunum sendromu, böbrek yetmezliği ve ölüm de görülebilir. COVID-19 pandemisinde ölüm riskine maruz kalma durumu söz konusudur ve travmatik bir olay olarak sınıflandırılabilir (1). Anksiyete, depresyon, korku ve stres gibi belirtilerin COVID-19 pandemisi sırasında daha sık olduğu gösterilmiştir (2). Benzer bir durum olan Şiddetli Akut Solunum Yolu Sendromu (SARS) salgını sırasında ve sonrasında %10 ile %18 oranında depresyon, anksiyete ve travma sonrası stres bozukluğu (TSSB) semptomlarının olduğu gösterilmiştir (3).

D Tipi kişilik, olumsuz duygulanım ve sosyal izolasyon içeren, depresif ve uygunsuz düzeyde endişeli bir kişilik olarak tanımlanmıştır (4). Travmatik olaylar yaşayan herkeste TSSB gelişmeyebilir. Semptomların tipinin ve TSSB'nin şiddetinin, mağdurun travmatik olaya verdiği öznel tepkiye göre değişkenlik gösterebileceği ifade edilmiştir (5). Kronik stres durumlarında, bireysel faktörler, TSSB'nin gelişimi üzerinde travmatik olayın şiddetinden daha büyük bir etkiye sahip olabilir (6). TSSB'yi etkileyen bireysel faktörlerden biri de D Tipi kişilik olabilir.

Salgınla ilgili bu yönler, anksiyete, depresyon, stres belirtileri, akut stres bozukluğu ve TSSB gibi psikopatolojileri tetikleyebilir. Sağlık çalışanları patolojisi ve prognozu belirsiz, tedavisi olmayan ve yüksek ölüm oranı olan bir hastalığı yönetme çabalarında hem profesyonel hem de kişisel olarak zor bir durumla karşı karşıya kalmıştır. Korkulan koşullar altında zor etik kararlar almak ve profesyonel olarak görevlerine devam etmek zorunda kalmışlardır.

Sağlık çalışanlarda COVID-19 ile ilgili olarak, depresyon, anksiyete, stres, virüs korkusu ve travmanın incelendiği bir çok çalışma vardır. Fakat bu çalışmalarda ya kontrol grubu kullanılmamış ya da kontrol grubu olarak çalışanlar kullanılmamıştır. Sağlık dışı bir sektör çalışanlarının kontrol grubu olarak kullanıldığı karşılaştırılmış bir çalışma bilebildiğimiz kadarı ile yoktur. Bu çalışmanın amacı sağlık çalışanlarında depresyon, anksiyete, stres, virüs korkusu ve travma belirti düzeylerini sağlık dışı sektörde çalışan kişilerle karşılaştırmalı olarak değerlendirmek ve D Tipi kişilik ile ilişkisini incelemektir.

GEREÇ VE YÖNTEM

Katılımcılar

Bu çalışmaya, sağlık çalışanı olarak 01 - 30 Haziran 2020 tarihleri arasında, pandemi hastanesi olarak çalışmayan bir devlet hastanesinde görev yapan 22 hemşire, 11 ebe, 4 tıbbi sekreter, 7 sağlık memuru ve 6 doktordan oluşan, çalışmaya alınma ölçütlerini karşılayan ve çalışmaya katılmaya gönüllü olan toplam 50 kişi alındı. Kontrol grubu olarak benzer ölçütleri taşıyan çağrı merkezinde çalışan 89 kişi alındı. Bu çağrı merkezi çalışanları, sağlık dışı bir sektör firmasının müşteri ilişkileri hizmetini telefonla yürütmekteydi. Araştırmamıza dahil olma kriterleri; çalışmaya katılmaya gönüllü olmak, 18-65 yaş arasında olmak ve bilişsel bozukluk, mental retardasyon, bipolar duygulanım bozukluğu, şizofreni açılımı kapsamında olan ve psikozla giden bozukluklar gibi major psikiyatrik hastalığa sahip olmamak olarak belirlendi. Tüm prosedürler 1964 Helsinki Bildirgesi ve sonraki değişikliklerine uygun olarak yapıldı.

Veri Toplama Araçları

Sosyal ve Demografik Faktörler: Tüm katılımcıların yaşı, cinsiyeti, eğitim düzeyi araştırmacılar tarafından hazırlanan bir anket kullanılarak değerlendirildi.

Depresyon Anksiyete Stres Ölçeği-21 (DASS-21): Depresyon, anksiyete ve stres semptomlarını ölçmek için hazırlanan, 21 maddeden oluşan bir ölçektir. Ölçek 4'lü likert tipi olup her bir boyut için 7'şer soru içermektedir. Lovibond ve Lovibond tarafından geliştirilen ölçeğin ilk hali 42 maddelik uzun formdan oluşmaktadır (7). DASS 21 olarak isimlendirilen Kısa Formunun Türkçeye uyarlaması Yılmaz ve arkadaşları tarafından yapılmıştır (8). Toplam depresyon alt ölçeği puanı için kesme değer 10, toplam anksiyete alt ölçeği puanı kesme değer 7, toplam stres alt ölçeği puanı kesme değer 11 olarak kabul edildi (9).

D Tipi Kişilik Ölçeği (DKÖ): Ölçek 14 madde olarak geliştirilmiştir (4). Her biri 7 maddeden oluşan duygulanım ve sosyal baskılanma olarak iki alt ölçek içerir. Ölçeğin ülkemizde geçerlilik güvenirlilik çalışması Alçelik ve ark. tarafından yapılmıştır (10).

Olayların Etkisi Gözden Geçirilmiş Formu (OEÖ): Ölçeğin gözden geçirilmiş formu Weiss ve Marmar tarafından hazırlanmıştır(11). Ölçek 5'li likert tipi olup kişilerin son 7 günündeki travma sonrası stres belirtileri semptomlarını sorgular. Türkçe versiyonun geçerlik ve güvenirlik çalışması Çorapçıoğlu ve arkadaşları tarafından yapılmıştır (12). OEÖ toplam puanı kesme değeri 24 olarak kabul edilmiştir (13).

Vizüel Analog Skala: Sıfırdan ona kadar devam eden bir çizgiden oluşmaktadır. Basit oluşu kullanımda kolaylık sağlar. Ağrı ve duygu durumu gibi diğer öznel duyguları ölçmek için kullanılabilir (14). Bu çalışmada genel COVID-19 korkusunu ölçmek için kullanıldı.

Etik Kurul

Bu çalışmanın etik kurulu Kafkas Üniversitesi Klinik Araştırmalar Etik Kurulu'ndan 20.05.2020 tarihinde 2020/45 sayı ile alındı.

İstatistiksel Analiz

Verileri değerlendirmek için SPSS (20) programı kullanıldı. Veriler tablolarda birey sayısı, yüzdesi, aritmetik ortalama ve standart sapma şeklinde verildi, anlamlılık düzeyi 0,05 olarak kabul edildi. Verilerin normal dağılıma uygunluğu için Kolmogorov Smirnov testi kullanıldı. İki grubun ortalamaları arasındaki farkın tespiti için Mann-Whitney U testi, kategorik değişkenler için Ki-Kare test kullanıldı. Veriler arasındaki ilişkiyi değerlendirmek için spearman korelasyon analizi kullanıldı.

BULGULAR

Çalışma sağlık çalışanları grubu 39 kadın ve 11 erkek (n = 50), kontrol grubu 70 kadın ve 19 erkekten (n=89) oluşmuştur. Grupların yaş ortalamaları, sağlık çalışanları 32,51±8,50; kontrol grubu 26,64±3,51 bulundu. Grupların ortalama eğitim süreleri sağlık çalışanlarında 14,82±1,92; kontrol grubunda 14,74±1,73 bulundu. Sağlık çalışanları grubunun ortalama Vücut kitle indeksi (VKİ) 24,56±3,61; kontrol grubunun ise 22,71±2,63 idi. Gruplar arasında, eğitim, cinsiyet açısından istatistiksel olarak anlamlı fark tespit edilmedi (sırasıyla p = 0,830, p = 1,01) Tablo 1. Gruplar arasında yaş ve VKİ açısından anlamlı fark tespit edildi (sırasıyla p <0,001 ve p =0,002) **(Tablo 1)**.

Tablo 1: SÇ ve Kontrol Grubunun Demografik Özellikleri

		SÇ grubu	Kontrol grubu	P
		n=50	n=89	
		Ort±SS	Ort±SS	
Yaş		32,51±8,50	26,64±3,51	<0,001
Eğitim (yıl)		14,82±1,92	14,74±1,73	0,830
VKİ		24,56±3,61	22,71±2,63	0,002
		n (%)	n (%)	
Cinsiyet	Kadın	39 (78)	70 (78,7)	1,01
	Erkek	11 (22)	19 (21,3)	

Ort±SS : ortalama±standart sapma, SÇ: sağlık çalışanı, VKİ: vücut kitle indeksi

Sağlık çalışanları grubunun ortalama korku puanı 3,98±2,48; DASS-21 depresyon puanı 4,46±3,91, DASS-21 anksiyete puanı 3,54±3,39; DASS-21 stres puanı 6,76±4,19; OEÖ toplam puanı 28,10±14,25; DKÖ duygulanım puanı 10,32±6,68; DKÖ sosyal baskılanma 10,36±5,55; DKÖ toplam puanı 20,68±10,46 olarak hesaplandı. Kontrol grubunun ortalama korku puanı 4,70±2,77; DASS-21 depresyon puanı5,39±5,51; DASS-21 anksiyete puanı 5,43±5,49; DASS-21 stres puanı 6,48±5,35; OEÖ toplam puanı 33,56±22,19; DKÖ duygulanım puanı 9,80±7,43; DKÖ sosyal baskılanma 8,98±5,96; DKÖ toplam puanı 18,78±12,14 olarak hesaplandı. Gruplar arasında istatistiksel olarak anlamlı farklılık saptanmadı (sırasıyla p=0,105, p=0,863, p=0,261, p=0,404, p=0,351, p=0,581, p=0,197, p=0,285) **(Tablo 2)**.

Tablo 2: SÇ ve kontrol Grubunun Karşılaştırılması

	SÇ grubu	Kontrol grubu	P
	n=50	n=89	
	Ort±SS	Ort±SS	
Korku	3,98±2,48	4,70±2,77	0,105
DASS-21 Depresyon	4,46±3,91	5,39±5,51	0,863
DASS-21 Anksiyete	3,54±3,39	5,43±5,49	0,261
DASS-21 Stres	6,76±4,19	6,48±5,35	0,404
OEÖ toplam	28,10±14,25	33,56±22,19	0,351
DKÖ duygulanım	10,32±6,68	9,80±7,43	0,581
DKÖ sosyal baskılanma	10,36±5,55	8,98±5,96	0,197
DKÖ toplam	20,68±10,46	18,78±12,14	0,285
	n (%)	n (%)	
D tipi kişiliği Olan	35 (70)	51 (57,30)	0,2
Depresyon	4 (8)	18 (20,22)	0,104
Anksiyete	12 (24)	28 (31,46)	0,462
Stres	8 (16)	20 (22,47)	0,477
Travma	47 (94)	75 (84,26)	0,78

DASS-21: depresyon anksiyete stres ölçeği, DKÖ: D Tipi kişilik ölçeği, OEÖ: olayların etkisi ölçeği, Ort±SS : ortalama±standart sapma, SÇ: sağlık çalışanı

D tipi kişiliği olan sayısı sağlık çalışanları grubunda 35 (%70) kişi, kontrol grubunda 51 (% 57,3) olarak tespit edildi ancak istatistiksel olarak anlamlı fark saptanmadı (p=0,2) Tablo 2. OEÖ ve DASS-21 alt ölçekleri belirlenen kesme puanlarına göre değerlendirildiğinde sağlık çalışanları grubunda %8 oranında depresyon, %24 oranında anksiyete, %16 oranında stres, %94 oranında travma belirtileri olduğu saptandı. Kontrol grubunda %20,22 oranında depresyon, %31,46 oranında anksiyete, %22,47 oranında stres, %84,26 oranında travma olduğu saptandı ve gruplar arasında anlamlı bir fark görülmedi (sırasıyla p=0,104, p=0,462, p=0,477, p=0,78) Tablo 2.

D tipi kişiliği olan grubunun ortalama DASS-21 depresyon puanı 6,63±5,08; DASS-21 anksiyete puanı 5,69±5,12; DASS-21 stres puanı 8,14±4,85; OEÖ toplam puanı 37,73±19,11 olarak hesaplandı. D tipi kişiliği olmayan grubunun ortalama korku puanı 3,92±2,72; DASS-21 depresyon puanı2,15±3,1; DASS-21 anksiyete puanı2,91±3,77; DASS-21 stres puanı 3,78±3,67; OEÖ toplam puanı 20,67±15,91 olarak hesaplandı. Gruplar arasında tüm değişkenler açısından istatistiksel olarak anlamlı fark tespit edildi (sırasıyla p<0,0001, p=0,001, p<0,0001, p<0,0001) **(Tablo 3)**.

Tablo 3: D tipi kişiliği olan ve olmayan grupların karşılaştırılması

	D tipi kişiliği olan n=86 Ort±SS	D tipi kişiliği olmayan =53 Ort±SS	P
Korku	4,76±2,62	3,92±2,72	0,069
DASS-21 Depresyon	6,63±5,08	2,15±3,10	<0,001
DASS-21 Anksiyete	5,69±5,12	2,91±3,77	0,001
DASS-21 Stres	8,14±4,85	3,78±3,67	<0,001
OEÖ toplam	37,73±19,11	20,67±15,91	<0,001

DASS-21: depresyon anksiyete stres ölçeği, OEÖ: olayların etkisi ölçeği, Ort±SS : ortalama±standart sapma

D tipi kişiliği olan grubunun ortalama korku puanı 4,76±2,62; D tipi kişiliği olmayan grubunun ortalama korku puanı 3,92±2,72 olarak bulundu. Gruplar arasında istatistiksel olarak anlamlı fark saptanmadı (p=0,069) Tablo 3.

Yapılan korelasyon analizinde OEÖ ile korku (r=0,386, p<0,01), DKÖ duygulanım (r=0,652, p<0,01), DKÖ sosyal baskılanma (r=0,313, p<0,01), DKÖ toplam (r=0,570, p<0,01), DAS21 depresyon (r=0,691, p<0,01), DASS-21 anksiyete (r=0,678, p<0,01) ve stres puanı (r=0,733, p<0,01) arasında anlamlı pozitif korelasyon saptandı **(Tablo 4)**. DKÖ toplam puanı ile DASS-21 depresyon (r=0,607, p<0,01), DASS-21 anksiyete (r=0,468, p<0,01) ve DASS-21 stres puanı (r=0,611, p<0,01) arasında anlamlı pozitif korelasyon saptandı Tablo 4. DASS-21 Depresyon puanı ile DASS-21 anksiyete (r=0,761, p<0,01) ve DASS-21 stres puanı (r=0,822, p<0,01) arasında ve DASS-21 anksiyete puanı ile DASS-21 stres puanı (r=0,793, p<0,01) arasında anlamlı pozitif korelasyon saptandı Tablo 4.

Tablo 4: Değişkenlerin korelasyonları

	Korku	Yaş	Eğitim	DKÖ duygulanım	DKÖ sosyal baskılanma	DKÖ toplam	DASS-21 Depresyon	DASS-21 Anksiyete	DASS-21 Stres	OEÖ
Korku	1									
Yaş	,036	1								
Eğitim	,064	-,091	1							
DKÖ duygulanım	,334**	,091	-,160	1						
DKÖ sosyal baskılanma	,207**	,094	-,145	,576**	1					
DKÖ toplam	,319**	,098	-,166	,917**	,847**	1				
DASS-21 Depresyon	,353**	,177	-,028	,609**	,446**	,607**	1			
DASS-21 Anksiyete	,399**	,164	-,197	,527**	,267**	,468**	,761**	1		
DASS-21 Stres	,344**	,185	-,059	,656**	,389**	,611**	,822**	,793**	1	
OEÖ	,386**	,010	-,175	,652**	,313**	,570**	,691**	,678**	,733**	1

DASS-21: depresyon anksiyete stres ölçeği, DKÖ: D Tipi kişilik ölçeği, OEÖ: olayların etkisi ölçeği, Ort±SS : ortalama±standart sapma, **=<0.01, *=<0.05

TARTIŞMA

Bu çalışmanın amacı, COVID-19 pandemisine yanıt olarak gelişen virüs korkusu, stres, anksiyete, depresyon ve travma belirtilerinin sağlık çalışanlarındaki düzeyinin, başka bir sektörde çalışanlardan farkı olup olmadığını ve etkileyen faktörleri belirlemekti. Elde edilen sonuçlara göre korku, stres, anksiyete, depresyon ve travma belirtileri düzeyi açısından sağlık çalışanları grubu ile kontrol grubu arasında fark bulunmadı. D tipi kişiliği olanlarda korku, stres, depresyon ve travma düzeyi daha yüksek bulundu. Asıl önemli olanın çalışılan sektör değil, D Tipi kişilik özelliği olduğu tespit edildi.

Ulaşabildiğimiz kadarıyla daha önceki çalışmalarda COVİD-19 salgınında sağlık çalışanlarında stres, anksiyete, depresyon düzeyi, sağlık çalışanı olmayan gruplarla kıyaslanarak değerlendirilmemiştir. Ancak yapılan çalışmalarda ayrı ayrı hem sağlık çalışanlarında hem de genel nüfusta yüksek düzeyde depresyon, anksiyete ve stresten bahsedilmiştir (15, 16). COVID-19 pandemisi sırasında sağlık çalışanları arasında anksiyete ve depresyon prevalansının incelendiği birçok çalışma vardır. Anksiyete 12 çalışmada değerlendirilmiş ve %23,2'lik bir yaygınlık elde edilmiştir; depresyon 10 çalışmada değerlendi-

rilmiş ve %22,8'lik bir yaygınlık elde edilmiştir (17). Sosyal medya ve e-posta aracılığıyla yapılan bir çalışmada sağlık çalışanları ve genel nüfus kaygı ve stres açısından değerlendirilmiştir. Kuzey İtalya'dan sağlık çalışanları grubu katılımcılarının genel nüfusa göre daha yüksek düzeyde kaygı ve stres bildirdikleri ortaya konmuştur. Ancak merkez ve güney İtalya için bu sonuç bulunamamış, farklılığın bölgesel faktörlere bağlı olduğu vurgulanmıştır (18). Çalışmamızda ölçek kesme puanlarına göre değerlendirme yapıldığında sağlık çalışanlarında depresyon anksiyete ve stres belirtileri yaygınlığı sırayla %8, %24, %16 olarak, kontrol grubunda ise %20 ,22, %31,46, %22,47 olarak tespit edildi, gruplar arasında anlamlı bir fark görülmedi. Tespit ettiğimiz oranlar önceki çalışmalarla uyumluydu.

Psikolojik sorunlara yol açan birçok olay ve durumda olduğu gibi, bulaşıcı hastalık salgınları ani ve bunaltıcıdır, çaresizlik, zayıflık ve suçluluk duyguları yaratır ve travmaya neden olabilir. Sağlık çalışanlarında travmayı değerlendiren çalışmalardan Kore'de yapılan çalışmada ortalama OEÖ puanı 26,3 bulunmuş, travma görülen kişilerin oranı %40,3 olarak tespit edilmiştir (19). Singapur çalışmasında katılımcıların yaklaşık %20'sinin OEÖ puanları 30'un üzerinde olduğu gösterilmiştir (20). Genel nüfusun değerlendirildiği başka bir çalışmada ise OEÖ puanı 32,98 bulunmuş, travma görülen kişilerin oranı ise %53,8 olarak belirtilmiştir (21). Ulaşabildiğimiz kadarıyla sağlık çalışanı ile normal nüfusu travma açısından kıyaslayarak değerlendiren çalışma yoktur. Çalışmamızda OEÖ ortalama puanı sağlık çalışanlarında 28,1 kontrol grubunda ise 33,56 olarak bulunmuş ancak gruplar arasında anlamlı fark bulunamamıştır. Çalışmamızda travma görülen kişilerin oranı sağlık çalışanlarında %94, kontrol grubunda 84,26 olarak tespit edildi. Gruplarımız arasında anlamlı fark yoktu. Oranın yüksek olmasının sebebi her iki grupta da kadın cinsiyet fazla olması, yaş ortalamasının düşük olması ve kültürel farklılıklar olabilir.

Sağlık çalışanlarında D tipi kişilik ile mesleki stres ve tükenmişlik arasındaki ilişkiyi gösteren birkaç çalışma yapılmıştır. Bir çalışmada sağlık çalışanlarında D Tipi kişilik özelliklerinin yüksek tükenmişlik düzeyleri ile ilişkili olduğu bildirilmiştir (22). Başka bir çalışmada sağlık çalışanlarının iş algısında D Tipi kişilik özelliklerinin rolü olduğu belirtilmiş, D Tipi kişiliğe sahip olanların işyerini daha stresli algıladıkları, tükenmişlik, kaygı, depresyon, bedensel belirtiler ve uykusuzluk düzeylerinin yüksek olduğu ve ruhsal bozukluk belirtilerinin daha fazla olduğu gösterilmiştir (23). COVID-19 salgınında yapılan bir çalışmada D Tipi kişilik özelliklerine sahip sağlık çalışanlarında D Tipi kişilik özelliklerine sahip olmayanlara göre daha yüksek düzeyde anksiyete, depresyon, hastalık ve virüs korkusu tespit edilmiştir (24). Çalışmamızda da benzer şekilde D Tipi kişilik özelliklerine sahip sağlık çalışanı ve kontrol grubundan oluşan katılımcılarda D Tipi kişilik özelliklerine sahip olmayanlara göre daha yüksek düzeyde anksiyete, depresyon, stres, virüs korkusu, travma belirtileri tespit edildi. Ayrıca D tipi kişilik puanı ile anksiyete, depresyon, stres, virüs korkusu, travma belirtileri arasında pozitif korelasyon olduğu görüldü.

Sağlık çalışanlarında D Tipi kişilik oranını değerlendiren, katılımcıların hekimlerden oluştuğu çalışmada D tipi kişilik, acil servis hekimleri ve diğer hastane hekimlerinde %28,5 ila %29,1 arasında değişmektedir (25). Hemşirelerin değerlendirildiği başka bir çalışmada ise katılımcıların %36,8'inin D tipi kişiliğe sahip olduğu tespit edilmiştir (26). Çalışmamızda ise sağlık çalışanlarında D Tipi kişilik oranı %70 olarak bulundu ve kontrol grubuyla oran açısından anlamlı fark yoktu. Diğer çalışmalara göre çalışmamızdaki oranın yüksek olmasının sebebi çalışmamızın salgın döneminde yapılmış olması ve kültürel farklılıklar olabilir.

Çalışmamızın bazı sınırlılıkları vardır. Birincisi, bu öz bildirim ölçeklerine dayalı bir çalışmadır ve herhangi bir psikiyatrik tanı görüşmesi yapılmamıştır. Ölçeklerin kullanılma kılavuzunda belirtilen kesme puanlarına göre semptom varlığı, yokluğu değerlendirilmiştir. İkincisi, pandemi sürecinde ülkenin kalabalık şehirlerindeki hastanelere göre görece daha az etkilenen, pandemi hastanesi olmayan bir ilçe hastanesinde yapıldı. Bu nedenle tüm ülkenin sağlık çalışanlarını temsil etmekten uzaktır. Üçüncüsü çalışmamızda kontrol grubu tek bir iş kolundan oluştuğu için tüm sağlık alanı dışı çalışanları için genelleme yapmak zordur.

Bildiğimiz kadarıyla çalışmamız pandemi döneminde sağlık çalışanlarını depresyon, stres, anksiyete, virüs korkusu, travma, açısından değerlendiren ilk vaka-kontrol çalışmasıdır. Çalış-

mamızın sonucunda gruplar arasında bu değişkenler açısından anlamlı bir fark bulunamadı. Ayrıca çalışmamızda Tip D kişiliğe sahip sağlık çalışanlarında anksiyete, depresyon, stres, travma, virüs korkusu daha yüksek oranda bulundu. Pandemi döneminde hem iş yükleri artan sağlık çalışanlarının hem de genel nüfusun ruh sağlığını korumak için çeşitli önlemler alınması gerekmektedir. Pandemi sırasında D tipi kişilik, anksiyete, depresyon, stres, travma ve virüs korkusu için bir yatkınlık sebebi olabilir. Bu nedenle D Tipi kişilik ölçeği, yatkın grupların belirlenmesinde kolay ve ucuz bir değerlendirme aracı olarak kullanılabilir**.**

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

AKUT İNME SONRASI YATAN HASTA REHABİLİTASYONU VE EV TABANLI REHABİLİTASYON UYGULAMALARININ KARŞILAŞTIRILMASI: PROSPEKTiF KONTROLLÜ BİR ÇALIŞMA

COMPARING INPATIENT REHABILITATION AND HOME-BASED REHABILITATION PRACTICES FOLLOWING ACUTE STROKE: A PROSPECTIVE CONTROLLED STUDY

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ÖZET

AMAÇ: Bu çalışmanın amacı, akut inmeli hastalarda ev temelli rehabilitasyonun yatan hasta rehabilitasyonu kadar etkili olup olmadığını değerlendirmek ve rehabilitasyon sırasında yüksek mortalite/morbidite riski taşıyan hastaları belirlemektir.

GEREÇ VE YÖNTEM: Bu çalışmaya, nöroloji servisi ve yoğun bakım ünitelerinden yatan hasta rehabilitasyonu (n=28) veya ev egzersiz programlarına (n=36) yönlendirilen akut inmeli 64 hasta dahil edildi. Tedavi öncesi ve tedaviden 12 hafta sonra tüm hastaların Brunnstrom motor evreleri, Fonksiyonel Bağımsızlık Ölçeği (FBÖ) ve İnme Etki Ölçeği (İEÖ) skorları kaydedildi. Değerlendirme parametreleri 2 grup arasında karşılaştırıldı. Rehabilitasyon süresince gelişen morbidite/mortalite varlığı kaydedildi. Daha sonra tüm hastalar yatan hasta, ev egzersiz ve mortalite/morbidite grubu olarak üç gruba ayrıldı ve tedavi öncesi değerlendirme parametreleri gruplar arasında karşılaştırıldı.

BULGULAR: Üçüncü ayda, ev egzersiz grubunda yaşam kalitesi ölçeklerinin tüm alt gruplarında anlamlı bir değişiklik olmazken, yatarak rehabilitasyon grubunda yaşam kalitesi ölçeklerinin bellek ve duygu alt ölçekleri dışında anlamlı iyileşme saptandı. 12. haftanın sonunda; ev egzersiz grubunda 36 hastanın 5'i (%13,90) öldü ve 5'inde (%13,90) yeni bir serebrovasküler hastalık gelişti. Mortalite/morbiditesi olan 10 hastanın bellek, iletişim ve duygu alt ölçek puanları, mortalite/morbiditesi olmayan diğer iki hasta grubundan anlamlı olarak daha düşüktü.

SONUÇ: Zor klinik durumları daha iyi yönetmek için hekimin yatan hasta rehabilitasyonu veya ev egzersiz grubuna yönlendirilecek akut inme hastalarını iyi belirlemesi gerekir. Hekimler hastaları bir rehabilitasyon programına yönlendirirken morbidite/mortalite ile ilgili olabilecek hafıza, iletişim ve emosyonel durum skorlarını göz önünde bulundurabilirler.

ANAHTAR KELİMELER: Evde bakım, Rehabilitasyon, İnme, Yaşam kalitesi

ABSTRACT

OBJECTIVE: The aim of this study is to evaluate whether home-based rehabilitation (HBR) is as effective as inpatient rehabilitation in patients with acute stroke as well as to identify patients at increased risk of mortality/morbidity during rehabilitation.

MATERIAL AND METHODS: The present study included 64 patients with acute stroke who were referred from the neurology service and intensive care units to an inpatient rehabilitation unit (n=28) or HBR programs (n=36). Brunnstrom motor stages, Functional Independence Measure and Stroke Impact Scale scores of all patients were recorded before treatment and 12 weeks after therapy. Evaluation parameters were compared between 2 groups. The presence of any morbidity/mortality that developed during rehabilitation period were recorded. Afterward, all the patients were divided into 3 groups as inpatient, HBR and patients with mortality/morbidity and evaluation parameters before therapy were compared among the groups.

RESULTS: At third month, while there was no significant change in all quality of life subscales following HBR, the improvement in all quality of life subscales following inpatient rehabilitation, except for the memory and emotion subscales were significant. At the end of 12th week; 5 (13.90%) of the 36 patients were died, and another 5 (13.90%) had developed a new cerebrovascular disease in HBR group. The memory, communication and emotion subscales scores of 10 patients with mortality/morbidity were significantly lower than the patients without mortality/morbidity in other 2 groups.

CONCLUSIONS: To better manage difficult clinical encounters, the physician needs to well identify acute stroke patients who will be referred to inpatient rehabilitation or home exercise group. When choosing a rehabilitation program, physicians may also consider the mortality/morbidity related to memory, communication and emotional scores.

KEYWORDS: Home care, Rehabilitation, Stroke, Quality of life

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INTRODUCTION

Stroke is the second leading cause of death worldwide and a major cause of chronic neurological disability in adult populations (1). The prevalence of stroke increases with the increase in life expectancy, and prevalence rates of disability in stroke survivors range from 36%~45% (2).

Disability seen after stroke may occur depending on the nature of the disease, as well as secondary problems that occur over time in the post-stroke period such as spasticity and contractures.

Although rehabilitation programs applied after stroke have been reported to provide physical functional improvement (3), stroke patients should be provided early and continuous rehabilitation training to prevent disability and secondary complications.

After acute care, stroke survivors are typically discharged to either hospital-based inpatient rehabilitation or to the community (i.e. outpatient rehabilitation, long-term care, or the home). Outpatient rehabilitation may include hospital-based or home-based rehabilitation depending on service availability and patient need (4). Home-based rehabilitation is a form of service delivery where rehabilitation services are provided at the patient's home. Patients learn and apply the functional skills in their home environment (5). Home-based rehabilitation programs are psychosocioeconomically excellent approaches, as they have no cost and included treatment of the patient at home comfort. Previous studies on home-based rehabilitation outcomes showed inconsistent results, and few meta-analyses were performed to clarify the issues. (6). There is limited knowledge about the mechanisms behind home-based rehabilitation facilitating improved functional outcomes compared to standard treatments. The differences in interventional characteristics such as the number of home visits, interventions performed by an individual practitioner (caregiver, etc.) or a multidisciplinary team, and types of rehabilitation, including exercise, activities of daily living training, and physiotherapy and occupational therapy may account for the limited knowledge (7). In any event, comparability is difficult when trying to justify home-based versus inpatient rehabilitation services. Are home programs effective alternatives to inpatient rehabilitation programs? Do they have an impact on post-stroke mortality and morbidity as well as recovery, which is the main goal of rehabilitation? Can we estimate peri-treatment mortality and morbidity when choosing the therapy? These questions are still unanswered in the literature.

Hence, this study was designed aiming to evaluate whether home-based rehabilitation is as effective as inpatient rehabilitation following acute stroke as well as to estimate peri-treatment mortality and morbidity when deciding on a rehabilitation program.

MATERIAL AND METHODS

Patients

The present study examined 101 patients who had a stroke diagnosis, aged between 18 and 80 years, and had a first-ever ischemic stroke between January 1, 2018 and June 1, 2019 were included in this study. Patients who were discharged from the neurology outpatient clinic and referred to the stroke outpatient clinic or who were referred to the inpatient rehabilitation clinic within the first month (≤30 days) after the completion of their acute treatment in the intensive care unit or acute neurology were included.

Patients with; stroke onset >30 days, hypoxic anoxic brain damage, traumatic-non-traumatic intracranial hemorrhage, known pre-existing dementia/Alzheimer's disease and/or severely impaired cognitive function, known progressive neurological disease or peripheral nerve involvements such as polyneuropathy, decompensated heart disease and/or severe bleeding diathesis, severe hepatic or renal failure, history of psychiatric disease or malignancy, trauma, fracture, fixed joint contracture, amputation or phlebitis at the affected side and medical complications causing interruption of rehabilitation program more than 1/week, were excluded from the study.

101 patients who met the inclusion and exclusion criteria were included in the study. 42 patients were (intervention group) referred to the inpatient treatment unit and 59 patients

admitted to the stroke outpatient clinic (control group) were evaluated for the study. During the study, ; 14 patients who were included in an intervention (inpatient rehabilitation) group were excluded from the stud since less than 4 weeks of inpatient therapy is given. Twenty-three patients in the control group (home-based rehabilitation program) were excluded from the study because they were admitted to another inpatient treatment program.

The study was completed with a total of 64 patients (intervention group, n: 28, control group, n: 36) **(Figure 1)**.

