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Contact information:

Gaziantep Islam Science and Technology University, Faculty of Medicine
Beştepe neighbouhood, Street number 192090 6/1 27010 Şahinbey/Gaziantep
Tel: +90 342 909 7500
E-mail: eams@gibtu.edu.tr

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Gaziantep İslam Bilim ve Teknoloji Üniversitesi Tıp Fakültesi adına

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Clerk of Editorial Office/Sorumlu Yazı İşleri Müdürü

Mehmet Göl, Asst. Prof.

Aim

Experimental and Applied Medical Science aims at being a current and easily accessible academic publication in which striking research results that will improve the quality of life and are unique from every field of medical sciences.

Amaç

Experimental and Applied Medical Science, yaşam kalitesini arttıracak çarpıcı araştırma sonuçlarının sunulduğu, tıp bilimlerinin her alanında benzersiz, güncel ve kolay erişilebilir bir akademik yayın olmayı hedeflemektedir.

Scope

Experimental and Applied Medical Science is an open-access, internationally double-blind peer reviewed academic medical journal which is published in English four times a year, under the auspices of Medical Faculty of Gaziantep Islam Science and Technology University. The journal receives manuscripts for consideration to be publishing in the form of research articles, reviews, letter to editor, brief notification, summary notification etc. which could have been presented from within the country or abroad and including experimental animal studies related to the pathogenesis of diseases, pharmacological, clinical, epidemiological and deontological studies, also studies in the fields of improving public health, health services or health insurance.

During evaluation or publication no charge is demanded from authors. The journal is published quarterly. The literary language of the journal is English. Abstract part of the manuscript only should also be submitted in Turkish.

Kapsam

Experimental and Applied Medical Science, Gaziantep İslam Bilim ve Teknoloji Üniversitesi Tıp Fakültesi himayesinde yılda dört kez İngilizce olarak yayınlanan açık erişimli, uluslararası çift kör hakemli bir akademik tıp dergisidir. Dergi, yurt içinden veya yurt dışından, hastalık patogenezleri ile ilişkili deneysel hayvan çalışmaları, klinik, farmakolojik, epidemiyolojik, deontolojik çalışmalar ile beraber halk sağlığının geliştirilmesi amacı taşıyan ve sağlık hizmetleri veya sağlık sigortaları konularında araştırma makaleleri, derlemeler, vaka sunumları, kısa bildirimleri, özet bildirimleri vs. yayınlamak için değerlendirmeye kabul etmektedir. Değerlendirme veya yayın sırasında yazarlardan herhangi bir ücret talep edilmez.

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Experimental and Applied Medical Science strictly adheres to the principles set forth by "Helsinki Declaration" whose web address is below.

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Makaleler, orijinal/özgün olmaları, eş zamanlı olarak başka bir dergi tarafından incelenmemeleri veya daha önce yayınlanmamış olmaları koşuluyla yayına kabul edilir. Telif hakkıyla korunan herhangi bir materyalden alınan doğrudan alıntılar, tablolar veya resimler, kullanımları için telif hakkı sahiplerinden alınan yazılı izinle birlikte sunulmalıdır. Tüm yazılar editörler ve hakemler tarafından incelemeye tabidir. Yayınlanmaya hak kazanılması, materyalin önemine ve özgünlüğüne bağlıdır. Herhangi bir makalenin yayınlanmayı hak ettiği düşünülürse, sunulan veriler değiştirilmeden netlik ve anlayışa yardımcı olmak için editör revizyonlarına tabi tutulabilir.

Experimental and Applied Medical Science, internet adresi aşağıda yer alan "Helsinki Deklarasyonu" ile belirlenen ilkelere sıkı sıkıya bağlıdır.