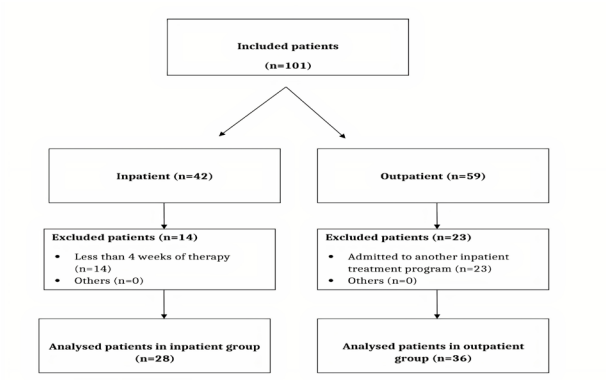

Figure1: Flow Chart

The patients and their relatives (at least one of their family members/relatives) were informed about the study and their written consents were obtained. The study was conducted in accordance with the Declaration of Helsinki Criteria.

Demographic Characteristics

Demographic features of the patients including age, gender and educational status were recorded.

Disease Characteristics

The length of stay in the intensive care unit or neurology clinic (days), hemiplegic side, and stroke classification were recorded. The stroke classification system we used is was the Bamford's classification Bamford's classification relies exclusively on clinical findings to classify the stroke according to the brain territory involved. This clinical tool categorizes stroke syndromes into 4 subtypes: total anterior circulation infarcts (TACI), partial anterior circulation infarcts (PACI), lacunar infarcts (LACI), and posterior circulation infarcts (POCI) (8).

The Brunnstrom stages of motor recovery were applied to assess motor function. Brunnstrom is a six-stage evaluation tool with three different parts concerning the upper extremity, hand, and lower extremity (Stages 1–6, 1: no activity of the limb; 2: spasticity appears, and weak basic flexor and extensor synergies are present; 3: spasticity is prominent; muscle activation is all within the synergy patterns; 4: patient begins to activate muscles selectively outside the flexor and extensor synergies; 5: spasticity decreases; most muscle activation is selective and independent from the limb synergies; 6: isolated movements in smooth, well-coordinated manner) (9).

The Stroke Impact Scale (SIS) used in the study is a stroke-specific outcome measurement tool. SIS is a 59-item stroke-specific measure of function. The SIS consists of eight domains: strength, hand function, instrumental activities of daily living, mobility, communication, memory, emotion and thinking, and social participation. Each item is scored from 'not difficult at all' to 'cannot do at all' on a 5-point scale. (10) The reliability and validity of the Turkish version of the SIS were conducted by Hantal et al. (11).

Functional disability was assessed with the Functional Independence Measure (FIM). FIM provides a measure of disability and an indication of independence in activities of daily living by assessing cognitive and motor functioning. The FIM consists of 18 items that are scored on a 7-points scale, with higher scores indicating a greater level of independence (1=total assistance, 7=total independence; total=126) (12).

Inpatient Rehabilitation / Home-Based Rehabilitation

Patients for inpatient rehabilitation treatment, defined as the intervention group, were hospitalized for 4 weeks and then given a home program for 8 weeks. Patients for the outpatient stroke unit, defined as the control group, were given a 12-week home program.

The Inpatient Rehabilitation Program (intervention group)

included; a range of motion, flexibility, stretching, strengthening, walking, balance, activities of daily living exercises for at least 60 minutes per day, 5 days per week, for 4 weeks, and

electrical stimulation to the required muscles. The patients were discharged from the hospital after 4 weeks of inpatient rehabilitation treatment, and these patients were given an 8-week home program.

Home-Based Rehabilitation Programs

Included the same exercise program (range of motion, flexibility, stretching, strengthening, walking, balance, activities of daily living exercises) for at least 60 minutes per day, 5 days per week, for 12 weeks. The exercise program was explained by the same physiotherapist on the first day to the control group, who was only included in the home-based program.

In order to control the exercise compliance of the patients, they were asked to create a chart where they could mark whether they did daily exercises or not. Both groups were called once a week for control and the accuracy of the exercises was confirmed under the supervision of the same physiotherapist.

The Study protocol and Comparisons

Brunnstrom motor stages, FIM total score, and SIS scores of all patients were recorded before treatment and after 12 weeks by the same physician. Both groups (inpatient/home-based rehabilitation) were compared in terms of these parameters.

In addition, the presence of any morbidity (new SVO or re-hospitalization due to clinical problems) and mortality were recorded during this period. Then, patients with mortality/morbidity were grouped separately; those who received a home-based program and those who received an inpatient program were compared in terms of evaluation parameters.

Ethical Committee

Ethics committee approval of the study was obtained from the Ethics Committee of Diskapi Research and Training Hospital with the date of 16.02.2015 and the number of 20/01.

Statistical Analysis

Data analyses were performed by Statistical Package for the Social Sciences (SPSS) 22.0 for Windows. The Shapiro Wilk test was used to determine if they were different from the normal distribution and descriptive statistics were described as median (minimum-maximum) for continuous variables and frequencies and percentages (%) for nominal variables. Statistically significant differences in repeated measurements within group 2 were evaluated with the Wilcoxon Signed Rank test. Parameters were compared between groups with the Mann-Whitney U test and among the groups with the Kruskal Wallis test and $p<0.05$ scores were accepted as significant.

RESULTS

The median age of patients was 68.5 years (range 49-78 years), and 51.56% were male. Twenty-eight (43.75%) of patients were receiving inpatient rehabilitation program and thirty-six (56.25%) were receiving a home-based exercise program.

Demographic and disease characteristics of both groups were similar ($p> 0.05$) **(Table 1)**.

Table 1: The distribution and comparison of demographic/disease characteristics according to the groups

Evaluated parameters	Home exercise group n=36	Inpatient group n=28	p values
Gender n(%)			
Female	16 (44.44)	15 (53.57)	0.477
Male	20 (55.56)	13 (46.43)	
Age (years) median (Min-max)	69.50 (49-78)	67.50 (56-77)	0.158
Education n(%)			
5 years	18 (50)	18 (64.29)	
8 years	10 (27.78)	4 (14.29)	0.223
11 years	3 (8.33)	3 (10.71)	
More than 11 years	5 (13.89)	3 (10.71)	
Hemiplegic Side n (%)			
Right	22 (61.11)	21 (75)	0.324
Left	14 (38.89)	7 (25)	
Bamford Classification n (%)			
Total anterior	24 (66.67)	17 (60.71)	
Partial anterior	4 (11.11)	6 (21.43)	0.564
Lacunar	2 (5.55)	1 (3.57)	
Posterior	6 (16.67)	4 (14.29)	
Length of Stay (day) median (Min-max)	7.50 (4-14)	10 (1-18)	0.057

** Min-max: minimum-maximum, A value of $p<0.05$ was considered statistically significant.

In the inpatient group, limb motor functional scores and functional disability scores were lower. In terms of quality of life; emotion, communication, and memory subscale scores were similar and other quality of life scores were lower in the inpatient rehabilitation group **(Table 2)**.

Table 2: Distribution and comparison of results of quality of life and functional disability of groups in before therapy

Evaluated parameters median (min-max)	Home exercise group n=36	Inpatient group n=28	p values
Brunnstrom stage (1-6)			
Hand	6 (1-6)	1 (1-6)	**0.001***
Upper extremity	6 (1-6)	1 (1-6)	**0.001***
Lower extremity	6 (1-6)	2 (1-6)	**0.001***
FIM Total score (18-126)	90 (22-126)	64 (36-93)	**0.003***
SIS (0-100)			
Strength	82.50 (20-100)	9.37 (0-87.50)	**0.001***
Hand Function	67 (20-100)	5 (0-60)	**0.001***
Mobility	63 (20-100)	6.90 (0-72.20)	**0.001***
DLA	73 (20-100)	20 (15-50)	**0.001***
Memory	71.50 (0-100)	80.30 (53.50-100)	0.813
Communication	80.50 (0-100)	69.60 (28.50-100)	0.091
Emotion	58 (0-100)	45.80 (22.20-83.30)	0.272
Social participation	39 (20-100)	3.10 (0-68.70)	**0.001***
Physical domain**	72 (10-90)	10 (0-60)	**0.001***

**Min-max: minimum-maximum; FIM: Functional Independence Measure; SIS: Stroke Impact Scale; DLA: daily activity of living. **physical domain occurs combination strength, hand function, activities of daily living, and mobility. A value of $p<0.05$ was considered statistically significant.

At the end of the 12th week, 5 (13.89%) of the 36 patients (home-based program) died, and another 5 (13.89%) had developed a new cerebrovascular disease. Therefore, 12th week controls were completed with 26 patients in the home-based rehabilitation group.There was no increase in mortality and morbidity within the intervention group.

In 26 patients who received a home exercise program, the change in the 12th week scores was not significant, but the improvement in all quality of life subscales was significant in the inpatient group, except for the memory and emotion subscales **(Table 3)**.

Table 3: Comparison of the results before and after treatment according to the groups

Parameters median (min-max)	Home exercise group n=26			Inpatient group n=28		
	Before therapy	12th week	p	Before therapy	12th week	p
FIM Total score (18-126)	93 (22-126)	90 (18-126)	0.362	64. (36-93)	84 (56-102)	0.017
SIS						
Strength	87.50 (20-100)	95 (0-100)	0.098	9.37 (0-87.50)	53.10 (6.20-100)	0.001*
Hand Function	68 (20-100)	78 (0-100)	0.709	5 (0-60)	12.50 (0 -85)	0.016*
Mobility	66.50 (20-100)	88 (0-100)	0.052	6.90 (0-72.20)	47.20 (19.40-88.80)	0.001*
DLA	73 (20-100)	77 (0-100)	0.904	20 (15-50)	31.25 (17.50-85)	0.025*
Memory	75.50 (0-100)	90 (0-100)	0.274	80.30 (53.50-100)	89.20 (60.70-100)	0.158
Communication	84.50 (0-100)	100 (0-100)	0.188	69.60 (28.50-100)	89.20 (46.40-100)	0.021*
Emotion	60 (0-100)	60 (0-100)	0.996	45.80 (22.20-83.30)	52.75 (27.70-88.80)	0.164
Social participation	40 (20-88)	58 (0-100)	0.156	3.10 (0-68.70)	32.75 (9.30-93.70)	0.001*
Physical domain**	75 (10-90)	80 (0-100)	0.302	10 (0-60)	50 (20-90)	0.001*

** Min-max: minimum-maximum; FIM: Functional Independence Measure; SIS: Stroke Impact Scale; DLA: daily activity of living. **physical domain occurs combination strength, hand function, activities of daily living, and mobility. A value of p<0.05 was considered statistically significant.

Improvement was more significant in the group who received inpatient treatment with regard to functional disability and quality of life **(Table 4)**.

Table 4: Distribution and comparison of results of quality of life and functional disability of groups in change with therapy

Evaluated parameters median (min-max)	Home exercise group n=26	Inpatient group n=28	p
FIM total score (18-126)	0 (-6-111)	15 (3-46)	**0.001***
SIS (0-100)			
Strength	0 (-20-100)	25 (0-56.25)	**0.001***
Hand Function	0 (-32-80)	11.50 (0-55)	**0.001***
Mobility	1 (-52-91)	36.15 (13.90-66.70)	**0.001***
DLA	5 (-20-80)	13.75 (2.50-42.50)	**0.015***
Memory	0 (-60-100)	10.75 (7.20-25)	**0.012***
Communication	0 (-17-100)	17.80 (0-39.30)	**0.003***
Emotion	0 (-33 -67)	6.95 (13.90-25)	**0.025***
Social participation	5 (-40 -40)	23.45 (9.30-56.20)	**0.004***
Physical domain**	0 (-20-90)	40 (20-55)	**0.001***

**Min-max: minimum-maximum; FIM: Functional Independence Measure; SIS: Stroke Impact Scale; DLA: daily activity of living. **physical domain occurs combination strength, hand function, activities of daily living, and mobility. A value of p<0.05 was considered statistically significant.

A comparison of 10 patients with increased mortality and morbidity in inpatient and home-based rehabilitation program groups is shown in **(Table 5)**.

Table 5: Distribution and comparison of results of quality of life and functional disability of home exercise, inpatient and mortality-morbidity groups before therapy

Evaluated parameters median (min-max)	Home exercise group n=26	Inpatient group n=28	Mortality/mobidity group n=10	p			
				Among groups	Home-IP	Home-MM	IP-MM
FIM Total score (18-126)	93 (22-126)	64 (36-93)	66.20 (43-126)	0.011*	0.001*	0.003*	0.891
SIS (0-100)							
Strength	87.50 (20-100)	9.37 (0.-87.50)	80 (60-100)	0.005*	0.001*	0.495	0.001*
Hand Function	68 (20-100)	5 (0-60)	65 (20-100)	0.001*	0.001*	0.782	0.001*
Mobility	66.50 (20-100)	6.90 (0-72.20)	55.50 (20-100)	0.001*	0.001*	0.789	0.001*
DLA	73 (20-100)	20 (15-50)	65 (20-100)	0.001*	0.001*	0.817	0.001*
Memory	75.50 (0-100)	80.30 (53.50-100.)	55 (0-100)	0.001*	0.193	0.038*	0.001*
Communication	84.50 (0-100)	69.60 (28.50-100)	55.50 (0-100)	0.001*	0.171	0.001*	0.033*
Emotion	60 (0-100)	45.80 (22.20-83.30)	24.50 (0-78)	0.001*	0.390	0.001*	0.025*
Social participation	40 (20-88)	3.10 (0-68.70)	20 (0-100)	0.001*	0.001*	0.026*	0.004*
Physical domain**	75 (10-90)	10 (0-60)	45 (30-90)	0.001*	0.001*	0.018*	0.016*

**Min-max: minimum-maximum; FIM: Functional Independence Measure; SIS: Stroke Impact Scale, DLA: daily activity of living; IP: inpatient group, MM: Mortality/morbidity group. **physical domain occurs combination strength, hand function, activities of daily living, and mobility. A value of p<0.05 was considered statistically significant.

DISCUSSION

Most stroke patients experience persistent difficulty with daily tasks as a direct consequence of stroke. It has been reported that 2/3 of stroke patients were receiving acute and post-acute rehabilitation services (13). Despite advances in modern medicine, most stroke patients remain with residual functional deficits. It causes a serious economic burden worldwide and is a global epidemic problem (14). It has been reported that inpatient stroke rehabilitation programs increase the burden and cost of illness (15). Therefore, implementing home based rehabilitation programs instead of inpatient rehabilitation services may provide a serious economic benefit. Based on this hypothesis, in the present study; home-based stroke rehabilitation after accelerated hospital discharge and early inpatient stroke rehabilitation were investigated with a broad spectrum of outcomes, such as death, readmissions to hospital, health-related quality of life and functional disability.

In the literature, the results of home based rehabilitation programs are contradictory. Some studies examined the effects of home-based rehabilitation on the functional outcome of patients with stroke. Björkdahl et al. reported benefits in physical function, balance, and walking after three different models of stroke rehabilitation such as early supported discharge in a day unit or at home, and traditional treatment (16). Chi et al., a meta-analysis of data from 49 studies showed that performing home-based rehabilitation can exert moderate improvements in physical function in home-dwelling patients

with a stroke (6). However, it has been shown to be ineffective in some studies (17). In a randomized, controlled trial, forty-two patients received early hospital discharge and home-based rehabilitation, and forty-four patients continued with conventional rehabilitation care after randomization. Anderson et al. have reported although patients received multidisciplinary home-based rehabilitation that was specifically targeted toward their individual needs, the program had no significant impact on their general health or physical or psychological outcomes and the program had an adverse impact on caregivers (17).

As a result of our work, improvements were significantly greater in patients receiving inpatient rehabilitation than home-based rehabilitation patients in the motor recovery and functional disability areas as well as the stroke impact scores. In the current study, the change in the 12th -week scores was not significant among the home exercise group, but the improvement in all quality of life subscales was significant in the inpatient group, except for the memory and emotion subscales. Despite these results, according to our general knowledge, patients with stroke have more spontaneous recovery in the first 3 months. Even if we do not give inpatient treatment to some of our patients, we may think that they will recover on their own. Unfortunately, it is not possible to distinguish between them as of now. However, studies in the literature reported that early rehabilitation increases cortical reorganization and neural plasticity, as in our study. (18). In addition, 5 (13.89%) of the 36 patients (home exercise program) died, and another 5 (13.89%) had developed a new cerebrovascular disease at the end of 12th week. Mortality rates from inpatient data did not increase during the 12 weeks. In addition, there were no complications secondary to treatment in inpatient patients. In the literature, although the rates vary regionally, the early period of stroke is the period with the highest mortality and morbidity (19). We think that inpatient treatment in the early period may be necessary due to the neural plasticity effect of the treatments given in this period and the chance to intervene in medical problems that may cause possible mortality and morbidity. Because although we included medically stabilized patients in our study, morbidity and mortality may increase secondary to the treatments applied to the patients, immobilization, or intervening infections during the post-stroke period (20).

To the best of our knowledge, our study is one of the first in the literature to show the difference in morbidity and mortality between two home-based and inpatient rehabilitation programs. In our study, treatment at the rehabilitation center was found to be more effective, but an important point is the early treatment.

In the studies carried out, it was found that the majority of patients with stroke were not eligible for early supported discharge due to disease severity, and discharge home was not realistic because of the disability severity (21). Adversities are often unrecognized during hospitalization and may only become evident after returning home. Moreover, the home-based rehabilitation program did achieve early discharge from the hospital and a marked reduction in the total length of stay. According to our results, the median length of hospital stay was 7.50 days and it was compatible with the literature (22). Another interesting result of our work is lower values on communication, emotion and social participation domains of the SIS in the patients who developed mortality and morbidity than that for both groups.

Lima et al. described an inversely proportional relationship between the severity of the stroke, disability and QoL. They found that QoL (the most affected domains were as follows: Work/ Productivity, Social Roles, Personality, Energy and Family Roles) was negatively correlated with the values of the Rankin and NIHSS scales (23). The NIHSS (National Institutes of Health Stroke Scale). total score was significantly associated with only the family role subscale of the 15 HRQoL (Health-related quality of life) subscales and total scores under investigation in another study (24).

On the other hand, Törnbom et al. investigated the self-assessed physical, emotional, and cognitive impact of stroke and associations of participation and stroke severity in the early stage and they found that participants with a more severe stroke perceived greater problems and

scored lower on all domains of the SIS, although scores of the emotion, memory, thinking and communication domains were high regardless of stroke severity (25).

To better manage difficult clinical encounters, the physician needs to identify patients who receive inpatient rehabilitation or home-based rehabilitation. We need to implement home-based rehabilitation programs for patients who can and will engage and benefit. Further studies are needed to define patients who may specifically benefit from the home rehabilitation program. Additionally, future research aimed to facilitate social participation and communication can be beneficial to improve the mortality and morbidity rate of stroke patients.

The present study has limitations. We think that our most important limitation is the small sample size. Unfortunately, it was not possible to increase the number because the same program was applied to all patients by the same physiotherapist in order to ensure homogeneity and there was a long follow-up period of 90 days with weekly follow-ups. In addition, home-based rehabilitation is inappropriate for patients with severe disabilities. Therefore, participants with poor physical functioning were included in the inpatient group. As the functional disability and quality of life scores before the treatment were not similar between the groups, it may have affected the rate of improvement among the treatment of groups. Registrations of activities among home-based group patients were not performed between baseline and 90 days post-stroke. The frequency of daily training may differ among patients, which may be considered another limitation.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

PEDİATRİK HEMATOLOJİ-ONKOLOJİ HASTALARININ EBEVEYNLERİNİN KAYGI YÜKÜNÜN İNCELENMESİ

EVALUATION OF ANXIETY BURDEN AMONG PARENTS OF PEDIATRIC HEMATOLOGY AND ONCOLOGY PATIENTS

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ÖZET

AMAÇ: Kanser hastası çocuğa sahip ebeveyn tanı ve tedavi sürecinde fiziksel ve psikolojik bir çok zorlayıcı faktörle yüzleşir. Bu çalışma bu ebeveyn grubunda kaygı düzeyi ve kaygıya etki eden faktörleri incelemek amacıyla yapılmıştır.

GEREÇ VE YÖNTEM: Araştırma, Haziran - Temmuz 2021 tarihleri arasında bir çocuk hematoloji tedavi merkezinde gerekli etik izinler alınarak yapıldı. Çocuğu kanser tanısı almış 100 ebeveyne 'STAI anksiyete ölçeği anketi' uygulandı. Veriler dağılım özelliğine göre seçilmiş olan uygun istatiksel yöntemlerle (ki-kare, Anova ve ortalama-t-testi) ile değerlendirildi; p<0,05 istatiksel anlamlı olarak kabul edilmişdi.

BULGULAR: Gelir durumu yüksek ailelerin çocuk sayısının anlamlı olarak düşük olduğu görüldü (p=0,023). Eğitim düzeyi arttıkça, anne ve babaların STAI kaygı ölçeği skorlarının da istatistiksel anlamlı olarak arttığı görüldü (p=0,019). Hasta çocuğun tedavi alıyor olmasının, remisyonda olmasının veya relaps hastalık durumunun ebeveyn kaygı düzeyine anlamlı etki etmediği görüldü (p=0,785).

SONUÇ: Ebeveynin yüksek eğitim seviyesi ve azalmış gelir durumu artmış anksiyete düzeyi ile ilişkili bulunmuştur. Anne ve babalar ile psikolog eşliğinde düzenli aralıklarla yapılacak bilgilendirme toplantıları kaygıyı azaltıcı etkide bulunabilir.

ANAHTAR KELİMELER: Anksiyete, Çocuk, Ebeveynler, Hematoloji, Onkoloji.

ABSTRACT

OBJECTIVE: Parents of a child with cancer faces many physical and psychological challenging factors during the diagnosis and treatment process. This study was conducted to examine the level of anxiety and the factors affecting anxiety in this parent group.

MATERIAL AND METHODS: The study was conducted in a pediatric hematology treatment center between June and July 2021 after obtaining ethical permissions. The 'STAI anxiety scale questionnaire' was administered to 100 parents whose children were diagnosed with cancer. The data was evaluated with appropriate statistical methods (chi-square, Anova and mean-t-test) selected according to the distribution feature; p<0.05 was accepted as statistically significant.

RESULTS: It was observed that the number of children in families with high income was significantly lower (p=0.023). As the education level increased, the STAI anxiety scale scores of the parents also increased statistically significantly (p=0.019). It was observed that the child's receiving treatment, being in remission, or relapsed illness did not have a significant effect on the parental anxiety level (p=0.785).

CONCLUSIONS: Parents' high education level and reduced income were found to be associated with increased anxiety levels. Informative meetings to be held at regular intervals with parents in company of psychologists can have a reducing effect on anxiety.

KEYWORDS: Anxiety, Child, Parents, Hematology, Oncology

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GİRİŞ

Çocukluk çağı kanser sıklığı her geçen yıl dünya çapında artış göstermekte ve artışın devam edeceği öngörülmektedir (1). Tanı ve tedavi süreci zorlu, uzun süreli ve invaziv bir çok tıbbi işlem gerektiriyor olması, yaş itibariyle bakıma muhtaç bu hastalık grubunu her geçen gün daha ön plana çıkarmaktadır. Kuşkusuz her çocuk kanser hastası bu sıkıntılı süreçte fiziksel ve psikolojik olarak ebeveyn desteğine ihtiyaç duymaktadır. Anne-babalar (veya bakım veren kişi) kanser tanısı sonrası öncelikle psikolojik bir yıkım yaşamakta; ardından yıllar sürebilecek, günlük yaşamsal fonksiyonların idamesi, tedaviye bağlı komplikasyonlar ve hasta kaybına ile sonlanabilen bir çok zorlayıcı faktörle baş etmek zorunda kalmaktadır. Bakım verenler psikososyal yönden ağır hasar veren bir tablo ile baş etmek zorunda kalmaktadır (2). Kaygı, diğer ifadeyle endişe anlamına gelmekte olup psikiyatrik açıdan kaygı, korku duygusu ile ortaya çıkan, bedensel semptomların da eşlik ettiği sebepsiz anormal tedirginlik hali olarak tanımlanır.

Ülkemizde de çocukluk çağı kanser insidansı değerlendirildiğinde durum dünya trendine paralel olmakla birlikte her yıl ortalama vaka sayısı artış göstermektedir. Türk Pediatrik Onkoloji Grubu ve Türk Pediatrik Hematoloji Derneği verilerinde 2009-2020 yılları arası kayıtlarına göre çocukluk çağı kanserlerinde ilk üç sırayı lösemiler, beyin tümörleri ve lenfomaların aldığı görülmektedir (3). Bugüne değin yapılan çalışmalarda sıklıkla hasta çocukların psikolojik sorunları üzerinde durulmuştur. Ancak bakım veren ebeveyn de bu süreçte bir çok sorunla yüzleşmekte fiziksel, psikolojik ve sosyal anlamda kısa ve uzun vadede zorluk yaşamaktadır (4). Kanser tanısı için yapılan operasyon veya girişimsel işlemler, ilk tanı ilk öğrenildiğinde yaşanılan şok, tedavi için uzun süreli hastanede yatış ve tedavi gereksinimi, hastalığa veya tedaviye bağlı komplikasyonlar, hastaneye ulaşım sorunları, sağlık ekibi ile ilişkiler ve tedavi maliyetleri başlıca ebeveyn problemlerini oluşturmaktadır (5, 6). Ebeveynin hastalığı kabullenme süresinin uzaması, hastalığın uygulanan tedaviye tam yanıt vermemesi, tedavi süresinin planlanan süreyi aşması, hastalığın nüksetmesi ve hastanın terminal dönemde olması gibi nedenler de ebeveyn üzerinde anksiyeteyi arttıran diğer nedenlerdendir (7). Ebeveynin eğitim durumu ve hastalığa ait bilgi seviyesi de kaygı düzeyine etki eden faktörler arasındadır. Ebeveyn hastalığın tanısı öncesi şikayet döneminde, tanı sürecinde, tedavide ve tedavi sonrasında hastanın yanında bakım veren kişi olarak psikolojik ve fiziksel destek sağlayan en önemli kişilerdir. Bu nedenle ebeveynin kaygı düzeyinin değerlendirilmesi, hastanın en büyük destekçisi olan ebeveyni ve dolayısıyla hastayı direkt olarak etkilemektedir. Bu çalışmada kanser tanısı alan çocuk hastalarda bakım sağlayan ebeveynin kaygı düzeyini etkileyen faktörlerin incelenmesi amaçlanmıştır.

GEREÇ VE YÖNTEM

Araştırma prospektif, kesitsel bir çalışma olup Haziran - Temmuz 2021 tarihlerinde Acıbadem Adana hastanesinde bulunan bir pediatrik hematoloji-onkoloji kliniğinde yapıldı. Çalışma Etik Kurul onayı alınarak "Helsinki İnsan Hakları Bildirisi" ile ilgili kılavuz ilkelere uygun olarak yürütüldü. Kurumumuzda Temmuz 2012- Temmuz 2021 tarihleri arasında tedavi görmüş 0-18 yaş arası çocuk hematoloji ve onkoloji hastaları çalışmaya dahil edildi. Hastaların ebeveynlerinden aydınlatılmış onam alındı. Bilgilere tıbbi hasta dosyalarından ulaşıldı. Hastaların yaşı, cinsiyeti, tanısı bilgileri alındı. Çalışmaya dahil edilmesi planlanan çocuklarına kanser tanısı konulmuş 58 ebeveyn çiftin 8'i çalışmaya katılmayı kabul etmeyince 50 çift ile çalışma yapıldı.

Araştırmaya Acıbadem Adana Hastanesinde çocuk hematoloji servis ve polikliniğine başvuran ve kemoterapi tedavisi alan çocukların (0-18 yaş aralığında kanser kemoterapisi almış) anne, baba veya sürekli bakım veren velileri dahil edilmesi planlandı. Veriler konuya ilişkin literatürlerden yararlanılarak araştırmacılar tarafından hazırlanan 25 soruluk bilgi formu ve STAI kaygı ölçeği kullanılarak toplanacaktır. Bilgi formunun ilk bölümünde demografik özelliklerle ilgili 13 soruya (anne ve babanın yaşları, mesleği ve gelir durumu vb.) yer verildi. Ölçekte ikinci bölümü ise, çocuğun tedavisine yönelik olarak hazırlandı. Durumluk alanda 20, sürekli alanda 20 soru vardır. Dört puanlık Likert tipi ölçüm sağlamaktadır. Bir puan, soruda belirtilen durumun kendilerini hiç yansıtmadığını; 4 puan, soruda belirtilen durumun kendilerini tamamen yansıttığını gösterir. Toplam 7 puan ve üzeri artmış kaygı durumunu göstermektedir.

Etik Kurul

Çalışma için Acıbadem Üniversitesi Tıp Fakültesi Klinik Araştırmalar Etik Kurulu'ndan 09.06.2021 tarihinde 2021-10/25 sayılı etik kurul onayı alınmıştır.

İstatistiksel Analiz

Veriler, Statistical Package for Social Sciences (SPSS) 22.0 istatistik programında, dağılım özelliğine göre seçilmiş olan uygun istatistiksel yöntemlerle (ki-kare, Anova ve ortalama-t-testi) ile değerlendirildi; p<0,05 ise istatistiksel anlamlı olarak kabul edildi. Öncelikle sosyo demografik veriler yüzde analizi yapılıp her bir gruba giren kişi sayısı ve yüzdesi belirlendi; ölçek puanları ile istatiksel anlamlılık açısından karşılaştırılacaktı (ki-kare testi). Ardından her bir ölçek için kişilerin aldıkları ortalama puanlar hesaplandı, testlerin birbirine göre anlamlılıkları karşılaştırıldı (ortalama-t-testi).

BULGULAR

Hastaların %56'sı (n=56) erkek, %44'ü (n=44) kız idi. Çalışmanın yapıldığı dönemde %40'ı kemoterapi alırken, %53 hasta remisyonda tedavisiz takipte ve %7'si relaps hastalık nedeniyle tetkik ediliyordu.

Pediatrik hematoloji-onkoloji kliniğinde kanser tanısı almış 0-18 yaş arası 50 çocuk hastanın her birinin hepsi evli olan anne (n=50, %50 kadın) ve babaları (n=50, %50 erkek) çalışmaya dahil edildi **(Tablo 1)**.

Ebeveynlerin 8'i (% 8) 20-30 yaş arasında, 63'ü (%63) 31-40 yaş arasında ve 29'u (%29) 41 yaş ve üzerindeydi. Ebeveynlerin STAI anksiyete skor ortalaması 6.03±3.12 idi. Ebeveynlerin 2'sinin (%2) okuma yazması yoktu. İlkokul, ortaokul, lise ve üniversite mezunu ebeveyn sayısı sırası ile 7 (%7), 21 (%21), 26 (%26) ve 44 (%44) idi. Tek çocuğu olan ebeveyn sayısı 12 iken (%12), 5 çocuğu olan ebeveyn sayısı 4 (%4) idi. En yüksek oran %48 ile iki çocuklu ailelerin idi. İkamet edilen merkezlere bakıldığında en yüksek oran il merkezleri (%64) iken bunu %25 ile ilçe ve %11 ile köyler takip ediyordu. Ebeveynlerin %34'ü çocuğuna tek başına bakım verirken %66'sı eşinden yardım alıyordu. Anne-babaların %47'si bir meslek grubunda çalışırken %53'ü çalışmıyordu. %52'sinin aylık geliri giderinden fazla ve yüksek gelirli iken %38'inin gideri gelirinden fazla ve düşük gelirli idi. Çalışmaya katılan anne ve babaların %21'inin birinci veya ikinci derece akrabasında kanser tanısı almış birey vardı.

Tablo 1: Hasta ve ebeveynlerin demografik özellikleri

Değişkenler		
Ebeveynlerin Özellikleri	**n**	**%**
Cinsiyet		
Erkek	50	50
Kadın	50	50
Yaş (yıl)		
20-30	8	8
31-40	63	63
41 ve üzeri	29	29
Eğitim Düzeyi		
Okuma-yazma yok	2	2
İlkokul	7	7
Ortaokul	21	21
Lise	26	26
Yüksekokul	44	44
Çocuk Sayısı		
1	12	12
2	48	48
3	26	26
4	10	10
5 ve üzeri	4	4
Yaşadığı Yer		
İl	64	64
İlçe	25	25
Köy	11	11
Çocuğuyla Yalnız İlgilenme		
Evet	34	34
Hayır	66	66
Çalışma Durumu		
Evet	47	47
Hayır	53	53
Gelir Durumu		
Düşük	38	38
Orta	10	10
Yüksek	52	52
Hasta Özellikleri		
Cinsiyet		
Erkek	56	56
Kadın	44	44
Tedavi		
Kemoterapi	40	40
Remisyon	53	53
Relaps	7	7
Ailede benzer hastalık		
Evet	21	21
Hayır	79	79

Ebeveynlere ait sosyodemografik verileri, tanıtıcı özellikleri ile STAI anksiyete ölçeği skorlarının karşılaştırılmasına ilişkin sonuçlar **Tablo 2**'de verilmiştir. Çalışan ebeveynlerde erkek cinsiyet oranı anlamlı olarak yüksekti (p=0,001). Ebeveyn cinsiyeti ile STAI skor puanı arasında istatistiksel anlamlı ilişki kurulamadı (p=0,489). Eğitim düzeyi yüksek ebeveynleri il merkezlerinde yoğunlaştığı görülürken (p=0,001), yaşadığı yer ile STAI skor puanı arasında istatistiksel ilişki olmadığı tespit edildi (p=0,639). Eğitim seviyesinin yükseldikçe çocuğuna tek başına bakım veren ebeveyn sayısında artış olduğu, anne ve babaların çalışma oranlarının ve gelir durumunun arttığı belirlendi (p=0,01). Ayrıca eğitim düzeyi arttıkça, anne ve babaların STAI kaygı ölçeği skorlarının da istatistiksel anlamlı olarak arttığı görüldü (p=0,019). Gelir durumu yüksek ailelerin çocuk sayısının anlamlı olarak düşük olduğu tespit edildi (p=0,023). Çocuk sayısı STAI skoru arasında ise anlamlı ilişki kurulamadı (p=0,204). Şehir merkezinde yaşayan ailelerde tek başına bakım verme oranı anlamlı olarak yüksekti

(p=0,013). Çocuğuyla yalnız ilgilenen ebeveynlerde (hasta bakım yükü) çalışan anne baba olma oranı (p=0,035) ve gelir durumu (p=0,001) daha yüksek bulunurken bu durumun STAI skor puanına anlamlı yansıması olmadı (p=0,204). Gelir durumu yüksek ebevenlerde STAI skorunun istatistiksel olarak daha yüksek olduğu bulundu (p=0,042). Hasta çocuğun tedavi alıyor olmasının, remisyonda olmasının veya relaps hastalık durumunun STAI skoruna anlamlı etki göstermediği görüldü (p=0,785).

Tablo 2: Ebeveynlere ait sosyodemografik verileri, tanıtıcı özellikleri ile STAI anksiyete ölçeği skorlarının korelasyon analizi değerlendirmeleri

Özellikler	Değişken	Pearson Korelasyon	p
Cinsiyet	Çocukla yanlız ilgilenme	0.127	0.208
	Çalışma durumu	0.621	0.001*
	STAI skoru	0.066	0.489
Eğitim	Çocuk sayısı	0.461	0.001
	Yaşadığı yer	0.338	0.001†
	Çocukla yanlız ilgilenme	0.361	0.01‡
	Çalışma durumu	0.259	0.009§
	Gelir durumu	0.249	0.013‖
	STAI skoru	0.235	0.019¶
Çocuk sayısı	Çocukla yanlız ilgilenme	0.176	0.08
	Çalışma durumu	0.176	0.08
	Gelir durumu	0.227	0.023**
	STAI skoru	0.062	0.539
Yaşadığı yer	Çocukla yanlız ilgilenme	0.247	0.013††
	Çalışma durumu	0.120	0.236
	Gelir durumu	0.118	0.243
	STAI skoru	0.045	0.639
Çocukla yanlız ilgilenme	Çalışma durumu	0.211	0.035‡‡
	Gelir durumu	0.332	0.001ϑ
	STAI skoru	0.128	0.204
Çalışma durumu	Gelir durumu	0.329	0.001γ
	STAI skoru	00.061	0.545
Gelir durumu	STAI skoru	0.203	0.042ς
Tedavi durumu	STAI skoru	0.026	0.785

*Erkek cinsiyet oranı yüksek †İl merkezinde yaşamak ‡Anne ve babanın birlikte bakım vermesi

§Çalışan anne ve/veya baba ‖Gelir durumunun yüksek olması ¶STAI skorun yüksek olması

**Gelir durumunun düşük olması ††İl merkezinde yaşama ‡‡ Çalışan anne ve/veya baba

ϑGelirin giderden fazla olması γGelirin giderden fazla olması çSTAI skorun yüksek olması

TARTIŞMA

Kanser tanısı, tanı alan çocuğun aile üyelerinde bilhassa bakımından sorumlu ebeveynlerde korku, kaygı, stres ve umutsuzluk gibi bir çok psikolojik etkiye yol açmaktadır. Anne ve babalar tanı ve tedavi sürecinde psikolojik ve fiziksel çok sayıda zorlayıcı faktörle baş etmek zorunda kalmaktadır. Tanısal invaziv işlemler, tanı konulduktan sonra yaşanılan psikolojik şok, uzun süren kemoterapi, hastalık ve tedaviye bağlı komplikasyonlar, hastalık sekeli, ölüm, remisyona giren hastada relaps endişesi, ekonomik yük aile birliğinin bozulması ve ebeveynin hasta çocuk haricindeki çocuklara azalan ilgisi beraberinde önemli bir anksiyete tablosuna yol açmaktadır. Bu yazıda kanser tanısı almış çocuğun ebeveynlerinde kaygı durumu ve bu durumun sosyodemografik, sosyokültürel ve hastalık ilişkili parametrelerle ilişkisi araştırılmıştır.

Çalışmamızda ebeveynlerde cinsiyet değişikliğinin anksiyete düzeyine anlamlı etkisi olmadığı tespit edildi (p=0,489). Annelerin ve babaların bu olumsuz durumdan benzer ölçüde etkilendikleri görüldü. Benzer şekilde McCarthy ve ark. nın çocukları kanser tanısı almış 143 ebeveynle yaptıkları araştırmada ebeveynlere 6-8 ay ara ile iki farklı zamanda PAT2.0 psikososyal değerlendirme testi ile anksiyete durumlarını da ölçen bir test uygulamış ve yapılan değerlendirmede anne ve babaların kaygı düzeylerinin benzer olduğu tespit edilmiştir. Bu durum modern Türk aile yapısında eşlerde yardımlaşmanın artması, kaygı ve üzüntünün paylaşımı ile açıklanabilir (2).

Araştırmamızda dikkat çeken bir nokta ebeveynlerde eğitim düzeyi arttıkça STAI anksiyete ölçek skorlarının artmasıydı (p=0,019). Bu durum eğitimli anne-babaların hastalık hakkında internet ve sosyal medya araçları ile daha çok bilgi toplayan, hekimlere daha çok soru yönelten kişiler olmaları dolayısıyla hastalığın ciddiyetini, tedavi komplikasyonlarını ve sonuçlarını geniş bir yelpazede irdelemeleri nedeniyle olabilir. Buna rağmen Köse ve ark. kanser tanısı almış çocuğu olan 100 ebeveyn ile yaptığı çalışmada eğitim seviyesi ile anksiyete düzeyi arasında anlamlı ilişki kurulamamıştır (4). Bu durum örneklemlerin heterojen olması, skorların kültürel özellikler dahil bir çok faktörden etkilenmesi ile açıklanabilir. Sosyal medyanın doğru kullanımı ve psikolog eşliğinde sık aile bilgilendirme toplantıları düzenlenmesi sosyal ağlardaki bilgi kirliliğinin ebeveyni olumsuz etkilemesinin önüne geçerek kaygıyı azaltabilir.

Ailelerin çocuk sayılarının anksiyete düzeyleri ile ilişkisi sorgulandığında ise beklenenin aksine kaygı düzeyinin çocuk sayısından bağımsız olduğu görülmüştür. Çocuk sayısı 1 olan olan ebeveyn ile 5 ve üzeri olanlar arasında kaygı seviyesi açısından fark yoktu (p=0,539). Çok çocuklu ebeveynin kanser olmayan sağlıklı çocuklarının da gelecekte kanser olabileceği endişesi bu sonucu açıklayabilir. Benzer şekilde Arıkan ve ark. 31 kanser hastası çocuk ebeveyni ile yürüttüğü çalışmada çocuk sayısı ile ebeveyn anksiyete düzeyi arasında anlamlı ilişki kurulamamıştır (8). Aynı çalışmada en yüksek anksiyete skor farkı bir ve iki çocuklu ebeveyn arasında olup etken olarak ikinci çocuğu kaybetme korkusuna bağlanmıştır.

Kanserli çocukla, hastanın tek ebeveyni veya aynı anda iki ebeveyni birlikte ilgilenebilmektedir. Çalışmamızda bu konu araştırılmış olup literatürden farklı şekilde hasta çocuğuyla tek başına ilgilenen ebeveynler ile partnerinden yardım alarak ilgilenen ebeveynlerin kaygı düzeyleri benzer çıkmıştır (p=0,204). Bir diğer anlamda bakım yükü azalan ailelerde anksiyete seviyesinin daha az olması beklenen sonuçtur. Literatüre bakıldığında Wang ve ark. akut lenfoblastik lösemi tanılı çocuğa sahip 130 ebeveyn ile yaptığı çalışmada bakım yükü fazla olan ebeveynlerde stres ve kaygı seviyelerinin anlamlı olarak yüksek olduğu saptanmıştır (9). Çalışmamızda 'Çocuğunuzla tek başınıza mı ilgileniyorsunuz?' sorusu yanlış bir algı ile hastanın yanında fiziki olarak tek olarak kendilerinin bulunduğu şeklinde algılanmış ve bu nedenle eşlerinde aldıkları fiziksel ve psikolojik bakım yükü desteği istatistiki planda göz ardı edilmiş olabilir.

Ebeveynlerin yaşadığı merkez ile STAI skor kıyaslaması yapılmış, köyde ve il merkezinde yaşayan ebeveynlerin kaygı düzeyleri benzer bulunmuştur (p=0,639). Artık habere ulaşma araçlarının elektronik ortamda yaygın olması hastalık algısı ve bilgiye ulaşma bakımından kırsal-şehir ayrımını ortadan kaldırmış ve fiziki/beşeri coğrafyayı eşitlemiş olabilir. Şehir merkezlerine uzak olmanın hasta yakınlarına ek bir stres yükü getirdiği aşikardır (10). Bu nedenle hastaların tanı aldıktan sonra evini tedavi gördüğü hastaneye yakın bölgeye taşımış olması, ihtiyaç anında hızlı ve zaman kaybetmeden tedavi gördüğü merkeze ulaşabilmiş olması da bu durumu açıklayabilir.

Kanser tanı, tedavi ve takip sürecinde ailelerin zorlu mali sorunlarla karşı karşıya kaldıklarını ve gelir kaybı yaşadıkları açıktır (11). Çalışmamızda ebeveyn gelir durumu ile kaygı düzeyi arasında istatistiksel anlamlı bir ilişki mevcuttu (p=0.042). Gelir düzeyi yüksek ailelerde kaygı düzeyinin daha az olduğu ortaya konuldu. Literatürde çalışmamızda elde ettiğimiz sonuçla benzer yayınlar mevcuttur (12). Yıldırım ve ark. 3-12 yaşları arası kanser tedavisi tedavisi gören çocuğa sahip 80 anne ile yaptığı çalışmada gelir düzeyi arttıkça kaygı düzeyinin azaldığı tespit edilmiştir (7). Benzer şekilde Çınar ve ark. kanser tanısı ile tedavi görmekte olan 136 hasta çocuk ebeveyni ile yaptığı çalışmada ekonomik durumun ebeveyn stresini anlamlı olarak arttırdığı görülmüştür (p=0,000) (13). 23 anne ile başka bir çalışmada ise maddi boyuta vurgu yapılmış, yoksul kategorisinde değerlendirilen ailelerin kanser tedavisi sonrası ekonomik durumlarının tedavi giderleri ile daha da kötüleştiği bildirilmiştir (14). Sosyal güvenlik kurumları ile yapılacak finansal sözleşmeler ailelerin tedavi giderleri için ayıracağı kaynağı azaltarak bu olumsuz durumu ortadan kaldırabilir. Ayrıca hastalarımıza tanı ve tedavi sürecinde uzman psikolog eşliğinde verilen desteğin arttırılması ile ailelerin maddi nedenlerle tedavilerinin aksaması veya ek maliyetler (operasyon gereksinimi vb.) çıkması gibi endişelerinin önüne geçilebilir. Geliri yüksek aileler alanında uzman psikologlardan destek alabilir. Bunun dışında bakım yükünü azaltmak, evin düzenini sağlamak için yardımcı personel kullanabilir. Mutfak masrafı ve yol ücreti gibi tedavi dışı giderler için destek almak da bu kapsamda değerlendirilebilir.

Hastalarımızın tedavi durumları incelendiğinde aktif kemoterapi alan, remisyonda olan ve relaps olan hasta ebeveynlerinin anksiyete düzeyleri arasında anlamlı fark olmadığı görülmüştür (p=0,785). Kanser tanısı almış çocuğa sahip ailelerle yakın çalışmaları aktaran 58 makaleyi kapsayan yakın zamanda yayınlanmış bir meta-analizde ebeveynlerin anksiyete, depresyon ve postravmatik stres bozukluğu durumunun çalışmamıza benzer şekilde hastanın tedavinin hangi fazında olduğu ile yaygın olarak ilişkili olmadığı görülmüştür (15). Aksine, Boman ve ark. malignite tanısı almış ve kanser tedavisinin farklı periodlarında olan 264 ebeveynin stres düzeylerini incelediği kesitsel çalışmada tanı üzerinden geçen zaman uzadıkça anne ve babalardaki stres düzeyinin azaldığı ortaya konmuştur (16). Literatürde benzer şartlara sahip ebeveynler ile yapılmış anksiyete, depresyon ve posttravmatik semptomların aylar içerisinde anlamlı şekilde azaldığını gösteren çalışmalar mevcuttur (17 - 19). Çalışmamızda alınan bu sonuçta, zaman çizgisine relaps/refrakter kanser hastalığına sahip hastaların da dahil edilmiş olması katkıda bulunmuş olabilir. Zira ailelerin bu zorlu dönemde kendileri gibi çocuğu kanser tanısı almış ebeveynler ile fikir alışverişinde bulunması kanser hastalığının tekrarlaması kaygısını alevlendirmektedir. Kaygının tanımı, DSM V kriterlerine göre aslında var olmayan ancak olmasından endişelenilen ruh hali olarak belirlenmiştir (20).

Sonuç olarak pediatrik kanser hastalarının ebeveynlerinde anksiyete yaygın olarak görülmekte ve bir çok faktörden etkilenmektedir. Ebeveynin yüksek eğitim seviyesi ve azalmış gelir durumu artmış anksiyete düzeyi ile ilişkili bulunmuştur. Multidisipliner yaklaşım ile verilecek profesyonel psikolojik destek ve sık aralıklarla yapılacak yüz yüze aile bilgilendirme toplantıları anne ve babaların kaygı düzeylerini azaltıcı etkide bulunabilir.

Teşekkür

Hasta bilgilerinin toplanmasında çalışma ekibine yardımcı olan tıbbi sekreter Burcu Polat'a teşekkürler ederiz.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

TELARŞLI PUBERTE PREKOKS HASTALARINDA VASKÜLARİTENİN DOPPLER ULTRASONOGRAFI YÖNTEMLERİ İLE DEĞERLENDİRİLMESİ

ASSESSMENT OF VASCULARITY WITH DOPPLER ULTRASONOGRAPHY METHODS IN PATIENTS OF PUBERTY PRECOCIOUS WITH THELARCHE

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ÖZET

AMAÇ: Bu çalışmanın amacı; telarş değerlendirilmesinde meme vaskülarite düzeyi ile Tanner evrelemesi arasındaki korelasyonun araştırılması ve vaskülaritenin gösterilmesinde doppler yöntemlerinin karşılaştırılmasıdır.

GEREÇ VE YÖNTEM: Ekim - Aralık 2017 tarihleri arasında puberte prekoks ön tanısı ile başvuran ve memede şişlik şikâyeti olan, radyoloji kliniğine refere edilen 6-10 yaş arası kız çocukları çalışmaya dahil edildi. Katılımcıların hepsine meme ultrasonografi (US) ve renkli doppler ultrasonografi (CDUS) tetkiki yapıldı. Tüm katılımcıların takvim yaşı, Folikül Stimülan Hormon (FSH), Luteinizan Hormon (LH), Estradiol (E2), telarş evresi, her iki meme volümü değerlendirildi. Her iki meme için renkli doppler (CD), Power doppler (PD) ve superb mikrovasküler görüntüleme (SMI) yöntemleri kullanılarak vasküler skorlar ölçüldü.

BULGULAR: Çalışmaya 116 kız çocuğu, 213 telarşlı meme dahil edildi. Her bir meme için ölçülen derinlik transvers, longitudinal çap ölçümleri ve meme volümü ile sonografik Tanner sınıflaması arasında anlamlı korelasyon bulundu (sırasıyla: rs=0,762, rs=0,830, rs=0,774 rs=0,824, p<0,001). Doppler yöntemleri arasında en yüksek korelasyon PD'de saptanmakla birlikte (PD rs =0,68, CD rs =: 0,61, SMI rs =:0,61, p<0,001) yöntemlerin birbirlerine üstünlükleri yoktu (p>0,05). PD ile damarlanma gösterilemeyen 65 memeden 30'unda SMI ile damarlanma gösterildi. Bu 30 olgunun %90'ı (n:27) Tanner evre I ve II'ydi.

SONUÇ: Sonuç olarak; SMI tekniği telarş vaskülaritesinin değerlendirilmesinde konvansiyonel doppler yöntemleri kadar başarılı olmakla birlikte bazı olgularda daha fazla veri sağlayabilir.

ANAHTAR KELİMELER: Puberte prekoks, Ultrasonografi, Doppler, Meme

ABSTRACT

OBJECTIVE: The aim of this study is to investigate the correlation between breast vascularity level and Tanner staging in the evaluation of thelarche, and to compare Doppler methods for demonstrating vascularity.

MATERIAL AND METHODS: Girls aged 6–10 who were referred to the radiology clinic with a complaint of breast swelling and prediagnosed with precocious puberty between October and December 2017 were included in the study. Breast ultrasonography (US) and color doppler ultrasonography (CDUS) examinations were performed on all participants. Age, Follicle Stimulating Hormone (FSH), Luteinizing Hormone (LH), Estradiol (E2), thelarche stage, both breast volumes were recorded for all participants. Vascular scores were measured for both breasts using imaging modalities such as color doppler (CD), Power US (PD), and superb microvascular imaging (SMI).

RESULTS: We included 116 girls and 213 thelarche breasts in the study. A significant correlation was found between the depth and transverse and longitudinal diameter for each breast and breast volume and Tanner stages (rs = 0.762, rs = 0.830, rs = 0.774 rs = 0.824, respectively; p < 0.001). Although the highest correlation between Doppler methods was found in PD (PD rs =0.68, CD rs =: 0.61, SMI rs =:0.61, p<0.001), the methods did not have any superiority over each other (p>0.05). Vascularization with SMI was demonstrated in 30 of 65 breasts for which vascularization could not be demonstrated with power Doppler. Among these 30 cases, 90% (n = 27) were Tanner stage I and II.

CONCLUSIONS: In conclusion, although SMI is as successful as conventional Doppler methods in the evaluation of thelarche vascularity, it can provide more data in some cases.

KEYWORDS: Puberty precocious, Ultrasonography, Doppler, Breast

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INTRODUCTION

Precocious puberty is the development of secondary sex characters before the age of 8 in girls and 9 in boys (1). The development of breasts (thelarche) is the first to occur during puberty in girls. The 5-stage Tanner scale is used to monitor thelarche (1). With clinical examination, a subjective evaluation can be made about the glandular breast tissue volume. However, breast ultrasonography (US) can show the presence of glandular tissue, volume, and ductus development and aid in a more objective classification. (2). The US is the first choice for imaging in pediatrics with its radiation-free diagnostic accuracy and noninvasive feature (3). As a result, the US has been used for many years in the evaluation of thelarche in addition to the Tanner scale. In the US, the glandular tissue has a mixed or heterogeneous echogenicity, the adipose tissue is usually hypoechoic, and the fibrous tissue appears hyperechoic (2). There are studies on the correlation of breast vascularization with the Tanner stages or its effect on the stages of gynecomastia in males. (4 - 6). However, there is limited information about the contribution of vascularity assessment or the effectiveness of Doppler methods in the evaluation of thelarche in girls with precocious puberty.

In conventional US methods such as color Doppler (CD) and power Doppler (PD), which are used to investigate the vascularization of tissues, the screening of low-velocity blood flow is prevented by motion artifacts and various wall filters that prevent scattering and provide high-resolution images (7). With the development of technology, Doppler methods that are more successful in showing vascularization in tissues with less vascularity, such as the breast tissue, have been developed. Among these, superb microvascular imaging (SMI), is an up-to-date technology that can view microvascular structures with low-velocity blood flow by overlapping flow signals without filtering tissue movements, unlike conventional Doppler methods (7, 8). Therefore, we think that this may contribute to conventional Doppler methods in the evaluation of vascularity in patients with thelarche. This study aimed to investigate firstly the correlation between the Tanner stages of breast vascularity level, secondly the comparison of conventional Doppler methods and superb microvascular imaging (SMI) findings in demonstrating vascularity.

MATERIALS AND METHODS

This prospective study was initiated after receiving the ethics committee approval from our hospital. Between October and December 2017, girls who consulted the Pediatric Endocrinology clinic with a prediagnosis of precocious puberty and had a complaint of breast swelling were aged 72–126 months and referred to the radiology clinic were included in the study after receiving informed consent from the parents. Breast US and color doppler ultrasonography (CDUS) examinations were performed on all participants. Cases with benign or malignant lesions in the breast and cases with retroareolar adipose tissue hypertrophy were excluded.

US-CDUS (Canon Medical Systems, Otawara, Japan) examinations were performed, by one radiologist (10 years experience), in the supine position under average room temperature. A high-frequency linear ultrasound probe (5–14 MHz) was used for the breast US. Vascular scores were measured using the chronological age of all participants; follicle-stimulating hormone (FSH), luteinizing hormone (LH), and estradiol (E2) levels; the thelarche stage, the volume of both breasts; and CDUS, PD, and SMI methods for both breasts.

The depth, transverse, and longitudinal dimensions of both breasts as well as the glandular tissue volume was measured for evaluating thelarche (1, 6). The sonographic Tanner staging (I–V) was done as follows (3): Tanner Stage I; ill-defined hyperechoic retroareolar tissue, Tanner Stage II; retroareolar hyperechoic tissue with a central, star-shaped hypoechoic area, Tanner Stage III; wider retroareolar hyperechoic area and central spider-shaped hypoechoic appearance, Tanner stage IV; fibroglandular tissue, mostly periareolar, is accompanied by a prominent central hypoechoic area and sometimes adipose tissue, Tanner stage V; hyperechoic glandular tissue with increased subcutaneous fat tissue and without hypoechoic central nodule. Vascular scoring was done using CD, PD, and SMI. Examinations were carried out on the

low current setting-scale: 5 cm/s for CD and PD, scale: 1.5–2 cm/s for SMI, wall filter: 50–100 Hz and the gain was increased until an acceptable noise was reached. In vascular scoring, the breast was divided into five regions: the upper outer quadrant, upper inner quadrant, lower outer quadrant, lower inner quadrant, and retroareolar region. The methods described in previous studies were modified, by counting the vascular structures observed in each region, a score of 1 was assigned to each vascular structure to obtain the total vascular score for one breast, with the lowest vascular score being 0 and the highest vascular score being 10 (5, 6). For both breasts, the correlation between the Tanner stage and vascular scores was analyzed.

Ethical Committe

The study protocol complied with the ethical principles of the Declaration of Helsinki and received full approval from the institutional review boards of Keçiören Training and Research Hospital Ethics Committee (No.2017-15/1526).

Statistical Analysis

Analyses were completed in the IBM, SPSS, and V 23 programs. Descriptively, for numerical variables; mean, standard deviation, median, minimum, and maximum were given; and for categorical variables, frequency and percentage were given. Whether continuous numerical variables showed normal distribution was examined with the help of the Kolmogorov–Smirnov normality test and graphs (histogram, Q-Q-plot, and box-plot). Relationships between numerical variables were analyzed with Spearman's rank correlation coefficient.

RESULTS

We included 116 girls (mean age: 107.2 months ± 11.1) and 213 thelarche breasts found in these girls in the study **(Table 1)**.

Table 1: Characteristics of the cases

	Mean (±SD)	Minimum–Maximum (median)
Age (month)	107.27 ± 11.19	63–126 (109)
Breast volume (mm^3)	6096 ± 8130	19–48048 (4193)
Breast transverse diameter (mm)	25.98 ± 13.69	3–73 (28)
Breast depth (mm)	10.27 ± 4.85	3–27 (10)
Breast longitudinal diameter (mm)	23.20 ± 12.95	4–70 (24)
LH	1.01 ± 1.56	0.01–8.90 (0.35)
FSH	4.46 ± 2.55	0.60–16.50 (4.07)
Estradiol (E2)	28.56 ± 17.33	10–97.10 (25.00)

In a total of 19 (8.2%) breasts (7 on the right and 12 on the left), the breast tissue was not detected. The distribution of the Tanner stages in both breasts is shown in **Table 2**.

Table 2: Tanner stage distributions

	The number of cases (n)	Percentage (%)
Tanner stage 1	64	30.0
Tanner stage 2	60	28.2
Tanner stage 3	52	24.4
Tanner stage 4	22	10.3
Tanner stage 5	15	7.0
Total	213	100.0

A significant correlation was found between the depth and diameter measurements obtained for each breast and the Tanner stages (depth: $r_s = 0.762$, transverse diameter: $r_s = 0.830$, longitudinal diameter: $r_s = 0.774$ $p < 0.001$). A high level of correlation was found between the breast volume and the Tanner stages ($r_s = 0.824$, $p < 0.001$).

In the total of 213 breasts with thelarche, vascularization was detected using at least one Doppler method in 175 (82%) breasts. For each Doppler US, breast vascularization was detected in 148 (69%) breasts using PD, 143 (67%) breasts using CD, and 175 (82%) breasts using SMI **(Figure 1 - 5)**.

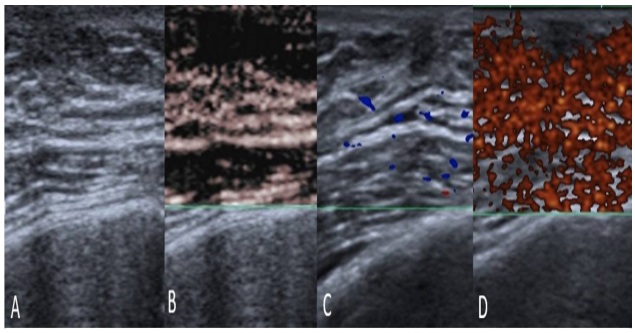

Figure 1: 7-year-old girl, Tanner stage I (A), no vascularization on SMI (B), CD (C), PD (D)

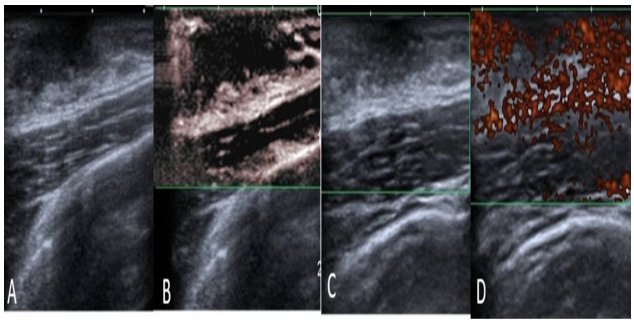

Figure 2: 9-year-old girl, Tanner stage II (A), no vascularization on SMI (B), CD (C), PD (D)

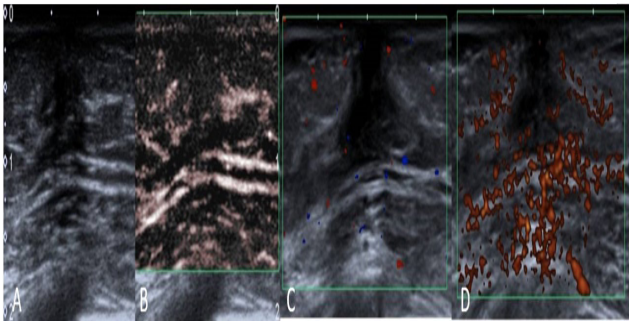

Figure 3: 9-year-old girl, Tanner stage III (A), no vascularization on SMI (B), CD (C), PD (D)

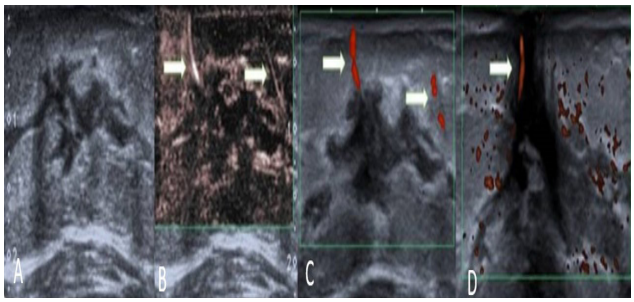

Figure 4: 10-year-old girl, Tanner stage IV (A), 2 vessels on SMI (B), CD (C), PD (D) (white arrows)

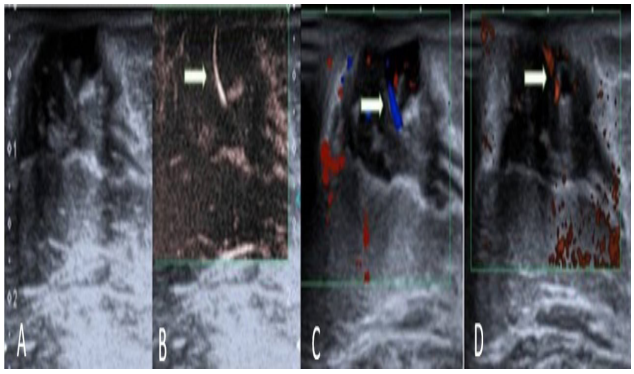

Figure 5: 9-year-old girl, Tanner stage V (A), SMI (B), CD (C), PD (D) images show vascularization (white arrows)

Vascularization could also be demonstrated with PD and SMI for each breast whose vascularization was shown with CD. Vascularization with SMI was demonstrated in 30 of 65 breasts for which vascularization could not be demonstrated with PD. 90% of these 30 cases were of the Tanner stage I (n:17) and II (n:10). When each Doppler method was compared with the Tanner stages, it was observed that they all showed moderate correlation. Although the highest correlation among them was detected in PD r_s = 0.68, CD r_s = 0.61, SMI r_s = 0.61, $p<0.001$), the methods were not superior to each other in terms of the Tanner stages in the thelarche breast ($p>0.05$). The distribution of Doppler scores according to the Tanner stages is shown in **Figure 6**. When the highest Tanner stage and LH, E2, FSH values of each case were compared, moderately significant relationships were found with LH and E2 (r_s = 0.544 and r_s = 0.443, respectively) and low level significant relationships with FSH (r_s = 0.265) ($p<0.05$).

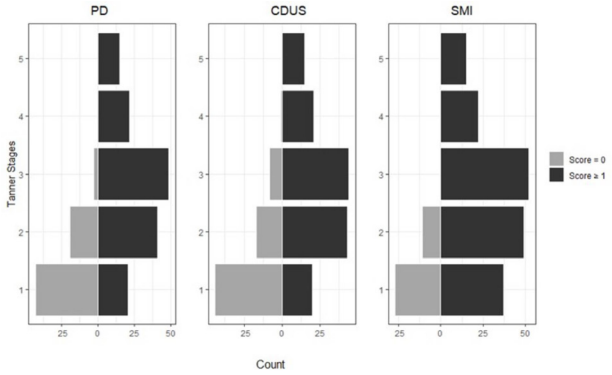

Figure 6: Distribution of doppler scores according to the Tanner stage

DISCUSSION

Puberty is a dynamic complex process, which is a transition from childhood to adulthood, wherein secondary sex characters develop accompanied by growth and rapid progress in bone age (9). Precocious puberty is generally defined as the onset of puberty before the age of 8 in girls and 9 in boys (9). It is approximately 2–23 times more common in girls than in boys (10). Early diagnosis and treatment are important due to the emotional consequences of precocious puberty (early adolescence problems, early fertility, etc.) and its effects on health (rapid progression in bone age and early outcome of growth, etc.) (10). US imaging of the breast and pelvic organs is often used in children with suspected precocious puberty. In our study, the correlation between breast US findings and different Doppler US methods (CD, PD, and SMI) was investigated in the evaluation of thelarche in girls with precocious puberty. In all Doppler US methods, especially in PD, which was moderately correlated with the increase in the sonographic Tanner stage, an increase in vascularization was found. However, vascularization with SMI, a newly developed technology, was demonstrated in 30 breasts (Tanner stage I, II, III; 17, 10, 3, respectively) where vascularization could not be demonstrated with PD.

Tanner stage distribution of cases, it was observed that 15 (7%) cases presented with Tanner stage V. This rate may be high but, in the literature, Tanner stage V cases are given at rates

varying between 1-20% (1, 5, 6). We think that this may be due to the difference in the population and age group included in the study. Clinical Tanner staging has been widely used for many years in the evaluation of the development of secondary sex characters in precocious puberty cases. The Tanner scale, which is based on physical examination findings in the evaluation of thelarche, may be insufficient for differentiating glandular tissue from retroareolar adipose tissue deposition. Therefore, in some cases, the reliability of the Tanner staging in the evaluation of thelarche is controversial. In contrast, breast US is a radiation-free, easily accessible, simple, and noninvasive imaging method that can be used to differentiate between the fibroglandular and adipose tissues. Garcia et al. (3) described the sonographic features of each Tanner stage during normal breast development. A study reported the sonographic breast volume to be an independent factor that can be used in the distinction between two types of precocious puberty, one with a rapidly progressive course and one with a slow course (11). In a study by Bruserud et al. (2), it was observed that in breast development staging between I-V, the visual image in the sonograph is a reliable method for staging the thelarche in healthy girls, but glandular depth and diameter measurements do not have sufficient sensitivity to determine breast development. In our study, there was a stronger correlation between the Tanner stages and the transverse diameter and breast volume measurements. This may be because volume measurements give more information about the amount of breast tissue in contrast to diameter measurements in the evaluation of thelarche staging and precocious puberty.