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Editör Kurulu, "insan" ile yapılan tüm raporlanan veya sunulan çalışmaların bu ilkelere uygun olması gerektiğini beyan eder. İnsan katılımcılarla yürütülen bir çalışma tasarımından elde edilen verileri sunan makaleler, *Gereç ve Yöntemler* bölümünde çalışmanın kurumsal etik inceleme komitesi tarafından onaylandığını ve her katılımcıdan "bilgilendirilmiş onam" alındığını belirten onay ifadeleri kullanmalıdır. Ayrıca laboratuvar hayvanlarının kullanıldığı deneyleri bildiren tüm yazılar, *Gereç ve Yöntemler* bölümünde, internet adresi aşağıda

Methods section validating that all animals have received human care in compliance with the "Guide for the Care and Use of Laboratory Animals" whose web address is below and reveal approval by the institutional ethical review board. https://www.gibtu.edu.tr/Medya/Birim/Dosya/20210818130308_dca61056.pdf

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belirtilmiş olan "Laboratuvar Hayvanlarının Bakımı ve Kullanımı Kılavuzu"na uygun olarak tüm hayvanların insanî bir bakım aldığını doğrulayan bir beyan ile kurumsal etik inceleme kurulunun onayını içermelidir. https://www.gibtu.edu.tr/Medya/Birim/Dosya/20210818130308_dca61056.pdf

Çalışma sürecine katkı sağlayan ticari bir ilişki veya çalışmaya maddi destek sağlayan bir kurum varsa; yazarlar ticari ürün, ilaç, aracılık eden şirket ile ticari bir ilişkilerinin olmadığını veya varsa ne tür bir ilişkisi (danışmanlık veya başka bir anlaşma) olduğunu beyan etmelidir.

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All manuscripts involving a research study must be evaluated in terms of biostatistics and it must be presented altogether with appropriate study design, analysis and results. ***p*** values must be given clearly in the manuscripts. Other than research articles, reviews, case reports, letters to the editor, etc. should also be original and up to date, and the references and, if any, their biostatistical parts should be clear, understandable and satisfactory.

The publication language of the journal is English. In addition, the abstract part of the article must be uploaded in both Turkish and English. Manuscripts should be evaluated by a linguist before being sent to the journal.

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According to the Law on Intellectual and Artistic Works, which was first published in the Official Gazette with the law number 5846 on 13/12/1951, whose web address is below, and on which subsequently various changes have been made or novel parts have been added in time, all kinds of publication rights of the articles accepted

Dergide yayınlanan yazılarda ifade edilenler veya görüşler, Gaziantep İslam Bilim ve Teknoloji Üniversitesi Tıp Fakültesi, editörler, yayın kurulu ve/veya yayıncının görüşlerini değil, yazar(lar)ın görüşlerini yansıtır; editörler, yayın kurulu ve yayıncı bu tür materyaller için herhangi bir sorumluluk veya yükümlülük kabul etmez.

Araştırma çalışması içeren tüm yazılar biyoistatistiksel açıdan değerlendirilmeli ve uygun çalışma düzeni, verilerin analizi ve sonuçları ile birlikte sunulmalıdır. ***p*** değerleri yazılarda açık olarak verilmelidir. Araştırma makaleleri dışında derlemeler, olgu sunumları, editöre mektuplar vb. de orijinal/özgün ve güncel olmalı, kaynaklar ve varsa biyoistatistiksel kısımlar açık, anlaşılır ve tatmin edici olmalıdır.

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Manuscripts should be prepared electronically using an appropriate “office word” compatible text-processing package, formatted for A4 size, double-spaced throughout, and using a “Times New Roman” 12 point font. Articles must be written in English. Abstracts must be written in both Turkish and English. Text should flush left, and not be justified. Words should not be hyphenated. Pages should be numbered sequentially.

There should be a separate title page with:

a) The title

b) The authors' names

c) The laboratory of origin, with complete address of each author

d) A running title

e) Corresponding author and e-mail

f) Conflict of interest

g) Acknowledgements

The main body of full-length paper should be divided into:

1. Abstract

2. Introduction

3. Material and Methods

4. Results

5. Discussion

Yazım Kuralları

Bir çalışmanın dergimize gönderilmesi için bu çalışmanın daha önce yayınlanmamış veya başka bir akademik dergide şu anda yayınlanmak üzere değerlendirilmiyor olması koşulu ile mümkündür. Experimental and Applied Medical Science’a gönderilen her türlü çalışmanın yayınlanmasına ilişkin karar, Yayın Kurulu'nun çalışmanın önemi ve özgünlüğü konusundaki görüşüne dayanacaktır.