PD and CD have been used as conventional Doppler methods for many years in the evaluation of the vascularization of the lesion or normal tissues. However, it is known that CD and PD have limitations in showing low-velocity blood flow in small vascular structures due to the filters used to prevent motion artifacts and their poor signal-to-noise ratio (12, 13). Conversely, SMI is an up-to-date technology that can show microvascular blood flow, distinguish motion artifacts from vascular flow, and thus allow a more detailed evaluation of low-velocity blood flow in thin vascular structures (14). In a study comparing CD, PD, and SMI methods to show normal pediatric testicular blood supply (15), while there was a significant difference in the assessment of vascularity between SMI and CD, no significant difference was found between PD and SMI. Furthermore, studies comparing SMI with CD and PD in the differentiation of benign and malignant breast lesions (16, 17) report that SMI gives more information than CD and PD for evaluating the blood supply and vascular pattern of the lesion. In our study, although there was no statistically significant difference between the three Doppler methods, SMI was the method that mostly detects vascularization in the breast. Considering its correlation with the Tanner stages, all three Doppler methods showed higher vascularity scores as the stage increased with PD being the most prominent.

Our study had some limitations. The cases were evaluated by the same radiologist in a single session; therefore, inter and the intraobserver agreement could not be examined between the Doppler methods. Since the cases were not classified as rapid or slow progression, the amount of information this vascularization level could provide about the course of the thelarche could not be evaluated.

Although there is no statistically significant difference between the three Doppler methods in our study, the SMI technique is as successful as conventional Doppler methods in the evaluation of the thelarche vascularity, while in some cases it can provide more data.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

NAZAL CERRAHİLERDE MİNİMAL, DÜŞÜK VE YÜKSEK AKIMLI ANESTEZİNİN VÜCUT SICAKLIĞI VE DOKU OKSİJENLENMESİ ÜZERİNE ETKİLERİ

THE EFFECTS OF MINIMAL, LOW AND HIGH FLOW ANESTHESIA ON BODY TEMPERATURE AND TISSUE OXYGENATION IN NASAL SURGERIES

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ÖZET

AMAÇ: İntraoperatif yüksek taze gaz akışı istemsiz perioperatif hipotermi (İPH) oluşumuna neden olabilir. Bu nedenle anestezi iklimini iyileştiren düşük ve minimal akımlı anestezi yöntemleri uygulanmaktadır. Elektif nazal cerrahi geçiren hastalarda minimal, düşük ve yüksek akımlı anestezinin vücut sıcaklığı ve doku oksijenasyonu üzerine etkisini araştırmayı amaçladık.

GEREÇ VE YÖNTEM: Prospektif randomize kontrollü çalışmaya hipotansif anestezi altında, elektif nazal cerrahi planlanan 18-60 yaş, ASA 1-2, operasyon süresi 1-4 saat olan 92 hasta dahil edildi. Hastalar, Grup1(0.5L dk^{-1}), Grup2(1L dk^{-1}) ve Grup 3(2L dk^{-1}) olarak ayrıldı.Hastaların demografik ve operatif verileri, preoperatif bekleme odası sıcaklığı, intraoperatif ameliyathane sıcaklığı, intraoperatif vücut sıcaklığı, anestezi solunum devresi nemi ve sıcaklığı, doku oksijen satürasyonu, 0.,15.,30.,60.,90.,120.,150. Dakika(dk) ve postoperatif dönemde titreme, Aldrete skoru, derlenme ünitesindeki oda sıcaklığı ve vücut sıcaklıkları kaydedildi

BULGULAR: Hastaların tümünde perioperatif hipotermi gelişti (p=0.001). Her üç gruptada timpanik sıcaklıklar benzerdi(p>0.05). Alt grup karşılaştırmasında Grup 1'in StO_2 60. dk değerinin Grup 2'ye göre yüksekti (p=0,046). Grup 1'in doku oksijen düzeyi (StO_2) 90.dk değerinin grup 2 ve 3'ten yüksek olduğu istatistiksel olarak anlamlı olduğu belirlendi (p=0.013, p=0.013). Grup 1'in StO_2 120.dk değerinin grup 3'ten yüksek olması istatistiksel olarak anlamlıydı (p=0,008). Grup 1'de postoperatif Aldrete skoru diğer iki gruba göre anlamlı derecede yüksek bulundu(p=0.002, p=0.002). Vücut sıcaklığı ile ameliyathane oda sıcaklığı,postoperatif derlenme oda sıcaklığı arasında korelasyon saptandı(r=.446, p<0.05; r=.531, p<0.01).

SONUÇ: Minimal, düşük ve yüksek akımlı anestezi uygulamalarında hipotansif anestezi ile elektif nazal cerrahi uygulanan tüm hastalarda istemsiz perioperatif hipotermi gelişti. Tüm gruplarda vücut sıcaklıkları, nem ve anestezi devresinin sıcaklığının benzer olduğu gözlendi. Minimal akımlı anestezi grubunda doku oksijen saturasyonu ve postoperatif derlenme ünitesinde Aldrete skoru daha yüksek bulundu. Minimal akımlı anestezi uygulamaları İPH önlemek için iyi bir alternatif olabilir.Ancak düşük akımlı anestezi tekniklerinin doku düzeyindeki etkileri için daha fazla çalışmaya ihtiyaç olduğunu düşünmekteyiz.

ANAHTAR KELİMELER: Oksijen satürasyonu, Düşük akımlı anestezi, Minimal akımlı anestezi, Hipotermi

ABSTRACT

OBJECTIVE: Intraoperative high fresh gas flow may cause Inadvertent perioperative hypothermia (IPH). For this reason, low and minimal flow anesthesia methods that improve the anesthesia climate are applied. We aimed to investigate the effects of minimal, low and high flow anesthesia on body temperature and tissue oxygenation in patients undergoing elective nasal surgery.

MATERIAL AND METHODS: Prospective randomized controlled study included 92 patients aged 18-60 years, ASA1-2 operation time 1-4 hours, scheduled for elective nasal surgery under hypotensive anesthesia. The patients were divided into Group 1 (0.5$Lmin^{-1}$), Group 2 (1$Lmin^{-1}$) and Group 3 (2 $Lmin^{-1}$). Demographic and operative data of the patients, preoperative waiting room temperature, intraoperative operating room temperature, intraoperative body temperature, anesthesia breathing circuit humidity and temperature, tissue oxygen saturation, 0th, 15th, 30th, 60th, 90th, 120th, 150thmin and postoperative shivering, Aldrete score, room temperature and body temperatures in the recovery unit were recorded.

RESULTS: Perioperative hypothermia developed in all patients (p=0.001). Tympanic temperatures were similar in all three groups (p>0.05). In the subgroup comparison, it was found that the tissue oxygen saturation (StO_2) 60 th min value of Group1 was higher than Group 2 (p=0.046). It was found statistically significant that the StO_2 90 th min value of Group1 was higher than that of Group 2 and 3 (p=0.013, p=0.013). It was statistically significant that the StO2 120th min value of Group1 was higher than Group 3 (p=0.008).In Group1, postoperativeAldrete score was found to be significantly higher than the other two groups(p=0.002, p=0.002). A correlation was found between operating room temperature, postoperative recovery room temperature, and body temperature(r=.446, p<0.05;r=.531, p<0.01).

CONCLUSIONS: Inadvertent perioperative hypothermia developed in all patients who underwent elective nasal surgery with hypotensive anesthesia in minimal, low and high flow anesthesia applications. It was observed that body temperatures, humidity and the temperature of the anesthesia period were similar in all groups. Tissue oxygen saturation was higher in the minimal flow anesthesia group and Aldrete score was higher in the postoperative recovery unit. Minimal flow anesthesia applications can be a good alternative to prevent IPH. However, we think that more studies are needed for the effects of low-flow anesthesia techniques at the tissue level.

KEYWORDS: Oxygen saturation, Low-Flow anesthesia, Minimal-Flow anesthesia, Hypothermia

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INTRODUCTION

Inadvertent perioperative hypothermia (IPH) is frequently observed in patients undergoing general anesthesia. IPH is a decrease in body temperature below 36ºC from the preoperative period to the postoperative period (1). Factors such as cold operating room, intravenous fluids and irrigation solutions, and heat lost from the surgical field cause hypothermia. High flow, dry and cold respiratory system air applied during general anesthesia may increase incidence of hypothermia.

During general anesthesia, dry and cold air disrupts mucociliary activity in the lungs and may cause postoperative lung problems. Therefore, low and minimal flow anesthesia is an alternative to high flow anesthesia to maintain the temperature and humidity of respiratory gases (2). Low-flow anesthesia is less costly and less harmful to the environment. Complications can be noticed earlier as a result of careful patient follow-up (3). On the other hand, low-flow anesthesia may cause hypoxemia due to insufficient oxygen alarms in anesthesia devices (4). In nasal surgeries, hypotensive anesthesia is used to increase surgical vision. IPH with hypotension causes peripheral vasoconstriction. This event results in peripheral perfusion impairment. Although there was no change in core temperature with peripheral cooling in human volunteer studies; Significant decreases in tissue oxygen saturation (StO_2) were detected with peripheral vasoconstriction (5). Lambert et al. found some inconsistencies in the follow-ups of end-tidal carbon dioxide ($EtCO_2$), peripheral oxygen saturation (SpO_2) and StO_2 in patients who were sedated. Patients with respiratory depression who used supportive airway measures had greater changes in StO_2. Therefore, they concluded that StO_2 may be more sensitive than SpO_2 (6). In our study, we aimed to investigate the effects of high, low and minimal flow anesthesia methods on body temperature and StO_2 in patients who underwent hypotensive anesthesia and had elective nasal surgery.

MATERIALS AND METHODS

Patients (n:92) who were planned for nasal surgeries under hypotensive anesthesia were included the study. Patients whose physical status was American Society of Anesthesiologists (ASA) classification 1-2 and who were planned for an operation time of 1-4 hours were included in the study. In this prospective, controlled study, patients were randomized using the 30-person Research Randomizer program. Chronic obstructive pulmonary disease, decompensated diabetes mellitus, coronary and peripheral artery disease, congestive heart failure, thyroid dysfunction, significant anemia, alcohol-drug addiction, patients during pregnancy and lactation, those with signs of active infection, body temperature>37.5ºC and <35.5ºC, body mass index (BMI) other than 19-27, patients who could not be measured reliably by infrared tympanic membrane thermometer were excluded from the study.

Anesthesia Management

Standard perioperative follow-up procedure was applied to the patients. Premedication was not applied. Intravenous (iv) cannula was placed in the operating room. Before anesthesia induction, tympanic membrane temperature measurements were made with a braun thermoscan 5 ear thermometer. Demographic and operative data such as age, gender, BMI of the patients (duration of anesthesia, duration of operation, iv total fluid administered), preoperative waiting room temperature and intraoperative operating room temperature were recorded. As standard monitoring, systolic/diastolic arterial blood pressure, three-lead electrocardiography, SpO_2, StO_2 and tissue hemoglobin index (THI) monitoring were performed with the In Spectra™ StO_2 Spot Check Model 300 (Hutchinson, USA) device using the NIRS method over the probe attached to the left thenar region. A Dräger Primus anesthesia device was used. TFA 30.5013 Digital Thermo-Hygrometer was placed at the end of the intubation tube. The temperature and humidity of the gases in the system were measured and recorded. Device calibration, CO_2 absorber (Sorbo-Lime) replacement, breathing circuit and disposable filter replacement were performed for each patient. Before induction, patients were preoxygenated with 100 % O_2 for 3 minutes (min). Anesthesia induction remifentanil loading dose 1 µg kg-1 (30 seconds), propofol 2 mg kg^{-1}, rocuronium bromide 0.6 mg kg^{-1} were administered iv. Endot-

racheal intubation was performed. TFA 30.5013 Digital Thermo-Hygrometer was connected to the end of the intubation tube and the humidity and temperature values of the circuit were measured. With mechanical ventilation settings in volume-controlled mode, 6mL kg^{-1} tidal volume and 5 cmH_2O positive end-expiratory pressure were applied according to ideal body weight. Respiratory frequency was set to be in the range of $EtCO_2$ 35-45 cmH_2O. For minimal flow anesthesia, denitrogenation was applied for 10 min after induction, and a high flow of 4 L min^{-1} was applied for depth of anesthesia. The patients were divided into 3 groups as Group 1: minimal flow anesthesia (0.5L min^{-1}), Group 2: low flow anesthesia(1L min^{-1}) and Group 3: high flow anesthesia (2L min^{-1}). After reducing the flows, FiO_2 values were adjusted as 40 % in the low and high flow group and 50% in the minimal flow group. When the inspiratory O_2 value approached 30, the rate was increased to 10 %. Nitrous oxide was not used.

Anesthesia was maintained with controlled hypotension, desflurane MAC 4-5 and remifentanil 0.25-0.5 µg kg^{-1} min^{-1} iv infusion with a mean arterial pressure (MAP) of 60-65 mmHg. It was planned to discontinue the remifentanil infusion if the baseline value of MAP decreased more than 30%, and if no increase in blood pressure was observed, 10 mg iv ephedrine was administered. It was planned to interrupt the remifentanil infusion if the heart rate (HR) fell below 45 beats min^{-1}, and if the pulse rate did not increase, 1 mg of iv atropine was administered. Intraoperative HR, SpO_2, MAP, $EtCO_2$, body temperature, anesthesia breathing circuit humidity and temperature, StO_2 and THI values of the patients at 0th(post intubation), 15th, 30th, 60th, 90th, 120th, 150th min recorded. The vaporizer was turned off 10 min before the end of the surgery, and the flow was increased to 6L min^{-1} at the end of the surgery. For decurarization, patients were administered 15 µg kg^{-1} iv atropine and 50 µg kg^{-1} iv neostigmine. Extubation was performed with the return of spontaneous breathing and protective reflexes. In the postoperative period, shivering score, Alderete score, room temperature in the recovery unit and body temperature of the patients in the recovery unit were recorded.

Ethical Committee

This study was conducted after obtaining Recep Tayyip Erdoğan University Non-Interventional Clinical Research Ethics Committee, dated 23.12.2016 and decision number 2016/39.

Statistical Analysis

NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) software was used for statistical analysis. While evaluating the study data, the distribution of the data was evaluated with the Shapiro-Wilk Test, as well as the descriptive statistical methods (Mean, Standard Deviation, Median, Frequency, Ratio, Minimum, Maximum). Chi-Square test was used for group comparisons of qualitative data. Kruskal-Wallis test and Friedman test were used to compare the quantitative data with three or more groups that did not show normal distribution. One Way ANOVA test was used for the comparison of three or more groups with normal distribution of quantitative data. Bonferonni corrector was used to determine the differences. Wilcoxon test was used for comparison of quantitative data between two periods that did not show normal distribution. Significance was evaluated at the $p<0.05$ level. Spearman's test was used for correlation analysis, $p<0.05$ level was evaluated as significant.

RESULTS

One hundred two patients were included in the study. 10 patients were excluded from the study because they did not meet the study criteria. Data from 92 patients were analyzed **(Figure 1).**

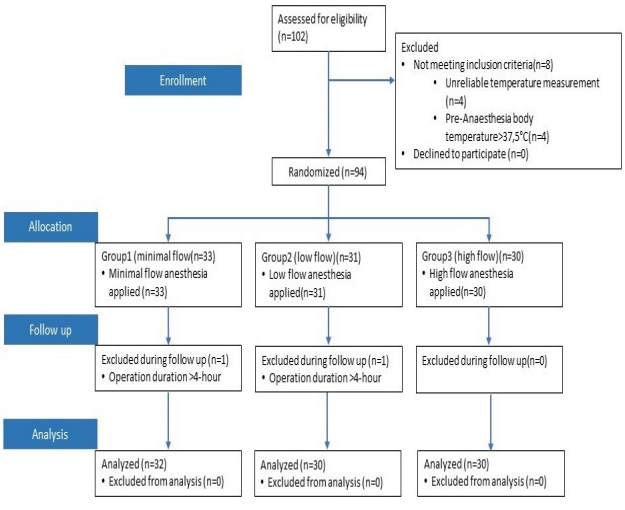

Figure 1: Consort Flow Diagram

The mean age of the patients was 37.8 ± 14.4 years, and the mean BMI was 24.42 ± 2.34 kg m^{-2}. The mean room temperature in the operating room was 20.86 ± 2.21 °C. The mean anesthesia time was 114.82 ± 47.6 min, and the operation time was 110.87 ± 46.36 min. In comparisons between groups, the mean scores of age, weight, height, BMI and ASA scores were similar in all three groups (p>0.05). It was statistically notable that the anesthesia and operation time of group 1 were higher than those in group 2 (p=0.008, p=0.038;respectively). Aldrete score of Group1 was statistically significantly higher than Group 2 and 3 (p=0.002, p=0.002;respectively), **(Table 1)**.

Table 1: Demographic and operative characteristics of patients [mean±standard deviation, number (%)]

	Group 1 (n = 32)	Group 2 (n = 30)	Group 3 (n = 30)	p
Age (year)	38.59±14.2	35.53±15.74	37±13.58	0.641
Gender				
Female	9 (%28.1)	18 (%60)	10 (%33.3)	0.024*
Male	23 (%71.9)	12 (%40)	20 (%66.7)	
Weight (kg)	73.9±11.3	69.8±9.6	72.2±9.2	0.317
Height (cm)	173.3±8.3	169.2±7.8	171.8±8.9	0.170
BMI(kg m^{-2})	24.5±2.8	24.3±2.5	24.4±1.7	0.317
ASA I/II (n)	17/15	12/18	13/17	
Anesthesia Duration(min)	132.06±48.99	101.87±41.49	109.37±47.86	0.025*
Operation Duration(min)	126.5±47.31	99.2±41.02	105.87±47.24	0.038*
Total iv fluid infusion (mL)	1689.06±336.43	1523.33±316.7	1555±372.4	0.060
Aldrete skoru	9.69±0.47	9.3±0.47	9.3±0.47	0.002**

Kruskal Wallis Test, *p<0.05, **p<0.01
(ASA: American Society of Anesthesiologists score, BMI: body mass index, min:minute, iv:intravenous)

The tympanic temperature at the 120th min value differed statistically between the groups (p=0.036). In the subgroup comparison, it was found statistically significant that the tympanic temperature 120th min value of group1 was lower than that of group 2 (p=0.033) **(Table 2)**.

Table 2: Intraoperative tympanic temperature values (mean ± standard deviation)

	Group 1 (n=32)	Group 2 (n=30)	Group 3 (n=30)	p
0th min	36.87±0.37	36.89±0.57	36.88±0.42	0.982
15thmin	36.41±0.46	36.58±0.42	36.55±0.37	0.245
30thmin	36.31±0.43	36.46±0.54	36.44±0.41	0.386
60thmin	36.3±0.53	36.45±0.45	36.4±0.42	0.474
90thmin	36.26±0.49	36.33±0.57	36.42±0.49	0.620
120thmin	36.11±0.54	36.67±0.43	36.36±0.5	0.036*
150thmin	35.96±0.63	36.47±0.49	36.47±0.33	0.080

OneWay ANOVA Test, *p<0.05, **p<0.01, (min:minute)

The StO_2 15th min value of group1 was higher than group 2 was found to be statistically notable (p=0.033). In the subgroup comparison, it was found statistically significant that the StO_2 60th min value of Group 1 was higher than that of Group2 (p=0.046). It was found statistically significant that the StO_2 90th min value of group1 was higher than that of groups 2 and 3 (p=0.013, p=0.013;respectively). It was statistically significant that the StO_2 120th min value of group 1 was higher than group 3 (p=0.008) **(Table 3)**.

Table 3: Intraoperative StO2 values (mean ± standard deviation)

	Group 1 (n=32)	Group 2 (n=30)	Group 3 (n=30)	p
0thmin	89.25±5.32	87.4±5.89	86.5±6.2	0.168[b]
15thmin	90.13±5.01	86.47±6.93	87.43±4.71	0.033*[b]
30thmin	90±4.87	87.13±6.59	87.27±4.83	0.071[b]
60thmin	90.09±4.91	86.9±4.87	87.27±5.44	0.028*[b]
90thmin	90.4±4.75	86.41±5.73	83.82±8.33	0.011*[a]
120thmin	91.42±5.04	88.78±5.19	86.18±7.26	0.021*[a]
150thmin	92.23±3.32	89.43±5.35	90.5±4.97	0.472[a]

OneWay ANOVA Test (b), Kruskal Wallis Test (a), *p<0.05, **p<0.01
(min:minute)

A notable correlation was found between the operating room temperature and the tympanic temperature at the 150th min (r=.446, p<0.05). A significant correlation was found between the recovery room temperature and the body temperature in the recovery room (r =.531, p<0.01).

DISSCUSSION

All of our patients who underwent elective nasal surgery under hypotensive anesthesia developed IPH. It was determined that body temperature was associated with operating room temperature and postoperative recovery room temperature. It was observed that minimal, low and high flow anesthesia applied in our study did not have a significant effect on body temperature. However, it was found that StO_2 and Aldrete score at the time of admission to the postoperative recovery unit were higher in patients who underwent minimal flow anesthesia. Today, IPH occurs frequently during anesthesia applications. Its incidence is approximately 40-70% (7,8). In our study, IPH developed below 36 °C in all of our patients. Despite the use of modern methods (low and minimal flow anesthesia) and equipment, IPH is a problem. It is recommended to apply modern warming techniques to the patients from the preoperative period to the postoperative period. Aksu et al. investigated the incidence of postoperative hypothermia in the operating room of Kocaeli University. The body temperatures of the patients who were operated for one month were measured tympanically. The operating room temperatures were kept at an average of 23 °C. However, they emphasized that since room temperatures can be changed manually, there may be temperature changes in terms of surgeon and employee comfort. The incidence of

hypothermia was found to be 45.7% ; 2.7% of the patients were found to be hypothermic in the preoperative period. In addition, the time taken for the patients in the recovery unit to reach the discharge criteria was found to be approximately 10 minutes longer than in normothermic patients (9). Wang et al. evaluated patient temperatures in living donor hepatectomy operations at different operating room temperatures. They compared the two groups in which the room temperatures were maintained as 19-21°C and 24 °C. They found a difference of at least 0.5 °C between nasopharyngeal measurements of body temperatures (10). In another study, age-related differences in thermoregulation were investigated in a warm operating room environment. It was concluded that an operating room temperature of around 26 °C would prevent IPH (11). Our operating room temperatures were in a wide range between 17-24 °C and IPH developed in our patients. The correlation between the operating room temperature and the measured tympanic temperatures supports the importance of room temperature in line with the literature. Considering the cost and difficulty of active warming methods, higher operating room temperatures may be a cost-effective method to maintain patients' body temperature. Reducing fresh gas flow (FGF) rates is the most basic method to improve the airway climate. If high FGF is required, monitoring of anesthesia circuit equipment will be required along with methods such as active or passive heating of the circuit (12). According to Kleeman, inadequate airway conditioning and damage to the tracheobronchial epithelium are preventable complications of anesthesia (2). The aim is to preserve the mucociliary physiology (13). Therefore, the risk of postoperative atelectasis may increase with decreased gas exchange in the lungs (14, 15). In patients undergoing general anesthesia, passive, active humidification or low-flow anesthesia is recommended to maintain the physiological temperature and humidity of inspired gases. There are no exact values for the temperatures and absolute humidity of the inspired gases during mechanical ventilation. However, the American Respiratory Care Association reported that a heated humidifier should be used to provide 34-41°C inhaled gas temperature and 33-44 mgH_2O/L water vapor in the Y part of the circuit for an intubated patient (16). Choi et al. evaluated the differences in heat and moisture content of gases inspired by low-flow anesthesia using four different anesthesia machines. They concluded that there is no difference between breathing circuit temperature and humidity in low and high flow anesthesia, but some anesthesia machines are superior (17). In tympanoplasty cases where Lafçı et al. applied low (1L/min^{-1}) and high(6L/min^{-1}) flow desflurane anesthesia; A significant increase was found in the anesthesia circuit temperature and humidity parameters in the low flow group (18). Bengtson et al. (19) using 0.5 L/min^{-1}(minimal), 2L/min^{-1}(high) and 5L/min^{-1}(very high) FGF, found that there was sufficient humidification at 2L/min^{-1} (high) and below. When the flow is increased to 5 L/min (too high), the humidity did not rise to a sufficient level. Johanson et al (20). The effect of heat and moisture exchange filters on humidity and body temperature in low flow anesthesia was investigated. While the circuit temperature and humidity were maintained with heat and humidity exchange filters, no significant difference was found in all groups in tympanic measurements after 120 minutes of anesthesia (20). It is noteworthy that the FGF compared in the above-mentioned studies are quite different from each other. For example, when comparing 2L/min^{-1} to 5 L/min^{-1} FGF, it is not surprising that the results are different. In our study, high FGF was limited to 2 L/min^{-1}, as methods suitable for modern anesthesia practice were compared. The fact that there was not much difference between our fresh gas flows was effective in the result. Therefore, we think that the circuit temperature and humidity are similar between the groups.

Biological, clinical and cellular effects of low flow anesthesia applications continue to be investigated. There are also studies evaluating these effects of low flow anesthesia. In a study investigating the effects of minimal and high flow anesthesia on cerebral oxygenation, it was observed that the effects of both flows were similar (21). Low and high flow anesthesia with desflurane was compared in adult tympanomastoidectomies. It has been reported that

low-flow anesthesia improves pulmonary function and mucociliary clearance (22). In another study, adults undergoing thyroidectomy were given low-flow anesthesia with desflurane. A significant increase in plasma nitric oxide values occurred 24 hours after the operation (23). There are studies in the literature that follow low-flow anesthesia methods with FiO_2 values. Kim J et al. reported that under low-flow anesthesia, the inspired oxygen concentration in 180 min could be maintained at values of approximately 30 % and above in patients weighing less than 90 kg (24). Microperfusion from the tissue-level cellular effects of low-flow anesthesia; The patient's hemodynamic data can be evaluated using parameters such as lactate, StO_2 and microdialysis(25 - 27). Kaufner et al. (28) evaluated the effect of short-term preheating in ovarian cancer surgery with the microdialysis method. They reported that it may cause a better preserved microperfusion with increased tissue oxygenation in patients. In our study, we used StO_2 to evaluate the hypoxia risk of low-flow anesthesia management and the effects of peripheral vasoconstriction due to IPH. In our minimal flow anesthesia group, the StO_2 value was higher than the other groups. We interpreted this anesthetic method as improving tissue oxygenation in contrast to hypoxia concerns.

IPH developed in all patients who underwent elective nasal surgery with hypotensive anesthesia in minimal, low, and high flow anesthesia applications. It was observed that body temperatures, humidity and temperature of the anesthesia period were similar. However, tissue oxygen saturation and aldrete score in the postoperative recovery unit were higher in the minimal flow anesthesia group. Minimal flow anesthesia may be a good alternative to prevent IPH. Contrary to hypoxia concerns, we believe that these methods can be applied safely; however, more studies are needed for the effects of low-flow anesthesia technique at the tissue level.

Our study limitations; there are various nasal surgeries applied in otolaryngology. Surgical field bleeding, surgery and anesthesia duration are variable in different nasal surgeries. If one type of nasal surgery were preferred, it would be more reliable to evaluate the effects on intraoperative body temperature and StO_2. As stated in the literature, the importance of operating room temperature still seems to be the most effective way to maintain body temperature. The fact that our operating room temperatures have a wide range of 17-24°C may also have eliminated the difference in body temperature between patient groups.

In our study, tobacco use, which is closely related to the respiratory physiology of the patients, was standardized and not questioned. Tobacco use may also have an effect on patients' hemodynamic parameters and StO_2.

Due to the high cost, there were not enough heaters in our hospital. Patients could be standardized in terms of warming application methods.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

FARKLI YAŞLARDAKİ OPERE EDİLEN VSD'Lİ HASTALARIN DEĞERLENDİRİLMESİ

EVALUATION OF THE PATIENTS OPERATED WITH VSDs OF DIFFERENT AGES

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ÖZET

AMAÇ: Ventriküler septum defekt (VSD), sol ve sağ ventrikülü ayıran septuma yerleşen, bir ya da daha fazla sayıda olabilen açıklık olarak tanımlanabilir. Ventriküler septal defektler konjenital veya akkiz olabilir. En sık görülen doğuştan kalp anomalisidir. Bu yazımızda Kliniğimizde cerrahi olarak tedavi ettiğimiz VSD leri literatürler eşliğinde değerlendirdik.

GEREÇ VE YÖNTEM: Kliniğimizde 68 VSD hastasına girişim yapıldı. 39 olgu erkek (%57.3), 29 olgu kadın (%42.7) idi ve yaş ortalaması 9,10±9,13(1-48) yaş/yıl, kilo ortalaması 25±16,5(7-75) kg olarak bulundu. Preoperatif NYHA fonksiyonel kapasite(FK) karşılaştırıldığında FK-I 31 olgu(%45,5), FK-II 30 olgu(%44,1), FK-III 7 olgu(%10,2) olarak belirlendi. Preoperatif anomali olarak en sık 15 olgu(%22,05) aort yetmezliği(AY) ve aort valf prolapsusu (AVP); 18 olgu(%26,4) ASD; 8 olgu(%11,7) PDA mevcuttu.

BULGULAR: VSD tiplerine göre girişim yöntemlerine bakıldığında perimembranöz tipte en sık 53 olgu (%77,9) ile sağ atriotomi, 1 olgu(%1,4) sağ atriotomi ve triküspit septal annulus radial kesisi; müsküler tipte 8 olgu (%11,7) ile sağ atriotomi ve Swiss-Chess tip olan 2 olguda (%2,9) sol ventrikülotomi; DCJA(Doubly Committed Jukstaarteryel) tipte 4 olgu (%5,8) ile sağ ventrikülotomi tercih edilmiştir. Postoperatif komplikasyonlar arasında en sık görülen 9 olgu(%15,3) ile rezidü VSD dir. Fatal seyreden 3 hastanın(%5,09) PAB 67±7,5mmHg; LV-RV şant 49±9,6mmHg; Qp/Qs 4,7±3,87; PVR 7,5±4,6 değerlerinin yüksek oldukları görülmüştür. Pre/postoperatif NYHA ve RVP karşılaştırıldığında istatistiki olarak anlamlı($p<0,05$) olduğu görülmüş olup reoperasyonsuz yaşam olasılığı %93,2 olarak hesaplanmıştır.

SONUÇ: Ventriküler septal defekt en sık görülen konjenital kalp hastalığıdır. Tanı ve sınıflandırılmasında EKO ve kardiak anjiografinin gelişiminin payı büyüktür. Defektleri çok iyi değerlendirip 3 aydan sonra kapatılması tercih edilmelidir.

ANAHTAR KELİMELER: Sol ventrikül, İnterventriküler septum, Defekt

ABSTRACT

OBJECTIVE: Ventricular septum defect (VSD) can be defined as one or more openings located in the septum separating the left and right ventricle. Ventricular septal defects can be congenital or acquired. It is the most common congenital heart anomaly. In this article, we evaluated the VSDs that we treated surgically in our clinic in the light of the literature.

MATERIAL AND METHODS: 68 VSD patients were intervened in our clinic. 39 cases were male (57.3%) and 29 cases were female (42.7%). The mean age was 9.10 ± 9.13 (1-48), and the mean weight was 25 ± 16.5 (7-75). When the preoperative New York Heart Association (NYHA) functional capacity (FC) was compared, FC-I was determined as 31 cases (45.5%), FC-II as 30 cases (44.1%), and FC-III as 7 cases (10.2%). The most common preoperative existing anomalies were 15 cases (22.05%) with aortic insufficiency (AR) and aortic valve prolapse (AVP); 18 cases (26.4%) ASD and 8 cases (11.7%) with PDA.

RESULTS: When looking at the intervention methods according to VSD types, the most common cases of perimembranous type were right atriotomy in 53 cases (77.9%), right atriotomy in 1 case (1.4%) and tricuspid septal annulus radial incision; 8 cases of muscular type (11.7%) and right atriotomy and left ventriculotomy in 2 cases (2.9%) of Swiss-Chess type; Right ventriculotomy was preferred in 4 cases (5.8%) of DCJA (Doubly Committed Jukstaarterial) type. Between postoperative complications the most frequent one was residual VSD in 9 patients (15.3 %). Mortality was seen in 3 patients (5.09 %) with preoperative PAB 67±7.5 mmHg, LV- RV shunt 49±9.6 mmHg, Qp/Qs 4.7±3.87, PVR 7.5±4.6 values in follow-up. According to the comparison of the pre/postoperative NYHA and RVP statistics ($p<0.05$), the survival rate without reoperation was estimated as 93.2 %.

CONCLUSIONS: Ventricular septal defect is the most common congenital heart disease. The development of ECHO and cardiac angiography has a great share in the diagnosis and classification. It should be preferred to evaluate the defects very well and close them after 3 months.

KEYWORDS: Left Ventricle, Interventricular septum, Defect

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INTRODUCTION

Ventricular septum defect (VSD) can be defined as one or more openings located in the septum separating the left and right ventricle. Ventricular septal defects can be congenital or acquired. It is the most common congenital heart anomaly. It constitutes 50% of congenital heart diseases and its prevalence is 41.8 per 10000 live births (1). Although the rate of isolated VSD known in the society is about 20% of congenital heart diseases, the etiopathogenesis of VSD has not been elucidated yet. Along with the genetic predisposition, some environmental factors such as the mother's use of alcohol, smoking and amphetamines, the presence of diabetes in the mother, the mother's work in the paint industry, and pesticides are blamed in the aetiology (2).

VSD is more common in premature and low birth weight children. In colour Doppler ECHO scans performed in recent years, the frequency of VSD at birth has been reported to be between 1-5%. The reason for this increased frequency is the detection of small muscular VSDs, which usually close in the first months of life (3). Although the aetiology of congenital anomalies of the heart is not known exactly, it is thought that both genetic factors and environmental factors play a role in the aetiology. The fact that hereditary or non-hereditary anomalies are sometimes found together with congenital cardiovascular anomalies suggests a genetic feature in some patients (4).

Echocardiography is the most ideal diagnostic method in VSDs. Echocardiographic evaluation should cover all standard precordial leads. Since the ventricular septum is not a simple structure located in a single plane, it must be evaluated in various sections. All except pulmonary vascular resistance (PVR) are evaluated by ECHO. In addition, a good correlation was found between ECHO and cardiac catheterization findings for hemodynamic parameters such as right ventricular pressure and pulmonary-systemic flows ratio (Qp / Qs) measured as an indirect indicator of pulmonary artery pressure on ECHO (5). Transesophageal echocardiography (TEE), such as transthoracic echocardiography, is an important technique in the investigation of VSD morphology and cardiac functions, especially when precordial ECHO images are not sufficient. Catheterization is performed to determine the number of defects, evaluate the size of the shunt, pulmonary vascular resistance, workload of both ventricles, determine other accompanying lesions, inform the surgeon about the anatomical structure and localization of the defect, and transcatheter closure (6). In this article, we evaluated the VSDs that we treated surgically in our clinic in the light of the literature.

MATERIALS AND METHODS

The patients who were operated for ventricular septal defect between 2005 and 2017 by the department were examined. Surgical treatment and follow-up of clinical results of 68 patients who underwent surgical treatment for ventricular septal defects by the Department of Cardiovascular Surgery were retrospectively reviewed. 39 cases were male (57.3%) and 29 cases were female (42.6%). The mean age was 9.19 ± 9.13 (1-48), and the mean weight was 24.1 ± 16.5 (7-75). When the patients were compared according to NYHA functional capacity (FC), FC-I was determined as 31 cases (45.5%), FC-II as 30 cases (44.1%), and FC-III as 7 cases (10.2%). The highest group is the one with a heart murmur in routine health screenings and without symptoms who are referred to the pediatric cardiology clinic. In the physical examination of the patients, there was a murmur in the mesocardiac focus and stiffening at S2. 47 cases (69.1%) of our patients were found to have normal sinus rhythm **(Table 1)**.

Table 1: Preoperative characteristics of the patients

Total Number of Patients	68
Male female	39/29
Age range	1-48 y
Average Weight	25±16,5 (7-75)
NYHA Functional Capacity	
Functional Capacity I	31 (%52,5)
Functional Capacity II	30 (%42,4)
Functional Capacity III	7 (%5,1)
ECG	
Normal Sinus Rhythm	44 (%59,3)
Right bundle branch block (RBBB)	21 (%35,6)
LV Hypertrophy	2 (%3,4)
LV + RV Hypertrophy	1 (%1,7)
Telecardiography: Cardiothoracic Ratio Increased	
Normal	48 (%66,1)
Diagnosis	20 (%33,9)
Echo	
Angiography	3 (%5,1)
Eco + Angiography	1 (%1,7)
VSD Size	64 (%93,2)
Small	
Middle	17 (%25)
Big	28 (%41,1)
VSD amount	23 (%33,8)
Single	
Multiple	64 (%94,1)
	4 (%5,9)

Defects larger than 1 cm were considered large, defects between 0.5-1 cm were considered medium, and defects smaller than 0.5 were considered small. In our study, 23 patients (33.8%) diagnosed with large VSD according to their size were the most common, 28 patients (41.1%) diagnosed with medium-sized VSD and 17 patients (28.8%) diagnosed with small-sized VSD. The definitive diagnosis of the patients was made by echocardiography and cardiac catheterization-angiography **(Figure 1, 2)**.

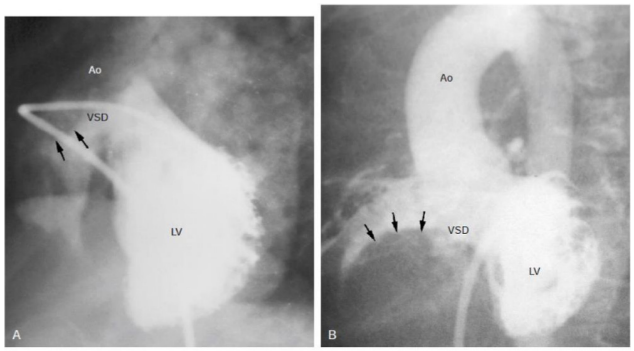

Figure 1: Angiographic view of the VSD

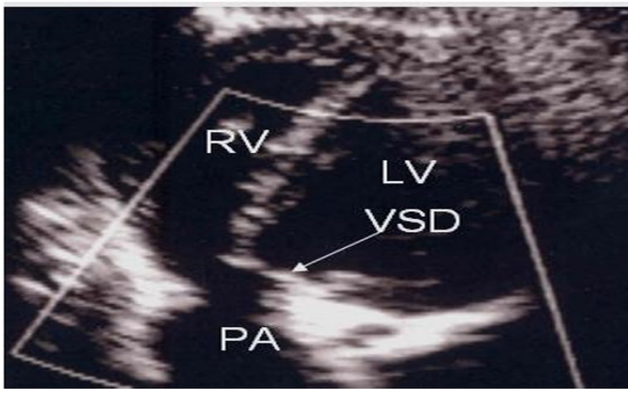

Figure 2: Echocardiographic appearance of the VSD

The mean left ventricular ejection fraction of the patients was measured as 65% (56-80). Mean pulmonary / systemic flow rate (Qp / Qs) was calculated as 2.53 (1.1-8.5), mean shunt between LV and RV as 59.7 mmHg (12-100), RVP as 50.2mmHg (20-100), PAP as 48.8 mmHg (17105) and pulmonary vascular resistance (PVR) as 4.6 (1.8-11.8). Right-left heart pressures and shunt rate were measured in all VSD cases **(Table 2)**.

Table 2: Some preoperative hemodynamic findings of the patients

Echocardiography Mean ejection fraction (EF): 68.86 ± 5.5% (56-87%)
Average LV-RV Shunt (mmHg): 57.7 ± 20.7 (12-100)
Right Ventricular Pressure (mmHg): 50.2 ± 20.4 (20-100)
Cardiac catheterization Pulmonary / systemic shunt ratio (Qp / Qs): 2.51 ± 1.56 (1.1-9.5)
PA pressure / systolic (mmHg): 48.86 ± 22.33 (17-105)
Pulmonary vascular resistance (PVR): 4.44 ± 2.15 (1.8-11.8)

Ethical Committee

At the meeting numbered B.30.2.ATA.0.01.00 / 40, dated 24.05.2012 and numbered B.30.2.ATA.0.01.00 / 40 of the Department of Cardiovascular Surgery of Atatürk University Faculty of Medicine.

Statistical Analysis

SPSS 21 computer program was used to analyse the data. The data are presented as number, percentage, median, mean and standard deviation. The compliance of the groups to the normal distribution was analysed with the Kolmogorov Smirnow Test. Kruskal Wallis Test for comparing weight status according to exitus status; Wilcoxon Signed Ranks Test for the comparison of preoperative right ventricular pressure and postoperative right ventricular pressures; Marginal Homogeneity Test for the comparison of preoperative NYHA FC and postoperative NYHA FC; Chi-Square Test in comparison of postoperative complications according to VSD type, patient symptoms according to VSD diameter, surgical intervention method according to VSD type, exitus rate according to VSD intervention route, postoperative complication rate according to VSD intervention route, postoperative complications according to repair material (patch) If the P value was less than 0.05, the results were considered statistically significant.

RESULTS

In our clinic, all patients having open heart surgery conditions were subjected to cardiopulmonary bypass under general anaesthesia (induction 5 mg/kg pentothal, 1 mcg/kg fentanyl, 0.6 mg/kg rocuronium bromide; maintenance sevoflurane MAC1), after standard bicaval venous and ascending aortic cannulation following median sternotomy. We generally apply 28-30 C° hypothermia for the operation. In moderate hypothermia, cold crystalloid (Plegisol®) at a dose of 20cc/kg initially, followed by intermittent blood cardioplegia (10 cc/kg) to cardiac arrest was achieved by topical cooling with cold saline. The vent cannula placed in the right superior pulmonary vein or through the patent foramen ovale was placed during surgery to draw blood from the left ventricle and left atrium to provide a bloodless environment

during the surgical procedure. In our study, 32 cases (47%) with intracardiac polytetrafluoroethylene (PTFE); 35 cases (51.4) pericardium fixed in glutaraldehyde and 1 case (1.4%) of multiple muscular trabecular type were repaired together with pericardial patch and primary **(Table 3)**. The most frequent 53 cases (77.9%) were reached by right atriotomy as the access route to VSD; 10 cases (14.7%) right ventriculotomy; 1 case (1.7%) right ventriculotomy and aortotomy; 1 case (1.7%) with pulmonary stenosis, right atriotomy and pulmonary arteriotomy; 2 (3.4%) left ventriculotomy with apically located Swiss-Chess type VSD; Right atriotomy + tricuspid septal annulus radial incision after covering with tricuspid leaflet tissue in 1 case (1.7%) with large perimembranous inlet type VSD, and one case (1.7%) with muscular trabecular swiss-chess type VSD accompanied by pulmonary stenosis was reached by performing left ventriculotomy + pulmonary arteriotomy.

Table 3: Intraoperative outcomes

Characteristics	***n* = 68**
Clamp time (min)	45,8±12,2(24-84)
Pump time (min)	79,13±21,11(56-192)
Cardioplegic solution infusion route	
Antegrade	68 (100%)
VSD diameter (mm)	5±2 (2–7)
Patch material used	
Pericardium[a]	33 (48,5%)
Gore-Tex	30 (44,1%)
Primary	5(7,3%)
Combined procedure	
ASD closure	18 (26,4%)
PDA ligation	8 (11,7%)
Subaortic Membrane Excision	1 (1,4%)
TV repair	7 (10,3%)
RVOT muscle resection	1 (1,4%)

Considering the intervention methods according to the VSD types, 54 cases (79.4%) of the perimembranous type were most frequently diagnosed with right atriotomy, 1 case (1.4%) right atriotomy and tricuspid septal annulus radial incision; Right atriotomy with the most common 7 cases (10.2%) of the muscular type and left ventriculotomy in 2 cases (2.9%) of the SwissChess type; Right ventriculotomy was preferred with the most common 5 cases (7.3%) of the DCJA type. In all VSD types, the most common preference of right atriotomy with 46 cases (77.9%) seems significant, but it was not statistically significant (p>0.05) **(Figure 3)**.

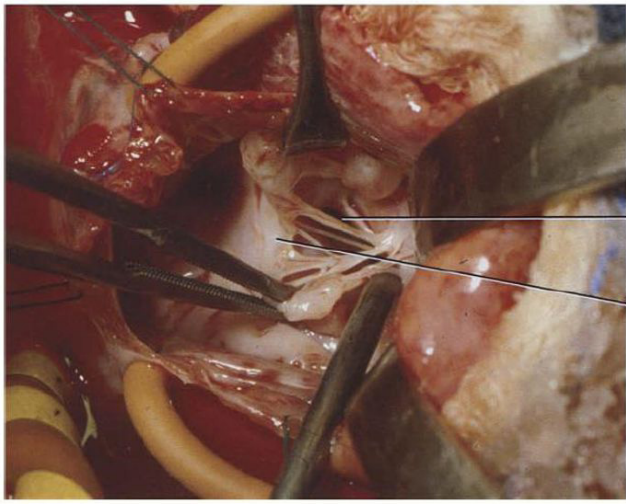

Figure 3: The appearance of the VSD during operation

In preoperative angiography, pulmonary artery pressure (PAP) was measured as 48.86 ± 22.33 (17-105) mmHg. Preoperative and postoperative inhaler iloprost treatment was administered to patients with high PAP (3-5mcg / kg / day). When we close the defect with pericardium or graft (polytetrafluoroethylene (PTFE)), we use 3/0 polyester suture with plegite as the suture material.

In order not to damage the A-V node and the conduction system, we prefer to place a 3/0 polyester pleulitic-free suture on the inferio-posterior edge of the defect, where the defect is close to the conduction paths. In addition, we use 4/0 polypropylene sutures in patients whose atrial septal defect is closed. Ventricular temporary pacemaker wire was placed in all patients. The mean cross-clamp time was 49.9 ± 11.2 (24-84) minutes, and the mean perfusion time was 82.03 ± 20.08 (56-192) minutes. The characteristic of patients with an average intubation period was 3.64 ± 1.29 (2-9) hours in the intensive care unit and prolonged intubation period are patients with preoperative pulmonary hypertension.

There was no perioperative mortality in our patients. Two patients (3.4%) died in the early postoperative period (first 2 months), one due to low cardiac output and the other due to postoperative pericardial tamponade. One patient (1.7%) died in the late postoperative period due to sepsis and bronchopneumonia. In

total, 3 patients (5.09%) had mortality. The preoperative NYHA Functional Capacity of these patients was 2 and above. The mean weight of 2 patients who died in the early postoperative period was found to be 18 ± 11.3 (10-26) kilograms (kg), and one patient who was fatal in the late period was 21 kilograms. The relationship between weight and exitus was not statistically significant (p>0.05). Among the postoperative complications, the most common 8 cases (11.7%) was residual VSD. Since the shunt and Qp/Qs ratio between the LV-RV was low in all residual VSDs, reoperation was not considered and clinical follow-up was performed. It was seen that 66.7% of the residual shunt patients with no hemodynamic significance were perimembranous outlet type. Postoperative temporary A-V block and pericardial tamponade developed in 4 patients (5.8%) with pericardial effusion, and in 1 patient (1.4%), temporary A-V block and pericardial tamponade developed on the 24th.day. Temporary A-V block returned to sinus rhythm on postoperative 12th day. When the effect of the repair material on postoperative complications, especially on residual VSDs (8 cases) was taken into account, it is seen that 5 cases (7.3%) were closed with grafts, and 3 cases (4.4%) were closed with pericardium. When **Table 4** was examined, although complications were seen less in pericardium use, it was not found statistically significant (p>0.05).

Table 4: Postoperative complications seen in VSDs by repair materials

		POSTOPERATIVE COMPLICATION							
Repair Material		Pericardial Effusion	Installing a Permanent Battery	Residue VSD	Tricuspid Insufficiency	Low Flow	Temporary A-V Block	Tamponad+ Temporarym A-V Block	PermanentBattery Installation + Low Flow
Graft	30	2	1	5	0	1	6	1	1
		%2,9	%1,4	%7,3	%0,0	%1,4	%8,8	%1,4	%1,4
Pericard	33	1	0	3	0	0	2	0	0
		%1,4	%0,0	%4,4	%0,0	%0,0	%2,9	%0,0	%0,0
Primary	5	0	0	0	1	0	0	0	0
		%0,0	%0,0	%0,0	%1,4	%0,0	%0,0	%0,0	%0,0

When preoperative NYHA with the data of 31 cases (45.5%) of FK-I, 30 cases of FC-II (44.1%), 7 cases of FC-III (10.2%) were compared with postoperative NHYA with the data of the data of 59 cases (86.7%) of FC-I, 7 cases of FC-II (10.2%), and data of FC-III 2 cases (2.9%), they were found to be statistically significant (p<0.05) **(Table 5)**.

Table 5: Comparison of preoperative and postoperative NYHA

			Postoperative NYHA			
			FK I	FK II	FK III	Total
Preoperative NYHA	FC I	Count	31	0	0	31
		% Pre NYHA	%100,0	%0,0	%0,0	%100,0
		% Post NYHA	%62,0	%0,0	%0,0	%52,5
	FC II	Count	23	6	1	30
		% Pre NYHA	%72,0	%24,0	%4,0	%100,0
		% Post NYHA	%36,0	%85,7	%50,0	%42,4
	FC III	Count	5	1	1	7
		% Pre NYHA	%33,3	%33,3	%33,3	%100,0
		% Post NYHA	%2,0	%14,3	%50,0	%5,1
Totally		Count	59	7	2	68
		% pre NYHA	%84,7	%11,9	%3,4	%100,0
		% post NYHA	%100,0	%100,0	%100,0	%100,0

It was found statistically significant that the preoperative right ventricular pressure value was 50.2 ± 20.4 (20-100) mmHg and the mean RVP was found to be 34.4 ± 12.4 (15-76) mmHg in the postoperative follow-up by ECHO (p<0.05) **(Table 6)**.

Table 6: Comparison of preoperative and postoperative pressures

	Preoperative Echo RVP	Preoperative Angiography PAP	Postoperative Angiography PVR	Postoperative Echo RVP
Valid	68	68	68	68
Missing	0	0	0	0
Mean-	50,22	48,86	4,444	34,47
Median-	47,00	45,00	4,100	34,00
Std. Deviation	20,478	22,339	2,1546	12,459
Minimum	20	17	1,8	15
Maximum	100	105	11,8	76

DISCUSSION

Ventricular septum defect (VSD) can be defined as one or more openings located in the septum separating the left and right ventricle. Ventricular septal defects can be congenital or acquired. It is the most common congenital heart anomaly. Complaints and physical examination findings of patients with ventricular septal defects are closely related to the size of the shunt and thus the defect (1). In our study, 27 cases (45.8%) without symptoms were found to be small and medium-sized VSDs Table 5. However, it was not found statistically significant due to the small number of data (p>0.05). New-borns with large defects are followed closely. If patients have heart failure and lung infection,

medical treatment is given. Patients who do not improve with medical treatment may be surgical candidates in the early period. In our study, 1 patient was operated due to frequent lung infection and 1 patient (1.4%) due to progression of aortic insufficiency after medical treatment. Pulmonary artery pressure and right ventricular pressures must be known in order to evaluate ventricular defects accurately and to determine the surgical time. Studies on this subject have emphasized that Doppler echocardiography is a non-invasive diagnostic tool as an alternative to hemodynamic testing (6). If the necessary information is not available, catheterization is performed to determine the number of defects, evaluate the size of the shunt, pulmonary vascular resistance, workload of both ventricles, determine other accompanying lesions, inform the surgeon about the anatomical structure and localization of the defect, and transcatheter closure (7). Catheterization should be performed especially in cases where there is data on excessive shunt findings, congestive heart failure and pulmonary hypertension. In addition, the role of catheterization is important in understanding additional pathologies. In our clinic, 3 patients (4.4%) scheduled for VSD closure were operated by echocardiography, 1 patient (1.4%) angiography, 64 patients (94.1%) echocardiography and angiography.

Especially patients with large or multiple VSDs are at risk for the development of pulmonary vascular obstructive disease after the age of 2 (8). In patients with PVR more than 10/m^2 and generally Qp/Qs<1.5, whose systolic murmur decreased or disappeared, pulmonary vascularity decreased on thorax radiogram, left ventricle was in normal size, and ECG had moderate right ventricular hypertrophy, it should be considered that Eisenmenger's picture is present and surgical intervention should not be planned. It can be operated if the PVR is between 5-10/m^2. Qp, Qs and PVR measurements will help us after moderate exercise in the patient scheduled for operation. If the Qp/Qs is 1.5-1.8 u/m^2 at rest, the operation should not be performed if this value decreases to 1 u/m^2 or less after exercise. Vasoreactivity test should be applied to make a definite decision. The most commonly used agents in vasoreactivity testing are oxygen, inhaled nitric oxide, epoprostenol, inhaled ilioprost and adenosine (9). The average value of PVR in our clinic was measured as 4.4 ± 2.15 (1.8-11.8). Vasoreactivity test is performed especially with oxygen for patients with high PVR values.

Patients who respond to medical treatment can be waited without catheterization until they are at least six months old. The aim of effective medical treatment in babies with symptomatic VSD is to prevent heart failure and insufficient weight gain. After 6 months, the risk of spontaneous closure and operation is significantly reduced (10). In addition to the medical treatment given to the patients, pre/postoperative inhaler iloprost (platelet aggregation inhibition, artery and vein dilatation; 3-5 mcg/kg/day 6-9 times according to PAP every two hours) treatment is given to patients with preoperative high PAP in our clinic. In patients with multiple defects in the septum (Swiss Cheese Septum), pulmonary banding within the first 3 months and debanding and septum repair within 3-5 years are recommended, as the risk of defect closure is high and left ventriculotomy is required (11).

In our study, we did not have a patient undergoing VSD operation after pulmonary banding. Debanding was performed while closing the vsd of a patient who had banding before **(Figure 4)**.

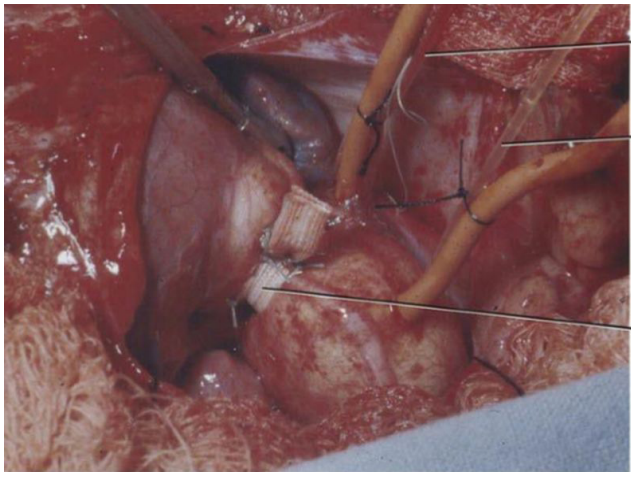

Figure 4: Operational view of pulmonary banding

All VSDs should be closed with a patch (12). In our study, 30 cases (44,1%) were repaired with intracardiac polytetrafluoroethylene (PTFE) and 33 cases (48.5%) were repaired with a pericardium fixed in glutaraldehyde. When closing perimembranous defects, care should be taken not to damage the A-V node and conduc-

tion system. In the area from the Lancisi muscle (medial papillary muscle of the subject) to the tricuspid valve annulus at the top of the Koch triangle, the conduction system proceeds close to the VSD. Clinically, we prefer to place individual sutures without 3/0 polyester on the inferio-posterior edge where the defect lies close to the conduction paths, especially in order not to damage the A-V node and conduction system. The probability of survival without reoperation in the long term was calculated as 93.2%. When pre / postoperative NYHA functional capacities were compared, it was found to be statistically significant ($p<0.05$). Hardin et al. indicated only 1 death in 48 infant cases (13). Mc Groth gave hospital mortality in 1 case in a series of 115 patients (14). In our study, 3 patients died and our mortality was 5.8%. Surgical closure of the VSD may lead to conduction defects, which are the most common complications after the operation. If the atrial route is used for VSD repair, the frequency and severity of postoperative intraventricular conduction disturbances are minimized (14). In our study, transient A-V block was observed in 8 patients (11.7%). Temporary A-V block development after right atriotomy was 37.5% and 62.5% after right ventriculotomy. Permanent pacing was applied to 1 patient followed by temporary pacing, others returned to sinus rhythm during their follow-up.

In our study, although the location of approach to VSD was a significant correlation with the development of A-V block, it was not found statistically significant ($p>0.05$). Small, hemodynamically insignificant residual defects, of which only 1% requires reoperation, have been reported with a frequency of 8% in the area where the patch was placed (15,16). In our patients, 8 patients (11.7%) had residual shunts that did not have any postoperative hemodynamic significance. 5 patients (66.7%) were of the perimembranous outlet type, 1 patient (11.1%) of the perimembranous trabecular type, 1 patient (11.1%) of the muscular inlet type, and 1 patient (11.1%) of the muscular trabecular type VSD. Residual shunts were observed in 6 patients (17.4%) who were treated with right atriotomy. It was not statistically significant ($p>0.05$). All patients were followed hemodynamically and no reoperation was required.

Complications of the aortic valve are mostly related to subarterial VSD due to natural history and anatomical morphology. Lack of anatomical muscle support just below the aortic valve leads to herniation of the leaflet and the additional 'Venturi effect' created by shunt flow during systole pulls the leaflet from the defect (17, 18). Moreover, the defect tendency in subarterial VSD usually does not close on its own. Occasionally, the defect may be seen as a 'functionally' restrictive defect, but in fact it is a major defect covered by the prolapse aortic valve leaflet that can mislead or delay the treatment strategy (19). Prolapse of aortic valves from VSD secondary to aortic insufficiency with VSD creates a significant problem in surgical approach and timing. Backer et al. demonstrated that early closure of doubly commited juxtaarterial VSD prevents progression of aortic regurgitation (18). Nygren et al. have reported that surgical indications are clearer in terms of approach to patients with asymptomatic VSD with a small diameter (restrictive) shunt ratio between 1.5 and 1.99 (19). Clinically, we believe that traditional indications as well as VSDs with aortic valve insufficiency regardless of the shunt rates and also the defects with a shunt ratio of 1.5-1.99 should be placed among the indications for VSD closure. Therefore, subarterial VSD requires close monitoring from the moment of diagnosis, and early surgical closure of subarterial VSD is highly recommended when aortic valve deformity is present and even before the onset of aortic valve deformity since preoperative AR or aortic valve prolapse are risk factors (18 - 20). In our study, there were 13 patients (22%) with preoperative isolated aortic insufficiency and aortic valve prolapse. We think that the reason why none of them had advanced aortic regurgitation in the aortic valve was our working in harmony with the pediatric cardiology clinic and our putting the cases with aortic insufficiency into elective emergency operation.

Various materials and suture techniques can be used while closing the VSD. All VSDs should be patch closed. However, if the defect is very small, the defect can be closed primarily. Synthetic materials such as Dacron, polytetrafluoroethylene (PTFE) can be used for VSD closure, as well as autologous materials such as fresh

pericardium, glutaraldehyde-fixed pericardium, and xenografts such as bovine pericardium (12). Synthetic patch was used in 30 patients (50.8%) and pericardial patch was used in 23 patients (39%) for closing the VSD. When the relationship between postoperative residual VSD (9 cases) and the repair material used in VSDs is considered, it is seen that 5 cases (55.5%) were closed with grafts and 4 cases (44.5%) were closed with pericardium. It was not found statistically significant ($p>0.05$) Table 5. VSD accompanies 31% of congenital cardiac defects (7).

After the surgical closure of the VSD, the risk of bacterial endocarditis is not completely eliminated, but it is significantly reduced (18, 19). In our study, a patient (1.4%) was diagnosed with a perimembranous trabecular type VSD in the angiography performed due to a heart murmur on physical examination and brucella growth in blood culture due to high fever. Most patients are asymptomatic in long-term follow-up and have a normal life span (8, 9). In our study, the probability of survival without reoperation was calculated as 93.2% in the long term. Especially, pre/postoperative NYHA and RVP comparisons were found to be statistically significant ($p<0.05$).

Pulmonary artery taping (PAP) is recommended as a palliative procedure for children in cases such as large ventricular septal defect (VSD), intracardiac anomalies such as single ventricle, a large left-to-right (LV-RV) shunt and large artery transposition (20). It has since been a palliative operation used to prevent congestive heart failure or pulmonary vascular obstructive disease (18). Regardless of the location of the great vessels, taping can be done by left or right thoracotomy or median sternotomy. Ideally, the main pulmonary artery can be accessed through left lateral 3rd-4th intrathoracic space by means of thoracotomy. If the tape is placed more proximally, it may cause dysplastic pulmonary valve development as a result of thickening in the valve and valve leaflet on the pulmonary commissure. If the band is placed too distal on the main pulmonary artery, it may cause kinks or kinking on the pulmonary artery branches. After the aortic and main pulmonary artery pressures are monitored, ideally, after banding, the mean pressure of the main pulmonary artery should decrease by 25-30 mmHg or the mean systemic pressure should decrease up to the ratio of 30% to 50%. Peripheral arterial oxygen saturation does not change with banding. A 5% drop is acceptable in normal patients. A 10% reduction in the presence of large artery transposition is acceptable, but peripheral arterial oxygen saturation should not fall below 65-70% (18).

Pulmonary artery reconstruction (debanding) is required during VSD closure in patients undergoing pulmonary banding. If debanding is done, 3 techniques can be applied; removal of the band and primary angioplasty, vertical removal of the band and narrow segment and patchplasty with pericardial or dacron graft, and resection of the band and narrow pulmonary artery segment and end-to-end anastomosis.

In addition, at present, transcatheter device closure for perimembranous ventricular septal defect has become a widely accepted alternative to open heart surgery (20). Since the development of occluders and intervention techniques, the range of indications has been expanded. Recently, several studies have been reported on the transcatheter device of the ventricular septal defect using the Amplatzer occluder. However, most of the reports are based on small samples with no long-term follow-up (17, 18, 20). As a result; Ventricular septal defect is the most common congenital heart disease. The development of Echo and cardiac angiography has a great share in the diagnosis and classification. It should be preferred to close the defects after 3 months. Small and medium VSDs should be followed up with medical treatment, but patients whose symptoms do not improve with medical treatment, whose pulmonary artery pressure increased and who developed $Qp/Qs>1.5$ and additional complications should be operated early. Surgical intervention should be applied without delay in the repair of large VSDs as early as possible, and in VSD cases with aortic valve insufficiency. Pre/postoperative iloprost treatment should be administered as an inhaler, especially in patients with high preoperative pulmonary artery pressure. In general, right atriotomy should be preferred as a means of access to the VSD and the VSDs should always be closed using a patch and one by one Teflon pledget suture technique. Pre/

postoperative prophylaxis should be applied to the patient from the point of endocarditis.

Closing the ventricular septal defect is one of the basic surgical procedures that a congenital heart surgeon must first specialize. In order to achieve a perfect patch closure of the defect without causing complications such as residual interventricular shunt, tricuspid valve insufficiency or atrioventricular block, the surgeon must have the anatomical features of the defect, effective intraoperative exposure, accurate preoperative and intraoperative assessment and understanding.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

COVID-19 PANDEMİ SÜRECİNDE GÖREV ALAN SAĞLIK ÇALIŞANLARININ KAS İSKELET SİSTEMİ AĞRILARININ VE FİZİKSEL AKTİVİTESİNİN DEĞERLENDİRİLMESİ

EVALUATION OF MUSCULOSKELETAL PAIN AND PHYSICAL ACTIVITY OF HEALTH CARE WORKERS TAKING PART IN THE COVID-19 PANDEMIA

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ÖZET

AMAÇ: Bu araştırmanın amacı Covid 19 pandemi döneminde görev yapan sağlık çalışanlarının ağrı ve fiziksel aktivite durumlarının değerlendirilmesidir.

GEREÇ VE YÖNTEM: Online formda hazırlanan tanıtıcı bilgiler formu ve Uluslararası fiziksel aktivite anketi (UFAA) mail ve cep telefonu uygulaması yoluyla katılımcılara gönderilmiştir. Bulguların yorumlanmasında frekans tabloları ve tanımlayıcı istatistikler kullanılmıştır.

BULGULAR: Çalışmaya 278 sağlık çalışanı dahil edildi. Yaş ortalamasına 30.24±8,46 olan sağlıkçıların, boy ortalaması 166.62±8,15 olarak hesaplandı. Katılımcıların %75'i kadın iken %25'i erkekti, meslekleri ise %45'i doktor, %29'u hemşire, %10'u ise diğer sağlık personeli olarak belirlendi. Sağlık çalışanlarının Covid öncesi ve sürecinde dönemde yaptıkları sporlara yönelik elde edilen sonuçlara göre yürüme ile egzersiz yapanlarda artış olduğu ancak Covid öncesinde futbol, voleybol, yüzme, tenis, masa tenisi, pilates, yürüme, koşma, ağır kaldırma, fitness salonu, dans gibi spor dallarıyla ilgilenenlerin Covid sürecinde anlamlı düzeyde azalma olduğu görülmüştür. Fiziksel aktivitede görülen azalmaya rağmen katılımcıların vücut ağırlıklarında farklılık olmadığı belirlenmiştir. Araştırmamızda sağlık çalışanlarının Covid sürecinde ise hareket ağrısı gözlenen toplam 70 kişi varken, gece ağrısı 25 kişide, istirahat ağrısı 53 kişide, yanma tarzında ağrı 45 kişide, uyuşma tarzı ağrı 45 kişide ve karıncalanma tarzı ağrı toplamda 35 kişide gözlendi. Ayrıca katılımcıların ağrı bölgelerine göre sırayla sırt, bel, omuz ve dirsekte ağrıları olduğu belirlenmiştir.