Çalışmalar, ya “office word” programı ile ya da bu program ile uyumlu uygun bir metin işleme programı kullanılarak, A4 boyutunda hazırlanmalı, baştan sona çift aralıklı ve “Times New Roman” tarzında 12 punto yazı tipi kullanılarak elektronik ortamda yazılmalıdır. Makaleler İngilizce yazılmalıdır. Özetler hem Türkçe hem de İngilizce olarak yazılmalıdır. Metin iki yana yaslandırılmamalı, sadece sola yaslanmamalıdır. Kelimeler kısa çizgi ile hecelenmemelidir. Sayfalar sırayla numaralandırılmalıdır.

Aşağıdakileri içeren ayrı bir başlık sayfası olmalıdır:

a) Başlık

b) Yazarların isimleri

c) Her yazarın tam adresi ile birlikte çalıştıkları laboratuarlar

d) Kısa başlık

e) İletişimdeki yazar ve iletişim bilgileri

f) Çıkar çatışması beyanı

g) Teşekkür, bilgilendirme

Tam uzunluktaki kağıdın ana gövdesi şu bölümlere ayrılmalıdır:

1. Özet

2. Giriş

6. Conclusion
7. Conflict of interest
8. Acknowledgement
9. References

In general, there are no specific word lengths for any manuscript. The general principle is that a manuscript can be as long as necessary to communicate clearly and most effectively the scientific message, but should be as short as possible to achieve a complete presentation of the information without undue repetition or redundancy.

In the *Materials and Methods* section, the source of all compounds, equipment or software should be identified by the full name of the supplier, city, state/country. The chemical names of any drug should precede the trade name.

Papers describing animal experiments must define species, strain, sex, age, supplier and number of animals used. An ethical statement concerning the use of animals, or the details of ethical approvals, consent and recruitment of human subjects should be clearly stated. *Results* and *Discussion* can be broken down into subsections for improving the comprehensibility. The Results should not repeat methodological details and should avoid the discussion of the data.

The results of statistical tests should be incorporated in the body of the text, typically in the *Results* section, rather than in figure legends. Adequate description of statistical analysis should be provided. Statistical measures of variation in the text, illustrations and tables, should be identified. All dimensions and measurements must be

3. Gereç ve Yöntemler
4. Sonuçlar
5. Tartışma
6. Bağlam
7. Çıkar çatışması
8. Teşekkür, bilgilendirme
9. Kaynaklar

Genel olarak, herhangi çalışma için şart koşulan belirli bir kelime sayısı/metin uzunluğu yoktur. Genel ilke; bir makalenin bilimsel mesajı açık ve etkili bir şekilde iletmek için gerektiği kadar uzun olabileceği, ancak gereksiz tekrar veya fazlalık olmadan bilgilerin eksiksiz bir sunumunu elde etmek için mümkün olduğunca kısa olması gerektiğidir.

Gereçler ve Yöntemler bölümünde, tüm bileşiklerin, malzemelerin veya yazılımların kaynağı, tedarikçinin tam adı, şehir, eyalet/ülke ile tanımlanmalıdır. Herhangi bir ilacın kimyasal isimleri ticari isminden önce gelmelidir.

Hayvan deneylerini açıklayan makaleler, tür, soy, cinsiyet, yaş, tedarikçi ve kullanılan hayvan sayısını açıkça tanımlamalıdır. Hayvanların kullanımına ilişkin bir etik beyan veya insan deneklerin etik kurul onayları, bilgilendirilmiş onamları ve çalışmaya dâhil edilmelerine ilişkin ayrıntılar açıkça belirtilmelidir. *Sonuçlar ve Tartışma* bölümleri, anlaşılırlığı artırmak için alt bölümlere ayrılabilir. Sonuçlar, metodolojik ayrıntıları tekrarlamamalı ve verilerin tartışılmasından kaçınmalıdır.

İstatistiksel testlerin sonuçları, şekillerin altındaki açıklama kısımlarından ziyade metnin gövdesine, tipik olarak Sonuçlar bölümüne dâhil edilmelidir. İstatistiksel analizin yeterli bir şekilde açıklaması sağlanmalıdır. Metinde, resimlerde ve

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Example:

1. Perell KL, Nelson A, Goldman RL, et al. Fall risk assessment measures: an analytic review. The journals of gerontology Series A, Biological sciences and medical sciences. 2001;56(12):M761-6.

2. Ha H, Han C, Kim B. Can Obesity Cause Depression? A Pseudo-panel Analysis. Journal of preventive medicine and public health = Yebang Uihakhoe chi. 2017;50(4):262-7.

3. Çekmen MB, Turgut M, Türköz Y, et al. Nitrik Oksit (NO) ve Nitrik Oksit Sentaz (NOS)'ın Fizyolojik ve Patolojik Özellikleri. Türkiye Klinikleri Journal of Pediatrics. 2001;10(4):226-35.

4. Parlakpınar H, Örüm MH, Acet A. Kafeik asit fenetil ester (KAFE) ve miyokardiyal

tablolarda istatistiksel varyasyon ölçütleri tanımlanmalıdır.

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Tüm alt simgeler, üst simgeler, Yunan harfleri ve olağandışı karakterler açıkça tanımlanmalıdır.

Metinde kısaltmalar tutarlı bir şekilde kullanılmalıdır. Kısaltmalar ilk kullanımda tanımlanmalıdır.

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1. Perell KL, Nelson A, Goldman RL, et al. Fall risk assessment measures: an analytic review. The journals of gerontology Series A, Biological sciences and medical sciences. 2001;56(12):M761-6.

2. Ha H, Han C, Kim B. Can Obesity Cause Depression? A Pseudo-panel Analysis. Journal of preventive medicine and public health = Yebang Uihakhoe chi. 2017;50(4):262-7.

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iskemi reperfüzyon (Mİ/R) hasarı. İnönü Üniversitesi Sağlık Bilimleri Dergisi 2012; 1: 10-5.
5. Yıldırım AB. The effects of maternal hypothyroidism on the immunoreactivity of cytochrome p450 aromatase in the postnatal rat testes. 2015; Doctoral thesis.
6. https://hsgm.saglik.gov.tr/depo/birimler/kanserdb/istatistik/Trkiye_Kanser_statistikleri_2016.pdf (Last access date: 21.09.2020).
7. Kuran O, İstanbul, Filiz Kitabevi. Sistematik Anatomi. 1983 p. 76-9.
8. Abbas AK, Andrew H Lichtman, Shiv Pillai. Cellular and Molecular Immunology. 6th ed. Philadelphia: Saunders Elsevier; 2007 p. 121-56.

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6. https://hsgm.saglik.gov.tr/depo/birimler/kanserdb/istatistik/Trkiye_Kanser_statistikleri_2016.pdf (Last access date: 21.09.2020).
7. Kuran O, İstanbul, Filiz Kitabevi. Sistematik Anatomi. 1983 p. 76-9.
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Bilimsel araştırmalarınızı desteklemek ve geliştirmek için elektronik ek materyaller kabul edilmektedir. Ek dosyalar, yazara, destekleyici uygulamaları, filmleri, animasyon dizilerini, yüksek çözünürlüklü

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Başvuru sırasında çıkar çatışmasının ve mali destek konularının açıklanması elzemdir. Yazarlar, makalelerinin yayımlanma tarihinden önce ortaya çıkabilecek ek çıkar çatışmalarını veya bulunan mali destekleri dergiye bildirmekle yükümlüdür. Tüm yazarlar, makalelerinin konusuyla doğrudan ilgili olsun ya da olmasın, tüm olası çıkar çatışmalarını ve mali desteği bireysel olarak açıklamalıdır.