SONUÇ: Ağrının önlenmesi ve azaltılmasında sağlık çalışanlarına yönelik, bel, sırt, boyun ergonomisinin öğretilmesi ve egzersiz programı verilerek fiziksel aktiviteyi arttırıcı aktivitelere yönlendirilmeleri oldukça yararlı olabilir.

ANAHTAR KELİMELER: Hastane sağlık personelleri, Egzersiz, Mesleki maruziyet

ABSTRACT

OBJECTIVE: The purpose of this research is to evaluate the pain and physical activity status of health care professionals working during the Covid 19 pandemic period.

MATERIAL AND METHODS: The introductory information form prepared in the online form and the International physical activity questionnaire (UFAA) were sent to the participants via e-mail and mobile phone application. Frequency tables and descriptive statistics were used to interpret the findings.

RESULTS: 278 healthcare professionals were included in the study. The mean height of healthcare professionals whose mean age was 30.24±8,46, was calculated as 166.62±8,15. 75% of the participants were women, 25% were men, and their occupations were determined as 45% doctors, 29% nurses and 10% other health personnel. According to the results of the sports that healthcare professionals did before and during Covid, it has been observed that there was an increase in those who exercised with walking, but there was a significant decrease in those who were interested in sports such as basketball, football, volleyball, swimming, tennis, table tennis, pilates, walking, running, heavy lifting, fitness center, dance, etc. in the Covid process. Despite the decrease in physical activity, it was determined that there was no difference in the participants' body mass index. While there were 70 people in total who had movement pain during Covid, night pain was observed in 25 people, rest pain in 53 people, burning pain in 45 people, numbness in 45 people, and tingling pain in 35 people in total in our research. In addition, it was determined that the participants had pain in the back, waist, shoulder and elbow, respectively, according to the pain regions.

CONCLUSIONS: In the prevention and reduction of pain, it can be very useful to teach waist, back and neck ergonomics to healthcare professionals and to direct them to activities that increase physical activity by giving an exercise program.

KEYWORDS: Hospital medical staffs, Exercise, Occupational exposure

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GİRİŞ

Koronavirüs hastalığı (Covid 19) ilk olarak 2019 yılı Aralık ayında Çin'in Wuhan kentinde ortaya çıkarak, halen devam eden; yayılımı hızlı olan salgın bir hastalık olarak (pandemi) değerlendirilmiştir (1, 2). Şu an hala devam etmekte olan Covid 19 salgını, bulaşın hızlı olmasından dolayı bir ay içerisinde tüm dünyaya yayılarak (3) sağlık personeli ihtiyacının tüm dünyada olduğu gibi ülkemizde de artmasına sebep olmuştur (4). Söz konusu salgında bu ihtiyacın daha da artmış olması ve sağlık personelinin de risk altında oluşu sebebiyle sağlık çalışanlarının iş yükünü arttırmıştır (5). Sağlık çalışanlarının yoğun çalışma temposunun olması, uzun süreli ve kesintisiz çalışma saatleri ve iş geriliminin diğer iş kollarında çalışanlara göre çok daha fazla olması, çeşitli meslek riskleri ile karşılaşılmasına ve sağlıklarının olumsuz etkilenmesine yol açmaktadır (6). Sağlık çalışanlarında yapılan çalışmalarda kas iskelet sistemi ağrıları açısından risk faktörleri; öne eğilme sıklığının fazla olması, itme ve çekme hareketleri, yoğun ve ağır fiziksel çalışma, statik iş pozisyonları, ağırlık kaldırma, tekrarlayan hareketler ve vibrasyonun etkili olabileceği ortaya konmuştur (7, 8). Ülkemizde pandemi öncesi sağlık çalışanlarında yapılan bir çalışmada ağrı lokalizasyonu olarak en sık bel bölgesinde ağrı görülürken; sağlık çalışanlarında en sık olarak yapılan spor ise yürüyüş olarak tespit edilmiştir (7). Pandemi döneminde sağlık çalışanlarında yapılan çalışmalarda fiziksel ağrılarının yanı sıra; anksiyete, depresyon seviyelerinin yüksek olduğu anlaşılmıştır (9). Ülkemizde yapılmış bir araştırma sonucuna göre; pandeminin sağlık çalışanlarında kas iskelet sisteminde ağrıda artış görülmesinin yanısıra, mutsuz ve endişeli bir ruh haline ve fiziksel aktivite süresinde azalmaya neden olduğu belirlenmiştir. Ancak düzenli fiziksel aktivite yapmanın kas iskelet sistemi ağrıları ile ilişkili olmadığı belirlenmiş olup, ağrının psikososyal durumla ilgili olduğu düşünülmektedir (10). Literatürde sağlık çalışanı olmayan bireylerde Covid 19 karantina sürecindeki fiziksel inaktivite ve ağrılarının ilişkili olduğu faktörlere odaklanan çalışmalarda; özellikle karantina sürecinde bireylerin uzun süre internet kullanımı, online çalışma düzenine geçilmesi, vücut postürüne dikkat edilmeden uzun süre bilgisayar kullanımı, sigara kullanımı, kadın cinsiyet olmanın kas iskelet sistemi ağrısı ile ilişkili olduğunu bildirilmektedir (11 - 13). Bu araştırma; çalışma koşulları nedeniyle daha önce risk altında olduğu bilinen sağlık çalışanlarının meslekleri ne göre vücudun değişik yerlerinde ağrılarını tespit edip, pandemi süresince fiziksel aktivite ve ağrı lokalizasyonunu ve etkilerini ortaya koyan ilk çalışma olması açısından önemlidir.

GEREÇ VE YÖNTEM

Araştırma Grubu (Evren- Örneklem): Çalışmaya pandemi döneminde çalışan ve çalışmaya katılmayı kabul eden 278 sağlık personeli Mayıs 2021'de katılmıştır.

Veri Toplama Araçları: Demografik veri formunda; katılımcıların yaş, cinsiyet, boy, kilo, medeni durum, Covid öncesi ve sürecinde kilosu, Covid 19 pandemisi öncesi fiziksel aktivite yapıp yapmadığı, düzenli aktivite yapanların ne tür aktivite yaptıkları, pandemi süresince düzenli olarak veya zaman zaman fiziksel aktivite yapıp yapmadıkları, pandemi öncesinde ve sürecinde kas iskelet sistemi ağrıları, lokalizasyonu, tipi ve düzeyi sorgulanmıştır. Katılımcılardan Uluslararası fiziksel aktivite anketi (UFAA) ile özellikle son 1 haftadır fiziksel aktivite yapıp yapmadığı, yaptıysa ne şiddette ve ne kadar sıklıkla yaptığının bilgisi alınmıştır. Uluslararası Fiziksel Aktivite anketi (UFAA) Türkçe geçerlilik ve güvenirliği alınmıştır. UFAA'da fiziksel aktivitelerin, tek seferde en az 10 dakika yapılıyor olması ölçüt alınır. Anket ile son 7 gün içerisinde; Şiddetli fiziksel aktivite (futbol, basketbol, aerobik, hızlı bisiklet çevirme, ağırlık kaldırma, yük taşıma vb.) süresi (dk), orta dereceli fiziksel aktivite (hafif yük taşıma, normal hızda bisiklet çevirme, halk oyunları, dans, bowling, masa tenisi vb.) süresi (dk), yürüme ve bir günlük oturma süreleri (dk) sorgulanarak şiddetli, orta dereceli aktivite ve yürüme süreleri hesaplamalarla bazal metabolik hıza karşılık gelen metabolik eşleniğe (MET) çevrilerek toplam fiziksel aktivite skoru (MET-dk/hafta) hesaplanır. Toplam fiziksel aktivite skoruna göre katılımcıların fiziksel aktivite düzeyleri "düşük, orta ve yüksek" biçiminde sınıflandırılır. Fiziksel Aktivite Düzeyleri: 1. Düşük düzey: 600 MET-dk/hafta nın altı. 2. Orta düzey: 600-3000 MET-dk/hafta arası. 3. Yüksek düzey: 3000 MET-dk/hafta üstü olarak kabul edilir (14, 15).

Verilerin Toplanması: Online formda hazırlanan sorular mail ve cep telefonu uygulaması yoluyla katılımcılara gönderilmiştir. Katılımcıların online olarak olarak doldurduğu anketler sorumlu hekimin mail adresine gönderilerek değerlendirmeye alınmıştır. Dahil olma kriteri olarak; çalışmaya katılmayı kabul etmiş olmak ve pandemi döneminde herhangi bir birimde çalışan sağlık çalışanı olmaktır. Dışlama kriterleri ise; anketi doldurmak istemeyenler, pandemi sırasında izinli olan ya da görev almayan sağlık çalışanları, görme problemi olanlar, dijital platform kullanmayanlar ve kullanamayacak kadar ileri kas iskelet sistemi problemi olanlar olarak belirlenmiştir.

Etik Kurul

Çalışma Sağlık Bakanlığı izni ile Kütahya Sağlık Bilimleri Üniversitesi Girişimsel Olmayan Etik Kurulu 15.04.2021 tarihli toplantıda 2021/07-14 numaralı etik kurul onayı ile yürütülmüştür.

İstatistiksel Analiz

İstatistiksel analizler IBM SPSS Statistics24.0 (IBM Corp. Released 2016. IBM SPSS Statistics for Windows, Version24.0. Armonk, NY: IBM Corp.) adlı paket 61 program kullanılarak yapıldı. Bulguların yorumlanmasında frekans tabloları ve tanımlayıcı istatistikler kullanıldı. Değişkenlerin normal dağılıma uygunluğu görsel (histogram ve olasılık grafikleri) ve analitik (Shapiro-Wilk testi) yöntemler ile incelendi. Normal dağılım göstermeyen parametrelerin değerlendirilmesinde Related Samples T Test (Wilcoxon Testi) kullanıldı. Normal dağılım göstermeyen 2 grubun değerlendirilmesinde Mann Whitney U testi, 2'den fazla grubun değerlendirilmesinde Kruskal Wallis testi ve Ki-Kare testi kullanıldı. Tüm istatistikteki p anlamlılık değeri $p<0.05$ olarak kabul edildi.

BULGULAR

Çalışmaya 278 sağlık çalışanı dahil edildi. Yaş ortalamasına 30.24±8.46 olan sağlıkçıların, boy ortalaması 166.62±8,15 olarak hesaplandı. Katılımcıların %75'i kadın iken %25'i erkekti. Çalışmaya dahil olan katılımcıların mesleği %45 oranla en fazla doktorluk iken; bu sırayı %29 ile hemşirelik, %10 ile diğer sağlık personelleri izledi (yaşı bakım elemanları, sağlık teknisyenleri vb). En az orana sahip grupta ise ilk sırada %0,4 ile eczacılar ve ergoterapistler vardı. Katılımcıların yaşadığı yerlerin yoğunluk sıralaması ise il (%77), ilçe (%18) ve köy (%5) şeklinde idi. Katılımcıların büyük çoğunluğunu lisans ve lisans üstü eğitime sahip olanlar oluşturdu. Katılımcıların %83,8'lik kısmında kronik bir rahatsızlık yok iken; geri kalanında rastlanan en sık rastlanan rahatsızlık tiroid hastalıkları idi. Katılımcıların pandemi süresince çalıştığı birimler sırası ile poliklinik ve servisler (%57), yoğun bakım ünitesi (%9), halk sağlığı merkezleri (%7), acil servis (%4), doğumhane (%2,5), filyasyon (%1) ve triyaj idi. Katılımcıların %19'u ise pandemi sürecinde kısmi zamanlı görevlendirilerek Covid ilişkili birimlerde görev yapmışlardır **(Tablo 1)**.

Tablo 1: Katılımcıların demografik özellikleri

		Ort±SS (n=278)	Ortanca (Min-Maks)
Yaş (yıl)		30.24±8.46	28 (18-55)
Boy (cm)		166.62±8.15	165 (150-190)
		n	%
Cinsiyet	Kadın	209	75.2
	Erkek	69	24.8
Meslek	Doktor	124	44.6
	Hemşire	80	28.8
	Fizyoterapist	3	1.1
	Ergoterapist	1	0.4
	Sağlık Personeli	27	9.7
	Memur	6	2.2
	Eczacı	1	0.4
	Öğrenci	21	7.6
	Teknik personel	2	0.7
	Ebe	13	4.7
Yaşanan Yer	İl	214	77
	İlçe	51	18.3
	Köy	13	4.7
Eğitim Durumu	Yl/Dr	97	34.9
	Lisans	165	59.4
	Lise	13	4.7
	Ortaokul	3	1.1
Kronik Hastalıklar	Yok	233	83.8
	Diyabet	3	1.1
	Astım	8	2.9
	Hipertansiyon	4	1.4
	Tiroid	14	5.0
	Romatoloji	3	1.1
	Diğer	13	4.7
Covid Boyu Çalışılan Birim	Poliklinik ve servisler	159	57.2
	Halk Sağlığı	19	6.8
	Filyasyon	3	1.1
	Kısmi zamanlı Covid servisi	53	19.1
	Yoğun bakım	24	8.6
	Acil	12	4.3
	Triyaj	1	0.4
	Doğumhane	7	2.5

Ort: Ortalama, SS: Standart Sapma, Min: Minimum, Maks: Maksimum, n: Katılımcı sayısı, %: Yüzde, Yl/Dr: Yüksek Lisans/Doktora

Katılımcıların Covid öncesi kilo ortalaması 66.39±14.71(kg) iken Covid sürecinde mevcut kiloları 66.32±14.89 (kg) olarak bulunmuştur. Katılımcıların Covid öncesi ve sürecinde mevcut kilolarındaki değişiklik benzer olup istatiksel olarak anlamlılık ifade etmemektedir (p=0.801).

Katılımcıların en sık yaptıkları spor süreleri Covid öncesi basketbol için her gün (%45), futbol için haftada 1-2 kez (%7), voleybol için haftada 1-2 (%11), yüzme için haftada 1-2 (%7.6), tenis için haftada 1-2 (%11), masa tenisi için haftada 1-2 (%4), pilates için haftada 1-2 (%5), yürüme için haftada 1-2 (%13), koşma için haftada 1-2

(%45), ağırlık kaldırma için haftada 1-2 (%24), fitness için haftada 1-2 (%9) ve dans için haftada 1-2 (%10) olarak hesaplandı. Basketbol sporuyla uğraşan katılımcılarda covid öncesi ve sürecinde istatistiksel anlamlı bir değişim olmazken (p=0,784), basketbol dışında kategorize edilen spor dallarında istatiksel olarak anlamlı azalma görüldü görüldü (p<0,001) **(Tablo 2)**.

Tablo 2: Covid öncesi ve Covid sürecinde spor durumu karşılaştırması

	Covid Öncesi								Covid Sürecinde									
	Hiç		Hergün		Haftada 1,2		Haftada 3,5		Hiç		Hergün		Haftada 1,2		Haftada 3,5			
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	x^2	p
Basketbol	200	29.1	16	45.3	46	16.5	16	9	223	80.2	7	2.5	38	13.7	10	3.6	5.547	0.784
Futbol	255	91.7	2	0.7	20	7.2	1	0.4	271	97.4	1	0.4	5	1.8	1	0.4	172.961	**<0.001**
Voleybol	243	87.4	1	0.4	31	11.2	3	1.1	263	94.6	1	0.4	11	4	3	1.1	346.081	**<0.001**
Yüzme	254	91.4	1	0.4	21	7.6	2	0.7	263	94.6	2	0.7	11	4	2	0.7	263.105	**<0.001**
Tenis	241	86.7	1	0.4	30	10.8	6	2.2	265	95.3	2	0.7	9	3.2	2	0.7	175.820	**<0.001**
Masa tenisi	263	94.6	1	0.4	11	4.0	3	1.1	262	94.2	1	0.4	12	4.3	3	1.1	437.483	**<0.001**
Pilates	262	94.2	1	0.4	14	5	1	0.4	273	98.2	2	0.7	3	1.1	0	0	138.703	**<0.001**
Yürüme	228	82	3	1.1	37	13.3	10	3.6	245	88.1	2	0.7	23	8.3	8	2.9	290.915	**<0.001**
Koşma	41	14.7	32	11.5	126	45.3	79	28.4	129	46.4	13	4.7	98	35.3	38	13.7	85.462	**<0.001**
Ağır Kaldırma	195	70.1	3	1.1	67	24.1	13	4.7	234	84.2	3	1.1	32	11.5	9	3.2	121.715	**<0.001**
Fitness Salonu	243	87.4	0	0	26	9.4	9	3.2	255	91.7	2	0.7	16	5.8	5	1.8	127.776	**<0.001**
Dans	243	87.4	2	0.7	27	9.7	6	2.2	265	95.3	3	1.1	8	2.9	2	0.7	82.373	**<0.001**

n: Katılımcı sayısı, %: Yüzde, x^2: ki kare testi, p<0.05

Fiziksel aktivite puanları mesleklere göre karşılaştırıldığında şiddetli ve orta şiddetteki aktiviteler ile yürüme, oturma ve toplam puan arasında istatiksel olarak anlamlı farklılık yoktur (p=0,799, p=0,256, p=0,161, p=0,651, p=0,683). Buna göre toplam aktivite puanları doktorlarda 1144.46±309.47, hemşirelerde 1126.35±208.24, fizyoterapistlerde 1029.66±454.72, ergoterapistlerde 1046, yardımcı sağlık personellerinde 1200.81±354.03, memurlarda 1157.33±298.19, eczacılarda 1179, öğrencilerde 1043.76±279.54, ebelerde 1159.92±279.15 ve çalışmayan popülasyonda 922 olarak hesaplandı. Buna göre en yüksek aktivite puanı yardımcı sağlık personellerinde bulunurken en düşük puan Covid servislerinde kısmi zamanlı görevlendirilen kişilerden oluşmaktadır. Fiziksel aktivite puanları Covid süresince çalışılan birimlere göre karşılaştırıldığında şiddetli ve orta şiddetteki aktiviteler ile yürüme oturma ve toplam puan arası istatiksel olarak anlamlı farklılık bulunmamaktadır (p=0,50, p=0,669, p=984, p=0,589, p=0,978). Buna göre en yüksek aktivite puanı doğumhanede çalışanlarda iken en düşük aktivite puanı filyasyon ekiplerinde bulundu. Fiziksel aktivite puanları cinsiyete göre karşılaştırıldığında şiddetli ve orta şiddetteki aktiviteler ile yürüme oturma ve toplam puan arası istatiksel olarak anlamlı farklılık bulunmamaktadır (p=0,30, p=0,527, p=0,318, p=0,291, p=0,721) Buna göre kadınlardaki toplam aktivite puanı 1136.73±308.25 ve erkeklerdeki toplam aktivite puanı 1129.94±279,12 olarak hesaplandı. İki cinsiyette de benzer aktivite düzeyi görüldü. Fiziksel aktivite puanları kronik hastalık varlığına göre karşılaştırıldığında orta şiddetteki aktiviteler ile yürüme oturma ve toplam puan arası istatiksel olarak anlamlı farklılık bulunmamaktadır (p=0,414, p=0,165, p=0,153, p=0,204). Ancak şiddetli fiziksel aktivite ve kronik hastalık varlığı arasında istatiksel olarak anlamlılık ifade etmektedir (p=0.006). Buna göre kronik rahatsızlığı bulunmayan hastalarda şiddetli aktivite puanı 245.15±240.46, Diyabet hastalarında 480, astım hastalarında 60±169.70, hipertansiyon hastalarında 480, tiroit hastalarında 377.14±204.39, romatoloji hastalarında 480 ve diğer kronik hastalıklarda 258.46±249.05 olarak bulundu. Toplam fiziksel aktivite puanı göz önünde bulundurulduğunda ise en yüksek aktivite puanı 1433.66±341.86 ile romatoloji hastalarına aitti **(Tablo 3)**.

Tablo 3: Fiziksel aktiviteleri puanlarının ilişkili parametreler ile karşılaştırılması

		Şiddetli X±SS (n=278)	Orta X±SS (n=278)	Yürüme X±SS (n=278)	Oturma X±SS (n=278)	Toplam X±SS (n=278)
Meslek	**Doktor**	259.35±240.18	105.80±98.27	408.78±232.33	370.52±301.08	1144.46±309.47
	Hemşire	270±239.61	86±79.26	388.78±234.05	381.56±314.62	1126.35±208.24
	Fizyoterapi	160±277.12	26.66±46.18	363±57.15	480±527.35	1029.66±454.72
	Ergoterapi	480	80	396	90	1046
	Sağlık Personeli	248.88±244.40	108.14±111.94	469.33±276.75	374.44±329.51	1200.81±354.03
	Memur	240±262.90	53.33±41.31	594±396	270±398.44	1157.33±298.19
	Eczacı	480	0	99	600	1179
	Öğrenci	228.57±245.64	87.61±86.36	287.57±231.97	440±290.13	1043.76±279.54
	Çalışmıyor	0	40	297	585	922
	Ebe	221.53±249.05	113.84±95.00	464.53±253.64	360±279.82	1159.92±279.15
	x^2	5.389	11.292	13.025	6.865	6.554
	P	0.799	0.256	0.161	0.651	0.683
Covidde Çalışılan Birim	**Poliklinik ve servis**	265.66±239.37	91.82±86.98	406.27±235.17	268.30±315.77	1132.06±280.60
	Halk Sağlığı	227.36±246.23	124.21±137.85	388.21±254.66	401.84±253.99	1141.63±345.20
	Filyasyon	0	106.66±122.20	429±318.24	480±226.49	1015.66±457.75
	Yoğun Bakım	240±245.16	125±108.94	393.95±240.92	385.62±296.44	1144.58±350.22
	Acil	280±247.16	70±68.49	338.25±190.93	367.50±348.48	1055.75±185.62
	Triyaj	480	80	396	90	1046
	Doğumhane	342.85±234.21	85.71±81.41	466.71±247.26	278.57±215.43	1173.85±277.01
	x^2	6.346	4.928	1.440	5.583	1.606
	P	0.500	0.669	0.984	0.589	0.978
Cinsiyet	**Kadın**	264.11±239.35	94.54±81.82	412.19±241.32	365.88±304.91	1136.73±308.25
	Erkek	229.56±241.52	102.02±118.72	378.78±250.08	419.56±314.53	1129.94±279.12
	Z	6691.5	6867	6655.50	6611.50	7006.50
	P	0.300	0.527	0.318	0.291	0.721
Kronik Hastalık	**Yok**	245.15±240.46	97.85±95.97	406.06±250.87	390.51±312.64	1139.57±314.12
	Diyabet	480	53.33±46.18	198±171.47	430±294.44	1161.33±107.59
	Astım	60±169.70	60±52.37	414.62±259.24	551.25±327.82	1085.87±225.90
	Hipertansiyon	480	80	470.25±148.50	135±90	1165.25±238.50
	Tiroid	377.14±204.39	105.71±79.39	353.57±148.95	259.28±233.74	1095.71±216.02
	Romatoloji	480	146.66±83.26	627±206.08	180±90	1433.66±341.86
	Diğer	258.46±249.05	86.15±76.32	388.38±207.90	309.23±283.38	1042.23±170.99
	x^2	16.421	5.013	7.841	8.065	7.232
	P	**0.006**	0.414	0.165	0.153	0.204

Ort: Ortalama, SS: Standart Sapma, n: katılımcı sayısı, x^2: Kruskal Wallis Testi, Z: Mann Whitney U Test, p<0.05

Katılımcılarda Covid sürecinde ağrı derecesi 4.65±2.41 bulunurken Covid öncesinde ağrı derecesi 1.83±0.82 olarak bulundu. Ağrı istatiksel olarak anlamlı farklılık teşkil etmekteydi (p<0,001). Buna göre ağrı Covid sürecinde daha yüksek seyretmiştir **(Tablo 4)**.

Tablo 4: Covid öncesi ve sürecinde ağrı derecesi

	X±SS (n=278)	Ortanca (Min-Maks)	z	p
Covid sürecinde ağrı	4.65±2.41	5 (0-10)	-12.068	**<0.001**
Covid öncesinde ağrı	1.83±0.82	2 (0-6)		

Ort: Ortalama, SS: Standart Sapma, n: katılımcı sayısı, z: Wilcoxan Testi, p<0.05

Covid öncesi ve sürecinde ağrı lokalizasyonları karşılaştırıldığında istatistiksel anlamlı farklılık tespit edildi (p<0,001). Buna göre Covid öncesi bel ağrısı toplam 50, boyun ağrısı 15, kalça ağrısı 19, diz ağrısı 33, ayak bileği ağrısı 10, omuz ağrısı 42, dirsek ağrısı 10, el bileği ağrısı 13 el parmakları ağrısı 6, sırt ağrısı 74, ayak parmağı ağrısı 6 hastada bildirilmiştir. Covid sürecinde ağrı lokalizasyonlarının dağılımı ise şu şekildedir: bel ağrısı 46, boyun ağrısı 69, kalça ağrısı 13, diz ağrısı 22, ayak bileği ağrısı 9, omuz ağrısı 43, dirsek ağrısı 12, el bileği ağrısı 17, el parmakları ağrısı 8, sırt ağrısı 34 ve ayak parmakları ağrısı ise 5 olarak bulunmuştur. Verilere göre boyun ağrısı belirgin miktarda yükselirken sırt ağrısı ise azalmıştır **(Tablo 5)**.

Tablo 5: Covid öncesi ve Covid sürecinde ağrı lokalizasyonları karşılaştırılması

		Covid Sürecinde Ağrı Lokalizasyonu											Toplam	x^2	p
		bel	boyun	kalça	diz	a.b	omuz	dirsek	e.b	e.p	sırt	a.p			
Covid Öncesi Ağrı Lokalizasyonu	Bel	19	19	3	1	2	2	0	1	0	2	1	50	249.076	**<0.001**
	Boyun	1	9	0	0	0	3	0	0	0	2	0	15		
	Kalça	2	2	2	4	0	4	0	2	1	2	0	19		
	Diz	1	4	0	11	2	7	2	2	1	3	0	33		
	Ayak Bileği	2	3	0	1	2	2	0	0	0	0	0	10		
	Omuz	7	10	1	2	1	11	4	0	0	6	0	42		
	Dirsek	2	2	1	1	0	1	2	0	1	0	0	10		
	El bileği	0	4	0	0	0	0	0	7	2	0	0	13		
	El parmakları	0	0	0	0	2	1	0	2	0	1	0	6		
	Sırt	11	15	6	2	0	12	3	3	3	15	4	74		
	Ayak Parmakları	1	1	0	0	0	0	1	0	0	3	0	6		
Toplam		46	69	13	22	9	43	12	17	8	34	5	278		

x^2: ki kare testi, p<0.05, e.b:el bileği, e.p:el parmakları, a.p: ayak parmakları

TARTIŞMA

Bu çalışma; Covid 19 pandemisi sürecinde görev alan sağlık çalışanlarının kas iskelet sistemi ağrılarının ve fiziksel aktivitesinin değerlendirilmesi amacıyla yapılmıştır. Katılımcıların yaklaşık yarısı hekim olup, diğer katılımcılar hemşire ve yardımcı sağlık personelinden oluşmaktadır. Fiziksel aktivite puanlarının Covid servislerinde kısmi zamanlı görev alan sağlık çalışanlarında ve filyasyon ekiplerinde en düşük, yardımcı sağlık personelinde en yüksek olduğu, cinsiyetler arasında farklılık olmadığı ve kronik hastalıklarına göre en yüksek romatolojik hastalığı olanların puanlarının yüksek olduğu belirlenmiştir. Ayrıca sağlık çalışanlarının Covid öncesi ve sürecinde dönemde yaptıkları sporlara yönelik elde edilen sonuçlara göre yürüme ile egzersiz yapanlarda artış olduğu ancak Covid öncesinde basketbol, futbol, voleybol, yüzme, tenis, masatenisi, pilates, yürüme, koşma, ağır kaldırma, fitness salonu, dans gibi spor dallarıyla ilgilenenlerin Covid sürecinde anlamlı düzeyde azalma olduğu görülmüştür. Fiziksel aktivitede görülen azalmaya rağmen katılımcıların beden kitle indeksinde farklılık olmadığı belirlenmiştir.

Sağlık personelinde kas iskelet sistemi rahatsızlıklarını inceleyen bir araştırma sonucuna göre diş hekimlerinde boyun, diş ve laboratuvar teknisyenlerinde el/el bileği, hemşirelerde boyun ve omuzlar en sık etkilenen ekstremiteler olduğu, fizyoterapistlerde daha düşük prevalansı olduğu bildirilmiştir. Ayrıca sağlık hizmetlerinde her meslek grubundan yüksek bir oranda karpal tünel sendromu prevalansı gözlenmiştir (16). Bu durumun sağlık çalışanlarının vücut ergonomisini koruyacak önlemleri almamalarına ve bu konuda gerekli eğitimin yetersiz verilmiş olması ile ilişkili olduğu düşünülebilir.

Literatürde yer alan çalışmalar sıklıkla pandemi nedeniyle yapılan kısıtlamaların etkisine yönelik olup, bireylerin uzun süre internet kullanımı nedeniyle fiziksel olarak inaktif olduklarına ve bu durumun ağrıya neden olduğuna odaklanmaktadır (17). Benzer bir çalışmada 18-24 yaş grubundaki bireylerde enerji, canlılık ve ruhsal sağlığı olumsuz etkilendiği, kadınlarda fiziksel aktivite düzeyinin erkeklere oranla daha fazla düştüğü ve yaşam kalitesinin olumsuz etkilendiği bildirilmiştir (18). Çelik'in araştırma sonucuna göre fiziksel olarak aktif olan kişilerin daha az Covid korkusu yaşadıkları bu durumun ruhsal olarak iyilik hali ile ilişkili olabileceği düşünülmektedir (19). Tural'ın çalışmasında ise Covid 19 sürecinde ev karantinasında bulunan sağlıklı kişilerin düşük düzeyde fiziksel aktiviteye sahip oldukları ve bunun sağlıkla ilişkili yaşam kalitesi, fiziksel fonksiyon, ağrı ve genel sağlık algısını etkilediği belirlenmiştir (20). Bizim çalışmamızda da basketbol harici spor dallarında pandemi öncesi döneme göre anlamlı azalma tespit edilmiş olup; yalnızca basketbol aktivitelerinde pandemi öncesi dönemde farklılık olmaması, zaten pandemi öncesinde de az tercih edilen bir spor dalı olmasından kaynaklanmış olabilir. Araştırmamızdaki sonuçlara ve literatürde yer alan çalışma sonuçlarına göre; sağlık çalışanlarının pandemi döneminde fiziksel aktivite düzey-

lerini arttırmak ve tercih ettikleri spor türlerine göre daha sık spor aktivitelerinde bulunmalarına yönelik teşvik edilmelerinin iyi olacağı öngörülmüştür.

Literatürde pandeminin ve izolasyonun sağlık çalışanlarında kas iskelet sistemi ağrısı ve duygusal etkilenimini inceleyen bir çalışmada; pandemi döneminde kas iskelet sisteminde ağrılarının arttığını bulmuşlardır ancak ağrı lokalizasyonunu belirtmemişlerdir (21). Aslan ve ark.'larının yaptığı Covid 19 pandemisinde sağlık çalışanlarında kas iskelet sistemi ağrısı ve algılanan stres düzeyini değerlendirdikleri çalışmalarında; sağlık personellerinde el/el bileği ve bel ağrısının stresle ilişkili olduğunu tespit edilmiştir (22).

Bu araştırmamızda ise sağlık çalışanlarının Covid 19 sürecinde ise hareket ağrısı gözlenen toplam 70 kişi varken, gece ağrısı 25 kişide, istirahat ağrısı 53 kişide, yanma tarzında ağrı 45 kişide, uyuşma tarzı ağrı 45 kişide ve karıncalanma tarzı ağrı toplamda 35 kişide gözlendi. Ayrıca katılımcıların ağrı bölgelerine göre sırayla sırt, bel, omuz ve dirsekte ağrıları olduğu belirlenmiştir. Pandemi sürecinde sağlık çalışanlarında ağrı lokalizasyonu ve tipini ortaya koyan literatürde başka çalışma olmayıp; bu açıdan farklı çalışmalara ihtiyaç vardır.

Wuhan'da Covid sürecinde aktif olarak görev yapan sağlık çalışanlarının %67,8'inde akut stres bozukluğu olduğu ve ilişkili olarak %51,2'sinde göğüs ağrısı yaşadıkları bildirilmiştir (23). Singapur'da sağlık çalışanları ile yapılan bir araştırma sonucunda ise Covid 19 pandemisi sırasında sağlık çalışanları arasında fiziksel semptomların yaygınlığı ile psikolojik sonuçlar arasında anlamlı bir ilişki olduğu bildirilmiştir (24). Covid döneminde hazırlanmış bir rehbere göre sağlık çalışanlarının tükenmişliklerinin göz önünde bulundurulması, gerekli düzenlemelerin devamlılığın sağlanması ve personelin refahının desteklenmesi, çalışma koşullarının en düzeyde tutulmasına dikkat çekilmiştir. Bizim çalışmamızda da sağlık çalışanlarının fiziksel aktivitede görülen azalmayla birlikte ağrılarında artma olması, bu artışın artmış psikolojik iş yükü ve stresten mi ya da azalmış fiziksel aktiviteden mi kaynaklandığını net ortaya koymakta güçtür. Bu konuyu aydınlatacak daha çok katılımcı ve psikolojik değerlendirmeleri içeren de içeren daha çok çalışmaya ihtiyaç vardır.