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serife.kucukhuyuk@gibtu.edu.tr
Ebru Sena Poyraz, Research Assistant.
Gaziantep Islam Science and Technology University, Medical Faculty, Department of Medical Anatomy
ebrusena.calisir@gibtu.edu.tr

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info@gibtu.edu.tr | +90 342 909 75 00 - 20 | www.gibtu.edu.tr

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Research Article

Psychological Impact of the February 6th Earthquake in Turkey: A Study on Post-Traumatic Stress Disorder, Depression, and Anxiety

Gulsen Filazoglu Cokluk[1], Esra Savas[2*]

[1]*Toros University, Faculty of Arts and Sciences, Psychology Department, Mersin, Turkiye.*
[2]*Yeditepe University, Faculty of Arts and Sciences, Psychology Department, Istanbul, Turkiye.*

Abstract

The study aimed to examine the psychological effects of the earthquake. Seven hundred and forty earthquake survivors who experienced the February 6, 2023, earthquake was examined for relationships between post-traumatic stress disorder (PTSD), depression, anxiety, involuntary thoughts, and avoidance behaviors. The study utilized a sociodemographic information form, the Posttraumatic Stress Disorder Checklist (PTSD-5), the Impact of Events Scale (IES), the Beck Anxiety Scale (BAS), and the Beck Depression Inventory (BDI). The data were analyzed using the SPSS 25.0 software, and the presence of extreme data and normality distribution was checked before analysis. Results showed a positive correlation between the level of PTSD and the impact of the events, depression, and anxiety levels among earthquake survivors. While a positive relationship was found between the effects of events and depression, no significant relationship was observed with anxiety levels. A positive relationship was also found between depression and anxiety levels. According to the regression analysis, the impact of events, depression, and anxiety variables positively predicted the level of PTSD, with a total variance of 37%. Our findings highlight the importance of classifying earthquake survivors through psychiatric and psychosocial assessments to improve psychological intervention programs and support for future disasters.

Key Words: *Anxiety, Depression, Earthquake survivors, Mental health, Post-traumatic stress disorder*

* **Corresponding author:** Esra Savas, e-mail: dresrasavas@gmail.com, ORCID ID: 0000-0002-8178-6804

Introduction

Earthquakes and other natural catastrophes significantly influence both the physical landscape and the mental health of survivors. The February 6th, 2023, earthquake in Turkey caused severe damage, displacing thousands of individuals and leaving many with lasting psychological effects. Earthquakes, as multidimensional traumatic experiences, disrupt daily lives, prioritizing basic survival needs such as shelter, food, and safety over emotional and psychological well-being. However, psychological first aid should be as immediate and necessary as physical support in the aftermath of such catastrophic events. Early psychological interventions, like Psychological First Aid (PFA), are critical for mitigating post-traumatic stress and promoting recovery among survivors (1, 2). Studies suggest that providing timely psychological support can significantly reduce anxiety and long-term psychological distress (3, 4).

Previous studies have shown that survivors of natural disasters, particularly earthquakes, are more prone to developing post-traumatic stress disorder (PTSD), depression, and anxiety (5, 6). The intensity of PTSD, depression, and other psychological issues is often correlated with the severity of the disaster, the loss of loved ones, and the individual's demographic characteristics, such as age and gender (7). For instance, studies conducted after the Armenian and Taiwanese earthquakes demonstrated that between 50% and 52% of survivors developed major depression and significant levels of anxiety (8, 9).

Beyond psychiatric disorders, earthquake survivors also face long-term effects such as impaired relationships, diminished quality of life, and decreased academic or professional performance (10). These findings suggest a high comorbidity between PTSD, depression, and life satisfaction in earthquake survivors. Loss of life and property significantly heightens the psychological burden, with studies showing that the death of family members can intensify PTSD symptoms (7).

Studies of the relationship between the type of loss caused by trauma and the development of psychiatric disorders have found that the death of family members can increase the severity of PTSD (7, 9). A study conducted in Iran found that the loss of a family member in an earthquake caused prolonged grief, anxiety, and depression, but not PTSD (11). A study conducted in Turkey found that loss of home and dormitory increased PTSD (12).

Natural disasters are complex stressors that affect both the short-term and long-term

psychological health of affected populations. In the wake of an earthquake, individuals often experience heightened fear, anxiety, and sleep disturbances, which can escalate into more serious mental health conditions without timely intervention. While much research has explored the immediate psychological impacts of earthquakes, there is limited focus on the longitudinal effects, particularly in culturally specific contexts like Turkey. Early psychological support, such as Psychological First Aid (PFA), has been shown to mitigate anxiety and post-traumatic stress symptoms, especially when tailored to the cultural and social context of the affected population (1, 2). Additionally, culturally specific interventions, such as those addressing community and family support systems, have been effective in promoting resilience and recovery (13, 14). A strong sense of community and tailored psychological counseling strategies have further demonstrated their importance in mitigating the long-term psychological effects of earthquakes (15, 16).