Çalışmamızın limitasyonları; Uluslararası fiziksel aktivite anketi son 1 haftalık verileri analiz etmeyi amaçladığı için, daha geniş bir sorgulama yapılmamış olması ve sağlık çalışanlarının hastalığı geçirip geçirmediği bilgisinin verilmediği ayrıca çalışmanın yapıldığı dönemde henüz Covid 19 enfeksiyonu sonrası dönemde görülen ve hastalık ile ilişkisi net ortaya konamayan nevraljik amyotrofi, alt ekstremitede güçsüzlük-nöropatik ağrıya yol açan Guillan-Barre Sendromu gibi sendromların bildirilmemiş olmasıdır.

Pandemi döneminde görev yapan sağlık çalışanlarının vücut mekaniğini koruyabilmeleri, kas iskelet sistemi ağrıları için risk oluşturabilecek durumların farkında olmaları ve bu sorunların erken tanılanması, uzun vadede kronik hale gelmesinin önlenmesi için önem arz etmektedir. Bu durumun önlenmesi ve azaltılmasında sağlık çalışanlarına yönelik, bel, sırt, boyun ergonomisinin öğretilmesi ve egzersiz programı verilerek fiziksel aktiviteyi arttırıcı aktivitelere yönlendirilmeleri oldukça yararlı olabilir.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

BÖBREK NAKLİ ALICILARINDA ÖZ-YÖNETİM GÜCÜNÜ ETKİLEYEN PARAMETRELERİN ARAŞTIRILMASI

INVESTIGATION OF PARAMETERS AFFECTING SELF-MANAGEMENT POWER IN KIDNEY TRANSPLANT RECIPIENTS

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ÖZET

AMAÇ: Böbrek nakli son dönem böbrek yetmezliği olan hastalarda yapılabilen renal replasman tedavisi türlerinden birisidir. Hastanın yaşamını ve sağlığını idame ettirmeyi gerektiren aktiviteleri yapabilme gücüne öz-yönetim gücü denir. Öz-yönetim gücü yüksek olan hastalarda daha iyi sağlık sonuçları olması kaçınılmazdır. Bu çalışmamızda böbrek nakli alıcılarında öz-yönetim gücünü etkileyen parametreleri araştırmayı amaçladık.

GEREÇ VE YÖNTEM: Nefroloji polikliniğinden takipli ve Temmuz 2022 - Eylül 2022 tarihleri arasında nefroloji polikliniğine başvuran tüm böbrek nakli alıcıları ile görüşüldü. Öz-yönetim gücü öz-bakım ajansı ölçeği kullanılarak değerlendirildi. Öz-yönetim gücü ile korele bulunan parametreler lineer regresyon analizi ile değerlendirildi.

BULGULAR: Çalışma 128 böbrek nakli alıcısı ile yapıldı. Hastaların ortalama yaşı 44.63±13.5 yıldı. Ortalama öz-yönetim gücü skoru 112.86±14.6 idi. Öz-yönetim gücü ile yaş, kullanılan ilaç sayısı, nakilden sonra geçen süre ve kronik hastalık sayısı arasında bir korelasyon saptandı. Lineer regresyon modelinde öz-yönetim gücünü etkileyen en güçlü parametre yaş olarak bulundu.

SONUÇ: Böbrek nakli alıcılarında öz-yönetim gücünü etkileyen faktörlerin iyi bilinmesi ile hem greft hem de hasta sağkalımı iyileştirilebilir. Demografik ve klinik bazı faktörler öz-yönetim gücünü etkileyebilir. Böbrek naklinde başarı daha çok nakil merkezine atfedilse de hastanın öz-yönetim gücünün de bu başarıya katkı sağlayabileceği akılda tutulmalı ve öz-yönetim gücünü geliştirebilecek yaklaşımlar sergilenmelidir.

ANAHTAR KELİMELER: Böbrek nakli, Öz-yönetim, Yaş

ABSTRACT

OBJECTIVE: Kidney transplantation is one of the types of renal replacement therapy that can be performed in patients with end-stage renal disease. The power to perform activities that require the patient to maintain his life and health is called self-management power. Better health outcomes are inevitable in patients with high self-management power. In this study, we aimed to investigate the parameters affecting the self-management power in kidney transplant recipients.

MATERIAL AND METHODS: All kidney transplant recipients who were followed up from the nephrology outpatient clinic and applied to the nephrology outpatient clinic between July 2022 and September 2022 were interviewed. Self-management power was assessed using the self-care agency scale. Parameters correlated with self-management power were evaluated by linear regression analysis.

RESULTS: The study was conducted with 128 kidney transplant recipients. The mean age of the patients was 44.63±13.5 years. The mean self-management power score was 112.86±14.6. A correlation was found between self-management power and age, number of drugs used, time after transplantation, and number of chronic diseases. Age was found to be the strongest parameter affecting self-management power in the linear regression model.

CONCLUSIONS: Both graft and patient survival can be improved with a good knowledge of the factors that affect self-management in kidney transplant recipients. Some demographic and clinical factors may affect the power of self-management. Although the success in kidney transplantation is mostly attributed to the transplantation center, it should be kept in mind that the self-management power of the patient can also contribute to this success, and approaches that can improve the sef-management power should be applied.

KEYWORDS: Kidney transplantation, Self-management, Age

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INTRODUCTION

Chronic kidney disease (CKD) is an important public health problem (1). In a patient with CKD with an estimated glomerular filtration rate of <15 ml/min/1.73 m^2, end-stage renal disease is mentioned and renal replacement therapy is considered. There are three types of renal replacement therapy; peritoneal dialysis, hemodialysis, and kidney transplantation. In terms of patient survival and quality of life, kidney transplantation is the best form of renal replacement therapy (2 - 5). According to the latest registry report of the Turkish Society of Nephrology, as of the end of 2019, 22.9% of patients receiving renal replacement therapy in our country consist of kidney transplant patients (6).

The ability of an individual to perform health activities to maintain life, health, and well-being is called self-management power (7). Sef-management power has been shown to be associated with better health outcomes in a variety of clinical situations (8 - 10). Jamieson et al. suggested in a review that improved self-management capacity could improve transplant outcomes (11). We think that the age of the patient, the number of chronic diseases and the number of drugs used, and the time elapsed after transplantation may affect the self-management power. We also think that kidney outcomes may be adversely affected if self-management power is reduced. In this sense, there is a need to determine the parameters that affect self-management power.

In this study, we aimed to investigate parameters affecting self-management power in kidney transplant recipients.

MATERIAL AND METHODS

Patients

All kidney transplant recipients (n=154) who applied to the nephrology outpatient clinic between July 2022 and September 2022 were interviewed for the study. The study was carried out with a total of 128 patients who volunteered to participate in the study. The demographical, clinical, and laboratory parameters of the patients were recorded. Being ≥18 years of age, having a history of kidney transplantation, and having a sufficient level of education to fill out the questionnaire was determined as inclusion criteria. Being <18 years of age, not having enough education to fill out the questionnaire, and not wanting to participate in the study were taken as exclusion criteria from the study.

Assessment of Self-Management Power

The exercise of the self-care agency scale was used as a self-management power scale. This scale was first developed by Kearney and Fleischer in 1979 (12). Afterward, reliability and validity studies were also carried out in our country (13). The scale consists of 35 descriptive statements. Each statement is scored between 0 and 4 points, the maximum score is 140, while the minimum score is 35. In the evaluation of the scale, patients were evaluated by grouping them as "poor self-management", "moderate self-management", "good in self-management" and "very good in self-management" in some studies, while evaluation was made on raw scores in others (14 - 17). In this study, we evaluated the scale with raw scores.

Covariates

All continuous variables were checked for the relationship with self-management power. Variables that correlated with self-management power were taken as covariates for linear regression analysis. Age was calculated via current date minus date of birth and it was used as years. The number of chronic diseases was found by adding the diagnosed chronic diseases that the patient had. The number of drugs used was calculated by adding different types of drugs used in a day. The time elapsed after transplantation was calculated as the current date minus the date of transplantation, and it is used as months.

Ethical Committee

Ethics Committee approval was received at the Afyonkarahisar Health Sciences University Ethics Committee meeting dated 01.07.2022 (code of ethics committee: 2011-KAEK-2, meeting number: 2022/8, decision number: 358).

Statistical Analysis

SPSS 26.0 package program was used for statistical analysis. Categorical variables were pre-

sented as percentages and frequencies. The conformity of continuous variables to normal distribution was checked with the Shapiro-Wilk test. Normally distributed continuous variables were presented as mean±standart deviation. Non-normally distributed continuous variables were presented as the median and interquartile range (IQR) 25-75. First Pearson correlation analysis was done for determining the correlation between self-management power and other continuous variables. Age, number of drugs used, time after transplantation, and number of chronic diseases, which were found to be associated with self-management power in the correlation analysis, were included in the linear regression analysis. All p values are bidirectional and $p<0.05$ is considered as statistically significant.

RESULTS

The study was conducted with a total of 128 patients, seventy (54.7%) male and 58 (45.3%) female. The mean age of the study population was 44.63±13.5 years. The mean self-management power score was 112.86±14.6. While 101 (78.9%) of the patients had a history of transplantation from a living donor, twenty-seven (21.1%) had cadaveric transplantation. In terms of primary diseases causing kidney loss, diabetes mellitus was found to be the most common disease with 35.9% (n= 46). **Figure 1** shows the distribution of primary diseases that cause kidney loss.

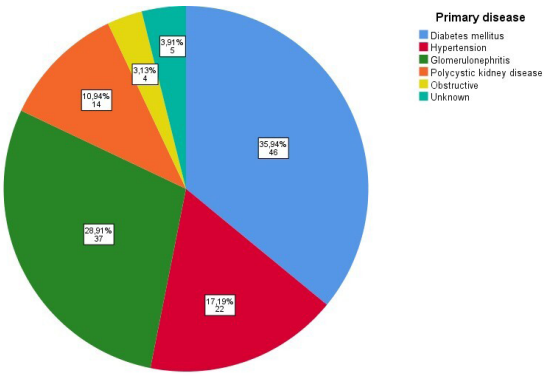

Figure 1: Distribution of the primary kidney diseases causing kidney loss

The median number of chronic diseases was 1 (IQR25-75= 1-2). Diabetes mellitus was found to be the most common comorbidity in our patients with a rate of 39.8% (n= 51). **Table 1** shows the comorbidities of the patients.

Table 1: Comorbidities of the patients

Comorbiditiy	%-n
Diabetes mellitus	39.8-51
Hypertension	33.6-43
Congestive heart failure	3.9-5
Chronic pulmonary disease	2.3-3
Hyperlipidemia	42-32.8
Coronary artery disease	6.3-8

The median number of drugs used was 6 (IQR25-75= 6-7). **Table 2** shows the drugs used by the patients.

Table 2: Drugs used by the patients

Drug	%-n
Oral antidiabetics	28.9-37
Renin-angiotensin aldosteron system inhibitors	21.1-27
Calcium channel blockers	28.9-37
Beta-blockers	15.6-20
Alpha-blockers	7-9
Diuretics	12.5-16
Anti-coagulants	4.7-6
Anti-aggregants	20.3-26
Calcineurin inhibitors	93-119
Mycophenolate mofetil	5.5-7
mTOR inhibitors	76.6-98
Steroids	100-128
Proton pump inhibitors	100-128
Vitamin D	100-128

The laboratory parameters and self-management power scores of the patients are summarized in **Table 3**.

Table 3: Laboratory parameters and self-management power scores of the patients

Parameter	
White blood cell ($x10^3/\mu L$)	9.01±2.7
Hemoglobin (g/dL)	12.95±2.3
Platelet ($x10^3/\mu L$)	255.48±85.6
Urea (mg/dL)	53.08±10.51
Creatinin (mg/dL)	1.29±0.29
Glomerulary filtration rate (ml/min/1.73 m^2)	64.69±18.9
Sodium (mEq/L)	138.48±3.7
Potassium (mEq/L)	4.49±0.4
Alanin-aminotransferase (U/L)	20.23±22.8
Self-management power	112.86±14.6

The continuous variables that were found to be related to self-management power are presented in **Table 4**. **Figure 2** shows the correlation matrix of self-management power, age, number of drugs used, time after transplantation, and number of chronic diseases. **Table 5** shows the R^2 values of the parameters included in the linear regression analysis, one by one and all four together. Our linear regression model is summarized in **Table 6**. In our regression model, the strongest parameter affecting self-management power was found to be age. **Figure 3** shows the contribution of the covariates to the model.

Table 4: Pearson correlation analysis results between self management power and continuous parameters

Parameter	Age	No. of drugs	Time after Tx	No. of chronic diseases
Self-management score				
r	-0.581	-0.287	-0.243	-0.422
p	**<0.001**	**0.001**	**0.006**	**<0.001**
Age				
r		0.172	0.280	0.442
p		0.053	**0.001**	**<0.001**
No. of drugs				
r			-0.125	0.780
p			0.160	**0.001**
Time after Tx				
r				0.125
p				0.269

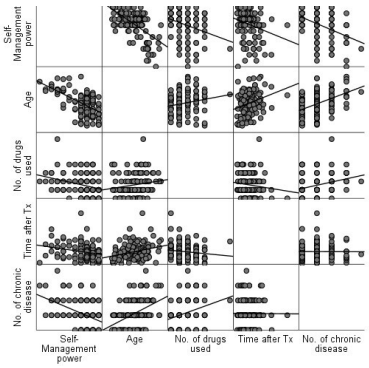

Figure 2: Correlation matrix of self-management power, age, number of drugs used, time after transplantation and number of chronic diseases

Table 5: R^2 values of covariates and multiple regression model

Parameters	R^2
Age	0.337
No. of drugs used	0.082
Time after transplantation	0.059
No. of chronic diseases	0.178
Age+No. of drugs used+Time after transplantation+No. of chronic diseases	0.413

Table 6: Multiple variable linear regression model for predicting self-management power

Predictor	B	Standart error	p	95% CI
Intercept	154.171	3.932	<0.001	146.388/161.954
Age	-0.287	0.055	<0.001	-0.396/-0.179
No. of drugs used	-1.324	0.535	0.015	-2.384/-0.264
Time after transplantation	-0.020	0.010	0.049	-0.039/0.001
No. of chronic diseases	-1.826	0.796	0.023	-3.401/-0.251

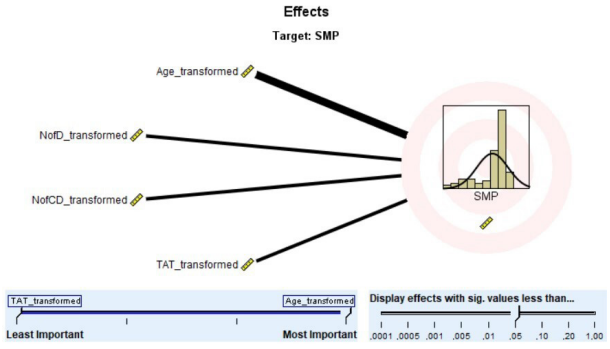

Figure 3: Contribution of the covariates to the model

DISCUSSION

Self-management skills of the recipient after kidney transplantation include taking immunosuppressive drugs, having knowledge of drug side effects, knowing methods of protection from infections, monitoring her/himself, and meeting with relevant specialists regularly (18-20). The patient's self-management power is considered valuable for maintaining health and minimizing CKD complications (21, 22). In our literature review, we could not find any study investigating the parameters that affect the self-management power in kidney transplant recipients. Our study shows that some factors such as; age, number of drugs used, time after transplantation, and number of chronic diseases may affect the patient's self-management power.

Since the chronic diseases of the patients will increase with age, the self-management power of the elderly individuals should be better, but in our study, it was determined that the self-management power decreased with aging. In fact, age was found to be the strongest factor in self-management power in our regression model. Cramm et al have shown that age influences poor health conditions (23). Studies showed that a decrease in physical activity and cognitive functions may lead to self-management problems in elderly patients (24, 25). Considering the increasing life expectancy, it seems certain that we will start to examine older kidney transplant recipients in the coming decades. It should be kept in mind that the power of self-management may decrease with aging and more frequent follow-up of elderly kidney transplant recipients may be considered.

The use of many drugs is common in the management of acute and chronic diseases. Demirbas et al. found that as the number of drugs used in the study increased, the scale of adherence to treatment decreased (26). Our study showed that the number of drugs used decreases self-management power. Polypharmacy should be considered in kidney transplant recipients and it should be considered that unnecessary drug use may lead to a decrease in self-management power.

Our study revealed that the patient's self-management power decreased as the time elapsed after transplantation increased. In a study conducted by Vankova et al., 211 kidney transplant patients were evaluated and it was found that although the compliance rates of the patients were not bad, the treatment compliance decreased as the time elapsed after the transplant increased (27). In the study of Demirbas et al., it was shown that as the duration of diagnosis of the disease increases, adherence to treatment decreases (26). We think that the decrease in the self-management power of our patients as the post-transplant time increases is due to the fact that there may be problems in their adaptation to drug use in the long term.

The current study revealed that as the number of comorbidities increases, there is a decrease in self-management power. There are many articles in the literature supporting this finding (28 - 30). While comorbidities can lead to a decrease in self-management power, they can also cause such a result with complications they cause. The increase in comorbid diseases also leads to an increase in the number of drugs that the patient should use, which may lead to a decrease in self-management power.

The two limitations of our study are that it was single-centered and the number of patients was small. However, our study is important because it is the first study to investigate the parameters affecting the self-management power in kidney transplant recipients.

In conclusion; There are some demographic and clinical factors that affect self-management power. Considering the scarcity of organ donations in our country, organ transplant recipients constitute a special patient group. Although success after kidney transplantation is usually attributed to the physician and the transplant unit, it should not be forgotten that the patient also plays an important role, especially in long-term kidney outcomes. There is a need for health policies that support the self-management power of kidney transplant recipients.

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ARAŞTIRMA YAZISI / RESEARCH ARTICLE

HİPERTROFİK KARDİYOMİYOPATİLİ HASTALARDA EGZERSİZ EKOKARDİYOGRAFİ VE NT-PROBNP DÜZEYLERİNİN DEĞERLENDİRİLMESİ

EVALUATION OF EXERCISE ECHOCARDIOGRAPHY AND NT-PROBNP LEVELS IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY

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ÖZET

AMAÇ: Hipertrofik kardiyomiyopatili (HKM) hastalarda anormal sol ventrikül diyastolik fonksiyonu ve NT-proBNP seviyeleri gösterilmiştir, ancak egzersiz hemodinamiği hakkında bilgi eksikliği vardır. Bu prospektif çalışmada, HKM hastalarında diyastolik fonksiyonun prognostik değerini ve NT-proBNP düzeylerinin egzersize yanıtını incelemeyi amaçladık.

GEREÇ VE YÖNTEM: Nonobstrüktif HKM tanısı almış 20 hasta (yaş: 52,6±11,3 yıl; n=12 (%60) erkek) ve 11 gönüllüye (yaş: 46,4±13,0 yıl; n=8 (%72,7) erkek) bisiklet ergometrisi ile egzersiz (25 –W, 2 dakika) testi yapıldı. Mitral akım (E/A oranı), septal mitral akım hızları (E/E' oranı) ve NT-proBNP seviyeleri istirahatte ve submaksimal egzersizde ölçüldü. Ayrıca hastalar dört yıl boyunca takip edildi.

BULGULAR: HKM hastalarında istirahatte daha yüksek E/E' oranı ve NT-proBNP seviyeleri tespit edildi (E/E'oran: 15,36 ±4,90 vs 7,97± 1, 44; p< 0,001, NT-proBNP: 348,25±215,71 pg/ml vs 37,27±11,93 pg/ml; p<0,001). Egzersiz ile kontrollerde anlamlı bir yükselme olmadı, ancak HKM'li hastalarda E/E' oranı ve NT-proBNP seviyeleri anlamlı olarak arttı (E/E' oranı: 23,83±10,85 vs 8,01±2,22 p<0,001, NT-proBNP: 591,25±276,28 pg/ml vs 40,0± 12,03 pg/ml; p<0,001). Ayrıca dört yıllık takipte hiçbir hastada ölüm gözlenmedi.

SONUÇ: Nonobstrüktif HKM hastalarında diyastolik disfonksiyon, yüksek dolum basınçları ve NT-proBNP seviyeleri gözlendi ve bu anormalliklerin maksimum egzersiz sırasında kötüleştiği saptandı. Fakat bu bulgularımız mortaliteyi öngörmedi.

ANAHTAR KELİMELER: Hipertrofik kardiyomiyopati, Stres ekokardiyografi, Beyin natriüretik peptid

ABSTRACT

OBJECTIVE: Abnormal left ventricular diastolic function, and NT-proBNP levels have been demonstrated in patients with hypertrophic cardiomyopathy (HCM), but there is lack of information about exercise hemodynamics. In this prospective study, we aimed to examine the prognostic value of diastolic function, and NT-proBNP levels response to exercise in HCM patients.

MATERIAL AND METHODS: Twenty patients (age: 52.6±11.3 years; n=12 (60%) men) with diagnosis of nonobstructive HCM and 11 volunteers (age: 46.4±13.0 years; n=8 (72.7%) men) serving as controls performed incremental cycle ergometry (25 –W, 2 minutes). Mitral inflow (E/A ratio), septal mitral annulus velocities (E/E' ratio), and NT-proBNP levels were measured at rest and at submaximal exercise. Furthermore, patients were followed for four years.

RESULTS: Higher E/E' ratio and NT-proBNP levels were detected at rest in HCM patients (E/E'ratio : 15.36 ±4.90 vs 7.97± 1, 44; p< 0.001, NT-proBNP: 348,25±215.71 pg/ml vs 37.27±11.93 pg/ml; p< 0.001). With exercise there was no significant elevation in controls, however E/E' ratio and, NT-proBNP levels incresed significantly in patients with HCM (E/E' ratio: 23.83±10.85 vs 8.01±2.22; p< 0.001, NT-proBNP: 591.25±276.28 pg/ml vs 40.0± 12.03 pg/ml; p<0.001). Also, four-year follow-up, none of the patients had died.

CONCLUSIONS: Nonobstructive HCM patients have diastolic dysfunction, elevated filling pressures and NT-proBNP levels and these abnormalities worsen during maximal exercise. but our findings did not predict mortality.

KEYWORDS: Hypertrophic cardiomyopathy, Stress echocardiography, Brain natriuretic peptide

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GİRİŞ

Sol ventrikül (LV) hipertrofisi, interstisyel fibrozis ve dezorganize miyokard ile karakterize hipertrofik kardiyomiyopati (HKM), genetik olarak heterojen bir hastalıktır ve sarkomerik protein mutasyonları ile ilişkilidir (1). Bu hastalarda sol ventrikül sistolik ejeksiyon fraksiyonu normal veya normalin üstündedir, ancak tüm bu yapısal anormallikler diyastolik disfonksiyon ile farklılaşmış sol ventrikül mekaniğine neden olur (2). Bu hastalardaki klinik semptomlar tipik olarak egzersize bağlıdır. Egzersiz veya katekolamin stimülasyonu ile diyastolik dolum periyodunun azalması ayrıca kalbin diyastolik dolumunda ciddi anormalliklere, göğüs ağrısına ve pulmoner venöz basınçta artışa neden olarak dispneye yol açacaktır (3, 4). Bu nedenle egzersiz değerlendirmesi gerekli görünmektedir (5 - 7). Önceki çalışmalarda, istirahatte ve egzersizde HKM hastalarda anormal LV diyastolik fonksiyonu, dolum basınçları ve yüksek NT-proBNP seviyeleri gösterilmiştir (3, 4, 8, 9), ancak egzersiz hemodinamiğinin prognostik değeri hakkında yetersiz bilgi vardır. Bu prospektif çalışmada, hipertrofik nonobstrüktif kardiyomiyopatili hastalarda diyastolik fonksiyon, dolum basınçları ve egzersize NT-proBNP yanıtının prognostik değerini incelemeyi amaçladık.

GEREÇ VE YÖNTEM

Örneklem

Tek bir merkezde (Gülhane Askeri Tıp Akademisi, Kardiyoloji Anabilim Dalı, Ankara, Türkiye) prospektif olarak HKM tanısı alan ardışık yirmi hasta alındı. Ekokardiyografik olarak, LV hipertrofisine neden olabilecek başka bir kardiyak veya sistemik hastalığın yokluğunda tüm hastalarda en az 15 mm maksimum septal kalınlık HKM olarak tanımlandı. Tüm hastalar sinüs ritmindeydi ve LV ejeksiyon fraksiyonu>%50 idi. Ekokardiyografide apikal hipertrofi, sürekli dalga (CW) Doppler incelemesinde (10) sol ventrikül çıkış yolunda maksimal anlık gradyan >30 mmHg veya önemli kapak hastalığı olan hastalar çalışma dışı bırakıldı. Hastalar, kardiyovasküler hastalık kanıtı olmayan (11) benzer cinsiyet ve yaş dağılımı sağlıklı gönüllü ile karşılaştırıldı. HKM hastalarının prognozunu araştırmak için HKM hastalarını ve kontrolleri dört yıl boyunca takip ettik. Tüm gruplar 3 ila 6 ay arayla muayeneye edildi.

Ekokardiyografik Veri Toplama

Görüntüler, 3.5 MHz dönüştürücülü bir Vivid E9 ekokardiyografi (GE Healthcare, Horten, Norveç) kullanılarak elde edildi. Tarama ekokardiyografisi sırtüstü pozisyonda yapıldı. Uygun deneklerde istirahat ve egzersiz ekokardiyografisi, sol lateral eğim ile yarı sırtüstü pozisyonda ekokardiyografi için özel bir egzersiz masasında yapıldı. İki boyutlu sinelooplar, parasternal kısa eksen görüntülerde (bazal ve apikal seviyeler) ve 4 ve 2 odalı görüntülerde kaydedildi. Tüm ölçümler için, kör çevrimdışı analiz için 3 ardışık kardiyak döngü dijital olarak saklandı.

Ekokardiyografik Analiz

LV'nin M-Modu ölçümleri Amerikan Ekokardiyografi Derneği tavsiyelerine göre elde edildi (11). LV diyastol sonu çapı, sistol sonu çapı, diyastol sonu arka duvar kalınlığı ve septum kalınlığı ölçüldü. LV kitlesi hesaplandı ve boy için indekslendi (2). LV ejeksiyon fraksiyonu çift düzlemli Simpson yöntemiyle hesaplandı. Dört boşluk apikal görünümde doku Doppler kullanılarak mitral ve triküspit akımlar ölçüldü. Mitral kapak erken ve geç zirve kan akım hızları (E/A) oranı hesaplandı ve tahmini pulmoner arter basıncı (PAB) ve sol ventrikül çıkış yolu (LVOT) gradyanı CW Doppler ile değerlendirildi. Anüler seviyede TDI tepe sistolik (Sa) ve diyastolik hızlar (Ea ve Aa), septal, lateral, inferior ve anteriordaki apikal görünümlerden elde edildi (11).

Egzersiz Protokolü

Beta bloker alan hastalar, testten en az 48 saat önce ilacı bıraktılar. Denekler yarı yatar durumda bir e-Bike EL 240 V ergometreye (GE Medical Systems Information Technologies GmbH, Freiburg, Almanya) yerleştirildi ve dinlenme verileri toplandı. 25 W'da 2 dakikalık ısınma süresinden sonra, kalp hızı yanıtına bağlı olarak 25 W'lık artışlarla 2 dakikalık aralıklarla iş yükü artırıldı. Hedef kalp hızının %80'i elde edildiğinde veriler kaydedildi.

NT-proBNP Analizi

NT-proBNP tayini için kan örnekleri, dinlenme ve maksimum egzersiz sırasında sırasında toplanmıştır. NT-proBNP tetkiki için buz içinde tutulan kuru tüpe alınan numune buzdolabında 10 dakika boyunca 3.000 rpm'de santrifüjlendi. Serum, elektrokemilüminesans immünoanaliz kullanılarak NT-proBNP tayini için ayrıldı.

Etik Kurul

Mevcut çalışma Gülhane Askeri Tıp Akademisi Etik Kurulundan onam alınarak yapılmıştır. (50687469-1491-2132-13/1648.4-2293 nolu karar). Ayrıca çalışma Helsinki ilkeleri Bildirgesi'ne uygun olarak yapılmış olup çalışmaya katılan hastalardan bilgilendirilmiş onam alınmıştır.

İstatistiksel Analiz

Sonuçlar ortalama ± SD olarak ifade edildi. Sürekli değişkenler, varyans analizi ile karşılaştırıldı ve HKM ve kontrol grupları arasındaki HRT değişkenlerindeki farklılıklar, çok değişkenli varyans analizi ile diğer klinik değişkenler için ayarlandı. Oranların karşılaştırılması ki-kare testi ile, korelasyon analizleri ise Pearson rank testi ile yapılmıştır. İkiden fazla sayısal değişkenin analizi için oneway Anova testi kullanıldı. İstatistiksel anlamlılık p<0.05'te varsayılmıştır. İstatistiksel analiz, SPSS for MS Windows, sürüm 22 kullanılarak yapıldı.

BULGULAR

İki grup arasında yaş ve cinsiyet açısından anlamlı fark yoktu. HKM hastalarının ve kontrol deneklerinin özellikleri **Tablo 1**'de sunulmuştur.

Tablo 1: HKM ve kontrol grubu özellikleri

Değişken	HKM Grubu	Kontrol Grubu
Yaş,y	52,65± 11,30	46,45± 13,04
Cinsiyet, K/E	12/8	8/3
Boy, cm	169,30±7,60	168,27± 8,19
Kilo, kg	76,45± 8,32	78,09± 10,03

Yedi HKM hastası asemptomatikti (New York Kalp Derneği sınıf I) ve 13 hasta New York Kalp Derneği sınıf II idi. HKM hastalarında, kontrol deneklerinden daha büyük sol atriyal hacmi, daha küçük LV diyastol sonu ve sistol sonu çapları saptandı. Septal kalınlık, LV kitlesi ve ejeksiyon fraksiyonu HKM hastalarında daha fazlaydı. Ayrıca HKM hastalarında istirahat ve egzersizde daha yüksek sPAB ve LVOT gradyanı bulundu **(Tablo 2, 3)**. Dört yıllık takip süresince HKM'li hastalarda ve kontrollerde herhangi bir ölüm tespit edilmedi. E/A oranı izovolumetrik relaksasyon zamanı (IVRT) ve istirahatte deselarasyon zamanı (DT) açısından iki grup arasında anlamlı fark vardı (E/A oranı: 0,98± 0,48 vs 1,29± 0,15; p: 0,045, IVRT: 114, 35± 7,42 ms vs 87,64± 5,71 ms; p< 0,001, DT: 234,95 ± 16,57 ms vs 168, 45 ± 16,50 ms; p< 0,001, HKM ve kontrol hastalarında grup, sırasıyla). HKM hastalarında istirahatte daha yüksek Mitral kapak erken zirve kan akım hızı ile erken diyastolik dalga hızı oranı (E/E') oranı ve NT-proBNP seviyeleri tespit edildi (E/E'oran: 15,36±4,90 vs 7,97±1, 44;p<0,001, NT-proBNP:348, 25±215,71pg/ml vs 37,27±11,93 pg/ml;p<0,001). Egzersiz ile kontrollerde anlamlı bir yükselme olmadı, ancak HKM'li hastalarda E/E' oranı ve NT-proBNP seviyeleri anlamlı olarak arttı (E/E' oranı: 23,83±10,85 vs 8,01±2,22 p<0,001, NT-proBNP:591,25±276,28 pg/ml vs 40,0±12,03 pg/ml;p<0,001). NT-proBNP ile istirahatte ve maksimal egzersizde E/E' oranı arasında pozitif korelasyon saptandı (r1 istirahatte: 0,432; p:0,015, r2 egzersizde:0,531; p: 0,003). E/E' oranındaki artış oranı sol atriyal hacim (LAV), IVS kalınlığı ve DT ile ilişkili saptandı (LAV r: 0, 370, p:0,040; IVS r:0,395, p:0,028; DT r:0,404; p: 0,024). NT-proBNP'deki artış oranı da LAV, DT, IVS, PW kalınlığı ve sol ventrikül kütle (LVM) ile korele idi (LAV r: 0,608, p<0,001; IVS r: 0,585, p:0,001; PW r: 0,552, p: 0,001; DT r: 0,674, p<0,001; LVM r: 0,455, p: 0,010).

Tablo 2: Kontrol Deneklerinde ve Hipertrofik Kardiyomiyopatili Hastalarda Dinlenme Halinde Ekokardiyografik ve Doku Doppler Verileri

Değişken	HKM Grubu	Kontrol Grubu	p
LA hacim,ml	81,75± 29,86	40,36± 11,28	<0,001
LV diyastol sonu çapı, mm	4,38± 0,51	4,71± 0,45	0,080
LV sistol sonu çapı, mm	2,99± 0,63	3,02± 0,32	0,87
Septum duvar kalınlığı, mm	2,11± 0,34	0,88± 0,09	<0,001
LV arka duvar kalınlığı, mm	1,23± 0,16	0,86± 0,09	<0,001
RV diyastol sonu çapı, mm	2,25± 0,25	2,20± 0,19	0,53
LV ejeksiyon fraksiyonu, %	68± 5	61± 4	<0,001
LV kütle, gm	127,85± 15,75	103,45± 17,40	<0,001
Egzersiz süresi,dk	5,58± 1,92	8,64± 2,92	0,001
Exercise work load,w	92,50± 31,51	129,55± 40,02	0,008

LV: sol ventrikül, LA: sol atriyum, RV: sağ ventrikül

Tablo 3: Kontrol Deneklerinde ve Hipertrofik Kardiyomiyopatili Hastalarda Dinlenme ve Egzersiz Sırasında Ekokardiyografik Veriler

Değişken	HKM Grubu		Kontrol Grubu	
	Dinlenme	Egzersiz	Dinlenme	Egzersiz
Sistolik kan basıncı, mm Hg	125,5± 16,77	151,25±14,58‖	119,55±18,36	153,64±,06 ‖
Diyastolik kan basıncı, mm Hg	74,25±8,15	78,75±9,01 §	70,91±9,43	75,45±10,59 §
Nabız, atım/dk	70,20±12,25	142,24±9,60‖	70,45±9,22	147,51±11,08 ‖
LVOT gradient, mm Hg	13,6±6,15*	24,3±10,69* ‖	5,91±1,44	7,45±1,80 ‖
SPAB, mm Hg	19,10±5,72	23,25±6,92 ‖	15,18±5,17	17,45±5,46* ‖

SPAB: sistolik pulmoner arter basıncı, LVOT: Sol ventrikül çıkış yolu. Aynı durumdaki kontrol deneklerinden önemli ölçüde farklı (dinlenme ya da egzersiz): *P<0.05, †P<0.01, ‡P<0.001; dinlenmeden önemli ölçüde farklı: §P<0.05, ‖P<0.001.

TARTIŞMA

Egzersiz ekokardiyografisi sırasında egzersiz kapasitesinin ve LV diyastolik fonksiyonunun değerlendirilmesi, HKM'li hastaların risk sınıflandırmasında rol oynayabilir (5 - 7). Çünkü nefes

darlığı gibi klinik semptomlar tipik olarak egzersize bağlıdır. Obstrüktif HKM'de efor dispnesi dinamik obstrüksiyon ile ilişkilendirilmiştir (12). Obstrüktif olmayan HKM'de, yükselmiş LV diyastolik dolum basınçlarının, sınırlı atım hacim artışının ve dolayısıyla azalmış pik egzersiz kapasitesinin en önemli belirleyicisi olduğu gösterilmiştir (3, 4). HKM'li hastalarda stres ekokardiyografinin diyastolik performans özelliklerinin prognostik değerini ve NT-proBNP yanıtını ele alan yayınlanmış yeterli sayıda çalışma bulunmamaktadır.

Bizim çalışmamızda da önceki çalışmalarda olduğu gibi HKM hastalarında istirahatte E/E' oranı ve NT-proBNP düzeylerinin daha yüksek olduğu ile aynı sonuçları saptadık (8, 9). Egzersiz ile kontrol grubunda anlamlı bir yükselme olmadı. Ancak HKM'li hastalarda önemli ölçüde artmış E/E' oranı ve NT-proBNP seviyeleri saptandı. Ayrıca patofizyolojiye uygun olarak NT-proBNP ile istirahat ve submaksimal egzersizde E/E' oranı arasında pozitif korelasyon saptandı. Bu bulgularla NT-proBNP ile E/E' oranı arasındaki ilişkinin egzersiz sırasında da devam ettiğini söyleyebiliriz.

Bildiğimiz gibi; LAV olarak değerlendirilen sol atriyal yeniden şekillenme, sol ventrikül diyastolik disfonksiyonunun iyi bir belirteci olarak önerilmiştir. Genişlemiş LAV, bozulmuş fonksiyonel NYHA sınıfı ile ve ters olarak koşu bandı egzersiz kapasitesi ile ilişkilidir (13). Ayrıca NT-proBNP ve E/E' oranı artış hızının LAV, LV kalınlığı, kütle ve DT ile ilişkili olduğunu bulduk. Önceki çalışmalar, istirahatte artan NT-pro-BNP düzeylerinin HKM'deki pik oksijen tüketimi ile korele olduğunu ve hastalık şiddetinin diğer geleneksel belirteçlerinden daha fazla fonksiyonel bozulmayı öngördüğünü göstermiştir (8, 9). Ayrıca geçmiş çalışmalara ek olarak egzersiz sırasında yüksek NT-proBNP seviyeleri gösterdik. Dolayısıyla bu, egzersiz sırasında diyastolik fonksiyonun daha da kötüleştiğinin güçlü bir kanıtı olabilir.

HKM hastalarında egzersiz sırasında pulmoner arter basıncında önemli bir artış saptadığımız bir diğer sonuç, istirahatte iki grup arasında fark olmamasına rağmen. Bu, diğer sonuçlarımız gibi bu hastalarda egzersiz testinin önemini not eder, çünkü bu hastalardaki patolojik bulguların çoğu dinlenmede belirlenemez.

Ayrıca tüm HKM hastalarımızı ve kontrollerimizi dört yıl boyunca takip ettik. Diyastolik disfonksiyon ve NT-proBNP düzeylerinin prognostik değerini araştırmayı amaçladık. Çünkü bu hastalarda mortaliteyi tahmin etmek çok önemlidir. HKM hastalarında diyastolik disfonksiyon, yüksek dolum basınçları ve istirahatte NT-proBNP seviyeleri olmasına ve bu anormallikler maksimal egzersiz sırasında kötüleşmesine rağmen, bu hastalarda herhangi bir ölüm tespit etmedik. Ancak biz sadece dört yıllık takip sonuçlarını gösterdik ve hasta sayımız azdı. Uzun dönem takip sonuçları, bulgularımızın önemini belirlememize yardımcı olabilir.

Obstrüktif olmayan HKM hastalarında istirahatte diyastolik disfonksiyon, yüksek dolum basınçları ve NT-proBNP seviyeleri vardır ve bu anormallikler maksimum egzersiz sırasında kötüleşir. Bu bulgular nonobstrüktif HKM'li hastalarda egzersiz intoleransını ve semptomları açıklayabilir ve tedavi stratejilerini planlamamıza yardımcı olabilir. Ancak bulgularımız mortaliteyi öngörmedi. Bununla birlikte, bu sonuçların daha uzun vadeli çalışmalarla araştırılması gerekir.

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OLGU YAZISI / CASE REPORTS

TİP 1 TİMPANOPLASTİ SONRASI GECİKMİŞ FASİYAL PARALİZİ

DELAYED FACIAL PALSY FOLLOWING TYPE 1 TYMPANOPLASTY

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ÖZET

Sorunsuz geçen bir kulak ameliyatından günler veya haftalar sonra ortaya çıkan gecikmiş yüz felci nadir bir durumdur. Prognozu genellikle iyi olsa da, hem hasta hem de cerrah için korkutucu bir sonuçtur. Bu can sıkıcı komplikasyon çoğunlukla sadece timpano-mastoidektomi, stapes cerrahisi, koklear implant ve endolenfatik cerrahiden sonra bildirilmiştir. Literatürü incelediğimiz kadarıyla olgumuz, literatürde sunulan tip 1 timpanoplasti sonrası fasiyal felci geciken ilk olgudur. Bu olgu sunumunda, mevcut literatür ışığında tip 1 timpanoplastiyi takiben postoperatif 9. gün periferik fasiyal paralizi ile gelen bir vakayı ve tedavi yaklaşımımızı sunmayı amaçladık.

ANAHTAR KELİMELER: Timpanoplasti, Fasiyal sinir, Gecikmiş fasiyal paralizi

ABSTRACT

Delayed facial paralysis that occurs days or weeks after a trouble-free ear surgery is a rare condition. Although its prognosis is generally good, it is a frightening result for both the patient and the surgeon. This troubling complication has mostly been reported only after tympano-mastoidectomy, stapes surgery, cochlear implant, and endolymphatic surgery. As far as we have investigated in the literature, our case is the first case of delayed facial palsy after type 1 tympanoplasty presented in the literature. In this case report, we aimed to present a case with peripheral facial paralysis on the postoperative 9th day following tympanoplasty type 1 and our treatment approach in the light of the current literature.

KEYWORDS: Tympanoplasty, Facial nerve, Delayed facial palsy

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INTRODUCTION

Facial nerve palsy (FNP) is a displeasing and rare complication of otologic interventions. This annoying complication has been reported only after tympano-mastoidectomy, stapes surgery, cochlear implant, and endolymphatic surgery (1 - 3). As far as we searched the literature, our case is the first one having delayed facial palsy after type 1 tympanoplasty presented in the literature. In this case report, we present a case of delayed FNP after type 1 tympanoplasty and our approach for treatment.

CASE

Written informed consent was obtained from the individual participant included in the study. A 49 years old male patient admitted to our clinic with hearing loss in the left ear and occasional ear discharge lasting for about 4 years. Otoscopy revealed a central perforation of approximately 4x5 mm in size. Pure tone audiometry showed 35 decibel mixt type hearing loss on the left ear. The patient's temporal computed tomography showed no pathology of ear except perforation **(Figure 1)**.

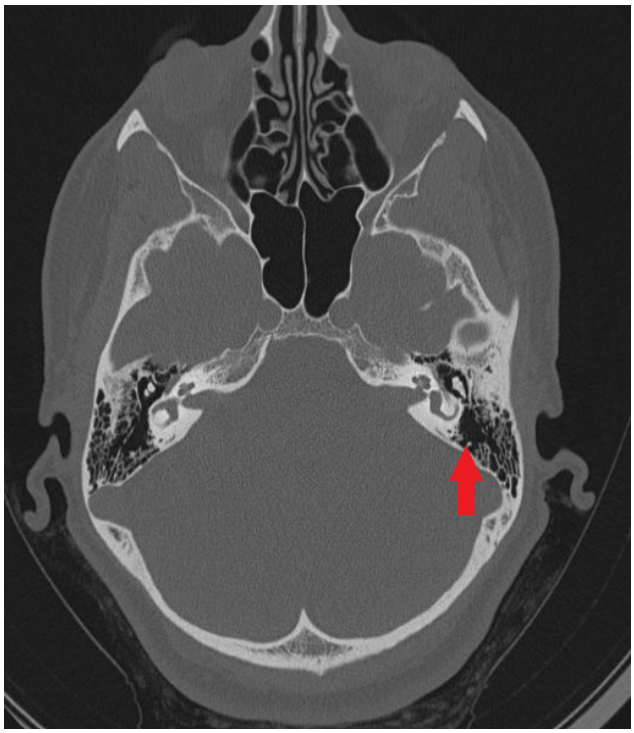

Figure 1: Axial CT image of ear. Arrow on the left indicating normal mastoid and tympanum

The patient underwent a type 1 tympanoplasty via underlay technique. Surgery was uneventful. Ater surgery the patient had no complaint. patient admitted back with a grade-4 FNP after 9 days of surgery **(Figure 2)**.

Figure 2: Image of patient with House-Brackmann grade 4 left facial palsy on postoperative 9th day

Herpes simplex virus-1 (HSV-I) genome was not detected with the PCR. The HSV1 IgM and the HSV1 IgG titer was negative also. There was no sign of infection in the left ear. Immediately after facial palsy diagnose, steroid therapy was given with administration of prednisone 120 mg/d followed by decreasing dosages in 3 days with 15 mg/d for 15 days. On the 6th day, A stir in the closing movements of the left eye was witnessed on the 6th day of treatment. Better improvenent of the facial nerve (House grade II) was seen on the 11nt day.On the 15th day, full recovery of facial nerve was obtained. The graft was intact and no recurrence was seen in the 6th-month control.

DISCUSSION

Facial palsy is an uncommon complication of otologic interventions. Etiology is generally traumatic and related to operative difficulties or anatomic abnormalities. FNP can occur immediately or with a delay subsequent to operation. Instantaneous palsy may be because of regional anesthetics and may revert in a few hours. Intraoperative critical operational trauma of the facial nerve can also cause total facial paralysis directly. Delayed FNP is reported with a range of 48 hours and 16 days postoperatively (1 - 5).

As far as we searched the literature just one case was presented as delayed facial palsy after tympanoplasty and mastoidectomy (6). Delayed FNP is usually from compression of nerve fibers by edema, harm to the blood supply to the facial nerve during operation, drilling-induced heat, or inflammation in the early postoperative phase (7 - 9). The added cause for delayed FNP can be viral reactivation. The vulnerability of facial nerve / chorda tympani, thermal or mechanical intervention nearby the facial nerve, or steroid/antibiotic soaked gel foam on geniculate ganglion can begin herpes virus reactivation. Varicella-zoster virus is also a presumable cause (10). Also, postoperative infection of the surgical area can cause delayed facial palsy. In our case, none of these causes were detected.

As a conclusion, although delayed facial palsy after an otological surgery generally has a good prognosis, the administration of steroids must be applied at once. Surgical decompression of the facial nerve is necessary infrequently in these types of cases.

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DERLEME/ REVIEW

ROMATOİD ARTRİTİN KLİNİK TEDAVİSİNDE KULLANILAN DİYET YAKLAŞIMLARININ DEĞERLENDİRİLMESİ

AN EVALUATION OF DIETARY APPROACHES USED IN THE CLINICAL MANAGEMENT OF RHEUMATOID ARTHRITIS

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ÖZET

Romatoid Artit (RA), populasyonun %0.5-1.0'ini etkileyen sistemik inflamasyon, kalıcı sinovit ve diğer komorbiditelerle karakterize bir kronik, otoimmün bozukluktur. Uzun süreli aktif RA şiddetli eklem hasarı, ağrının engellenememesi, yaşam kalitesinde düşüşe neden olmaktadır. RA'nın etiyolojisi tam olarak anlaşılamamıştır ancak doğuştan gelen ve edinilmiş bağışıklık sistemlerinin tepkileri arasındaki etkileşimden kaynaklandığı düşünülmektedir. RA, kan dolaşımında Romatoid Faktör ve antisitrüline peptit antikotlarının varlığı ile karakterize edilmektedir. Ayrıca Romatoid artrit ile ilişkili immünitede bağırsak mikrobiyomunun önemi olduğu vurgulanmaktadır. Mikrobiyotadaki değişikliklerin, hastalığın riski ve şiddeti ile ilgili olduğu düşünülmektedir. Başta akciğerler, ağız mukozası ve gastrointestinal sistem olmak üzere üç bölge, mikrobiyotada görülen değişiklikler ile ilişkilendirilmiştir. RA'nın farmasötik tedavisi genellikle; ağrıyı ve inflamasyonu yönetmek için kullanılan steroidal olmayan anti-inflamatuar ilaçları (NSAID's) ve hastalığı yavaşlatarak ağrıyı azaltan anti-romatizmal ilaçları içerir. Ne yazık ki birçok hastada remisyon olasılığı düşük olmakla birlikte, ilaçlarla ilgili yaygın yan etkiler rapor edilmektedir. Hastalarda bazı çevresel ve yaşamsal değişikliklerin semptomları şiddetlendirdiği ve dolayısıyla RA'nın şiddetini etkilediği düşünülmektedir. Örneğin RA hastaları, kırmızı et, alkollü ve alkolsüz içecek tüketiminin semptomlarını kötüleştirdiğini; balık ve yaban mersini gibi besinlerin ise semptomlarını hafifletmeye yardımcı olduğunu ifade etmektedir. RA'nın semptomlarını yönetmek amacıyla; inflamasyonu azaltmada, antioksidan seviyelerini artırmada ve lipid profillerini iyileştirmede potansiyel diyet değişiklikleri önerilmektedir. Romatoid Artritin hem başlangıcında hem de hastalığın şiddetinde, diyetle ilgili meydana gelen antijenik yük ve gıda sensivitesinin rol oynadığı düşünülmektedir. Bunun yanında RA hastalarında kullanılan NSAID ilaçlar ile hastaların bağırsak mukozasının alerjenlere karşı daha geçirgen olduğu gösterilmektedir. Bu anlamda Eliminasyon diyeti, Akdeniz Diyeti, Vegan/vejetaryen Diyet yaklaşımı; Omega-3 yağ asidi, D vitamin ve probiyotik takviyesinin hastalık aktivitesini azalttığı düşünülmektedir. Bu derlemenin amacı, RA ile ilişkili semptomları azaltmak için kullanılan belirli diyet yaklaşımlarının ve besin takviyelerinin etkinliğini, literatürde bilimsel kanıtlara dayanarak değerlendirmektir.

ANAHTAR KELİMELER: Artrit Romatoid, Diyet yönetimi, Diyet, Akdeniz, Vejetaryen

ABSTRACT

Rheumatoid arthritis (RA) is a chronic autoimmune disorder characterized by systemic inflammation, persistent synovitis, and other comorbidities, that affects 0.5-1.0% of the overall population. Long-term active RA causes severe joint damage, disabling pain and diminished life quality. The etiology of RA is not accurately understood, but it is thought to be due to an interaction between the responses of the innate and acquired immune systems. RA is characterized by the presence of Rheumatoid Factor (RF) and anti citrullinated peptide antibodies in the blood circulation. Also the composition of intestinal the gut microbiome is claimed to be critical in immune responses associated with RA. Changes in the microbiota are thought to be related to the risk and severity of the disease. Three regions; primarily the lungs, oral mucosa and gastrointestinal tract have been associated with changes in the microbiota. Commonly, the pharmaceutical treatment of RA includes non-steroidal anti-inflammatory drugs (NSAIDs) that are used to manage the pain and inflammation associated with RA and disease-modifying anti-rheumatic drugs that reduces pain by slowing down the disease. Unfortunately, remission is not likely in many patients. Moreover, side effects related to drugs are commonly reported. Some alterations in the patients' life and environment are thought to aggravate symptoms, thus influencing severity of RA. For example RA patients, the participants asserted that consumption of red meat, alcoholic and non-alcoholic beverages worsen their symptoms, while nutrients such as fish and blueberries help alleviate the symptoms. To manage the adverse effects of RA, particular dietary alterations are suggested to be effective in reducing inflammation, increasing antioxidant levels, and improving lipid profiles. Antigenic load and food intolerance are thought to play a role in both the onset of Rheumatoid Arthritis. Besides, it has been shown that the intestinal mucosa of the patients would have become more permeable to allergens due to long term NSAIDs use. In this sense, Elimination Diet, Mediterranean Diet, Vegan/Vegetarian Diet approach, Omega-3 Fatty acids, Vitamin D and probiotic supplementation is thought to reduce disease activity. The purpose of this review is to evaluate the efficiency of certain dietary approaches and supplements used for lessening the RA related symptoms, based on the scientific evidence found in the literature.

KEYWORDS: Arthritis Rheumatoid, Dietary management, Diet, Mediterranean, Vegaterian

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INTRODUCTION

Rheumatoid arthritis (RA) is a chronic autoimmune disorder characterized by systemic inflammation, persistent synovitis, structural bone damage and other comorbidities, that affects 0.5-1.0% of the overall population. Both genetic and environmental factors are believed to be play a role in the pathogenesis of RA (1). Fatigue, severe pain, loss in certain bodily functions due disabling effects in the bone structure are commonly reported symptoms. Besides, when it is the "end stage", in which inflammation ceases but the damage persists, surgical intervention may be necessary to alleviate joint pain (2).

The underlying pathogenic mechanism of RA is highly complex, involving an unhealthy interaction between innate and acquired immune responses. Immunological markers such as Rheumatoid Factor (RF) and anticitrullinated peptide antibodies are generally found in the patients' blood, even before any signs or symptoms of joint inflammation appear. Thus, it is thought that the activation of autoimmune responses may occur in regions, such as the gastrointestinal system, other than the usual location of inflammation, namely joints (3, 4).The first step in the treatment of RA is disease-modifying antirheumatic drugs (DMARDs) which suppress disease activity and reduce joint damage. With the development of more effective therapeutic agents such as tumor necrosis factor (TNF) alpha inhibitors or the combination of DMARDs with other drugs, some remission can be achieved in most patients. However, there are many patients whose disease symptoms persist despite the pharmacotherapy (5). Yet some alterations in personal life and environment are believed to alleviate the disease's severity. For instance, some "dietary approaches" are used to manage or lessen the symptoms of RA by reducing inflammation, increasing antioxidant levels, and improving lipid profiles (6, 7). Additionally, according to some recent study, there is strong evidence suggesting an association of the gastrointestinal microbiome with the immune system, pointing the significant role that intestinal microbiota may play in the pathogenesis of systemic inflammatory diseases such as RA (8).

Relationship between RA and Intestinal Microbiota

The gastrointestinal tract (GIT) is the major entry route for various environmental agents such as food and microorganisms that in turn may affect metabolic homeostasis and microbiota within the GIT (9). Although, some microbiota located in host may have a beneficial effect on the host's health, certain host-microbiota interactions may result in adverse effects on the host's wellbeing. For instance, particular resident bacterial species may cause inflammatory diseases by activating the immune system unnecessarily (10). Thus, the composition of intestinal microbiome is claimed to be critical in immune responses associated with RA. It has been reported that changes in the microbiota found in lungs, oral mucosa, and GIT are associated with the predisposition to and severity of the disease (11).

In a series of studies evaluating the impact of intestinal flora on the etiopathogenesis of RA; it was found that the *faecal* culture of RA patients had a significantly higher rate of *Clostridium perfringens* in comparison to the control group. Besides, it was determined that patients in early stages of RA had a higher rate of *Lactobacillus spp.* in their *faecal* microbiota compared to that of healthy controls (12).

Recent *in vitro* and *in vivo* studies have suggested that some probiotic strains may have anti-inflammatory properties. Scientists then began to investigate whether some probiotics could ease RA-related symptoms. In two randomized double-blind clinical trials on female patients, who were diagnosed with RA more than one year ago (at time of the study), *Lactobacillus casei* supplementation caused a significant decrease C-reactive protein levels in patients' serum. Additionally, in comparison to the placebo group, in the group provided probiotic supplement, RA scores are demonstrated significant difference in terms immunological parameters such as interleukin (IL) 10, IL-12 and TNF-alpha, in favor of the group using probiotics (13, 14).

Mohammed et al. (15) reports that, different species of probiotics especially *Lactobacillus* including the strains supplementation in RA

reduces proinflammatory cytokines such as IL-6, but there is no proved statistically significant difference between effects of probiotics and placebo substances on disease activity score. In a similar line, it is stated that the clinical effect of probiotic supplementation is not definite begging for additional high-quality randomized controlled studies to confirm the alleged impact of probiotics. A meta-analysis which investigated the impact of probiotic supplementation on RA demonstrated that probiotic use did not alter inflammatory parameters such as TNF-alpha, IL-6, IL-10, and IL-12, or oxidative stress level parameters such as total antioxidant capacity and malondialdehyde. Nonetheless, this meta-analysis pointed a partial effect on reducing the disease activity scores and C-reactive protein levels, concluding that probiotic supplementation may have only a "low impact" on the course of RA (16).

Studies suggest that RA-related pathophysiological mechanisms associated with intestinal microbiota might be multifactorial. Activation of Antigen-Presenting Cells (APCs) through Toll-like receptors (TLRs) or NOD-like receptors (NLRs), control of the host immune system, initiation of T cell differentiation and alterations in the permeability of the intestinal mucosa are some of the suggested factors (17). In addition, it is stated that microbial imbalance in/on the body (i.e., dysbiosis) can provoke proinflammatory cells that trigger intestinal permeability which in turn result in the development of autoimmune response. Within this context, it is highly plausible to proclaim that the diet is one of the major elements of both the intestinal microbiota and the immune system (18).

Dietary approaches in RA

Both patients and researchers have wondered about the impact of the diet on RA-related symptoms for a long time. Recently, the effect of non-pharmacological interventions on the disease symptoms were widely studied. In a single-center survey study conducted with 217 RA patients, the participants asserted that consumption of red meat, alcohol and non-alcoholic beverages worsen their symptoms, while nutrients such as fish and blueberries help alleviate the symptoms (19). As an outcome of these studies, it has been noticed that dietary means suggested to manage or minimize RA-related symptoms usually through various mechanisms such as reducing inflammation, increasing antioxidant levels, regulating lipid profiles to have an anti-inflammatory effect, and potentially regulating the intestinal flora (20).

Antigenic load and food intolerance are thought to play a role in both the onset of Rheumatoid Arthritis and the course of the disease for two main reasons. First one is the high number of mast cells activated in response to foreign antigens (mostly in an immunoglobulin E-mediated process) are present in the tissues of RA patients. Secondly, there are higher levels of cross-reactive antibodies displayed against various nutrients in the small intestine of patients with RA, in comparison to healthy individuals (21). Besides, it has been shown that the intestinal mucosa of the patients would have become more permeable to allergens due to long term non-steroidal anti-inflammatory drug (NSAIDs) use (22).

The elimination diet is a diet that purposefully avoids particular nutrients found to be associated with certain symptoms in a disease. It is generally based on the idea that removing a food from the diet should result in some improvement if it ever plays a role in the pathogenesis of the disease (8, 23). After a few weeks of deprivation, restricted nutrients are reintroduced to the patients gradually to determine if any of them has an aggravating effect on the RA. A study included 347 RA patients (27% of whom had food intolerance), reported that 9% of patients reacted against cow's milk protein while 4% reacted against wheat. Subsequently, when the "rectal protein food challenge" approach applied in the study, it is reported that mucosal reactivity shown against cow's milk and gluten was observed in only a small portion of RA patients (24).

It has been suggested that a low-fat vegetarian or vegan diet after a fasting period may be beneficial for RA patients. A systematic review on four controlled studies that had lasted at least three months, reports that such diets may have statistically significant clinical effects (25). Even though exact mechanisms (such as decrease

in the inflammatory cytokine release, reduced formation of leukotrienes, changes in intestinal permeability and consequently the penetration of immunostimulants from the intestines) of these diets are not fully understood, fasting is thought to suppress inflammation (26). It has been reported that with limited vitamin, mineral and carbohydrate supplementation, 7-day fasting results in (i) reduction of CD4+ lymphocyte count, (ii) decrease of CD4+ lymphocyte function, (iii) declined levels of specific inflammatory markers such as IL-6, CRP, and (iv) rise in the erythrocyte sedimentation rate (ESR). However, following reintroducing restricted nutrients, inflammation returns, and symptoms worsen. Hence, the therapeutic value of fasting is claimed to be limited unless accompanied with a vegetarian/vegan diet (27). In addition, it has been reported that substantial changes occurred in the intestinal flora of initially omnivorous RA patients only within one year after beginning a vegan diet. Therefore, it has been suggested that there is a noticeable correlation between vegan diet, faecal microbial flora, and disease activity in RA patients (28). Further controlled clinical studies are required to assess the safety and precise influences of fasting coupled with vegan/vegetarian diet on RA patients.

The Mediterranean diet includes three main groups. First group includes abundant vegetable-based foods such as unrefined grains, fruits, leguminous plants, and olive oil. Second group consists of poultry products, dairy products, and eggs. Third group involves sugar-based nutrients and red meat. Olive oil is main sources of fat, there is 1-2 times of month consumption of red meat, moderate intake of poultry. Also according to this dietary approach moderate amounts of wine are often recommended with meals. It is thought that Mediterranean diet, potentially, may alter inflammatory pathways in RA, as it contains nutrients with high amounts of antioxidants that may have anti-inflammatory effect (7, 29). In a three-months-long randomized study included 51 RA patients, a decrease in disease activity and improvement in physical function were observed following the introduction of Mediterranean diet. These results are proclaimed to be partially associated with deliberate choice of antioxidant-rich diet on the course of Mediterranean diet in the study (8). A second research, aimed to assess the impact of adherence to the Mediterranean diet on RA patients on disease activity and the relationship between comorbidities, asserts that the Mediterranean diet score was found to be negatively correlated with the total score of "RA Impact of disease" (RAID). Additionally, results of the latter study suggested noticeable association between the Mediterranean diet and general health score, although the relationship between high Mediterranean diet score and low disease activity was statistically insignificant (30). A third study revealed that Mediterranean diet may cause only slight reduction in pain or disease activity. Consequently, taking the limited evidence into account, this final study stated that it is not possible to determine the impact of Mediterranean diet on the quality of life among RA patients (31).

Some researchers state that because some non-enzymatic antioxidants such as vitamins A, C, and E may be helpful in managing RA-related symptoms, an antioxidant-rich diet can reduce free radical damage in the joints resulting in decreased inflammation, swelling and pain (32). In a study involved RA patient women who were daily introduced with certain vitamin and minerals (namely, 50 µg selenium, 400 µg vitamin A, 8 mg zinc, 40 mg Vitamin E, and 125 mg Vitamin C) for three months, a significant betterment in disease activity was reported. However, the study suggested that the impact of these antioxidant substances was statistically insignificant on specific disease parameters such as joint swelling and pain (33).

The influence of omega-3 fatty acids on the clinical management of RA patients has also been documented. When the amount of omega-3 fatty acid in diet is increased, the amount of arachidonic acid binding to the cell membrane decreases. Such a decrease, in turn, have affect molecular inflammatory responses such as TNF-alpha positively (34). Park et al. (35) performed a double-blind placebo-controlled study on 109 RA patients. The results suggested that 2.1 gr EPA + 1.2 gr DHA supplementation for a four-months period reduced the need for NSAIDs . Furthermore, Proudman et al. (36) demons-

trated that when supplemented with 5.5 grams of fish oil supplementation for 12 months, the rate of therapeutic inefficacy decreased in 140 recently diagnosed RA patients. In a similar line, another study demonstrated that using omega-3 capsules daily that contain 1.8 EPA and 2.1 DHA led to a substantial improvement in disease activity as well as a significant decrease in the need for analgesic drugs, in comparison to the placebo group (37). Moreover, when omega-3 fatty acids along with low doses of vitamin E is given as supplementation, construction of inflammatory blood markers was decreased. This in turn led to an overall decline in lipid peroxidation of RA patients, as well as the therapeutic dose they need for symptom alleviation (38).

Recent studies suggested that vitamin D plays an immunomodulatory role within the immune system as blood vitamin D levels are shown to correlate with the immune activity. When researchers examined whether vitamin D plays such a role in the RA pathogenesis, serum 25-OH vitamin D levels were found to be inversely associated with the disease activity (39, 40). Additionally, a negative relationship between serum vitamin D and RA disease activity was reported as blood vitamin D levels of RA patients were found to be lower than the healthy controls (41). Another study was performed to evaluate the association of Vitamin D levels with RA disease activity in 15 different countries. The results were suggesting a statistically significant correlation between low levels of vitamin D and RA disease activity differing both in countries and at latitudes (42). In a recent double-blind placebo-controlled study conducted by Buondonno et al. (43), it was demonstrated that when 30000 IU combined cholecalciferol was given to patients for 12 weeks period, a considerable improvement was noticed in the disease activity and severity as well as a significant reduction in the level of RA associated immunological markers. Moreover, others demonstrated that when RA patients on the DMARDs therapy are given vitamin D supplementation for three months, disease activity score and CRP blood levels become significantly better (44). However, there are also contradicting results from another study investigating the efficacy of oral vitamin D supplementation in active RA patients who are on methotrexate therapy. According to this study, there was no significant efficacy-related difference between the vitamin D supplemented patient group and the placebo group in terms of disease activity score at the end of the study period (45).

CONCLUSION

As demonstrated in this review paper, studies examining the possible effects of various dietary approaches on the course of RA are conducted on small study populations. Besides, they have considerably poor design. Although both non-enzymatic antioxidants and high-antioxidant diets, such as the above-mentioned Mediterranean diet, have been illustrated to be beneficial by lessening the inflammation, no specific dietary guidelines for RA were prepared or introduced due to inadequate scientific evidence. In several countries, such as Sweden, RA patients are encouraged to follow healthy and balanced diet guidelines (46, 47).

There are several limitations of diet modification approach on RA related symptoms. For instance, fasting approaches are reported to provide significant yet short-term and highly subjective advantages. Moreover, vegetarian/vegan and elimination diets are claimed to be complicated and subjective as well. It is also stated that the efficacy of different diet plans, such as Mediterranean Diet, vegetarian/vegan diet and elimination diet, are asserted to be unsatisfactory because of the fact that they involve small-scale or singlet studies that are prone to medium-to-high bias levels (48). It is also noted that dietary manipulation studies failed to provide any long-term feedback on whether participants continued to follow experimental diet after dietary interventions. In addition, some dietary manipulations were also claimed to be responsible for the aggravation of present nutritional risks associated with weight loss and RA-specific therapies (49).

Finally, positive outcomes on the RA disease activity were obtained through the administration of high doses of Omega-3 polyunsaturated fatty acids (PUFAs). It is reported that the daily recommened safe intake dose of omega3 is 3g below. PUFAs administration was also associated with decreased failure rates of pharmacotherapy on the course of RA. Moreover, vitamin

D supplements are mostly proven to yield beneficial outcomes on the RA disease activity. Although former studies demonstrated positive impact of nutrients on clinical outcomes of RA, studies evaluating the combined effects of different ingredients within a particular nutrient are lacking, as food ingredients usually interact with each other. All in all, this review, based on the detailed review of literature, concludes that there is not sufficient data and evidence to adopt specific dietary advice on the course of RA.

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