Earthquakes can cause short- and long-term damage to a community's psychological health, in addition to physical and financial damage. Understanding the changes in individuals' psychological states during this period plays a critical role in planning early interventions and long-term psychological support and recovery processes. The research will be conducted on individuals from different demographic groups affected by the earthquake, and data will be collected through questionnaires. This research can be used to improve the effectiveness of post-earthquake interventions and support programs, leading to faster and healthier recovery for individuals and communities. It can also make important contributions to the development of disaster management and public health policies.

The present study seeks to investigate the relationships between PTSD, depression, anxiety, and coping mechanisms among survivors of the February 6th, 2023 earthquake in Turkey. We aim to analyze how these psychological conditions manifest in the months following the disaster and how survivors' psychological states evolve over time. This research aims to contribute to disaster management policies and improve mental health interventions for earthquake survivors, ensuring more effective, long-term recovery strategies. The research problems were defined as follows:

Method

The study was approved by one of the University Research Ethics Committee and conducted by the Declaration of Helsinki (edited out for blind review).

A population-based epidemiological study was conducted after the Maraş earthquake. A descriptive correlational survey model was used to evaluate the psychological and traumatic effects of the earthquake in relation to coping strategies. This study was designed as a cross -sectional study. In this study, data were collected from the 9th month after the earthquake

Participants

The research population comprises residents from Antakya, Samandağ, Defne, and İskenderun in Hatay. A total of 740 participants (mean age = 38.22 years, SD = 11.29, 54.6% employed) were recruited for the study from regions most affected by the February 6, 2023, earthquake. Participants were selected based on their proximity to the epicenter and willingness to participate in the study.

Data Collection

Data were collected face-to-face from individuals living in Antakya, Samandağ, Defne, and İskenderun. The study used a researcher-prepared sociodemographic information form, the Posttraumatic Stress Disorder Checklist-5 for DSM-5 (PTSD Checklist-5), the Life Events List-5 (LIST-5), the Impact of Events Scale (IES) to assess traumatic and vital effects of the earthquake, the Beck Anxiety Scale to measure anxiety, and the Beck Depression Inventory to measure depression.

Sociodemographic Information Form: This form was developed for the study. The sociodemographic questionnaire consisted of four sections, it included questions such as age, marital status, spouse's working status, and previous natural disasters. In the second part of the questionnaire, questions were asked about which earthquakes the participants experienced in the provinces where the earthquake occurred, the losses they experienced, the meaning of the word earthquake in the third part, where they were at the time of the earthquake, what they felt, how they behaved, their level of awareness of earthquake risk, and in the fourth part, questions were asked about the participants' emotional, cognitive and behavioral reactions to the earthquake.

Posttraumatic Stress Disorder Checklist for DSM-5 (PTSD Checklist-5) and Life Events List-5 (LIST-5): It was developed by Weathers et al. (17), is a 20-item self-report scale using a 5-point Likert format to assess PTSD symptoms within one month of a traumatic event. The original scale showed strong reliability (Cronbach's alpha =94, test-retest =82), with the Turkish version also demonstrating excellent internal consistency (Cronbach’s alpha =94). In this study, the alpha coefficient was 87.

***The Impact of Events Scale (IES)*:** It was developed by Horowitz et al. (18) and adapted to Turkish by Çorapçıoğlu et al. (19), is a 22-item, 5-point Likert scale assessing the impact of traumatic events, with scores ranging from 0 to 88. Higher scores indicate greater impact. The scale has two subscales: Intrusive Thoughts (e.g., intrusive memories, nightmares) with an internal consistency of .78, and Avoidance (e.g., suppression of memories, emotional numbness) with an internal consistency of .82. The total scale's Cronbach's alpha is .94, and test-retest reliability is .87. In this study, the alpha coefficient for the total IES score was .65.

***Beck Anxiety Scale (BAS)*:** It was developed by Beck (20) and reliability and validity studies in Turkish was conducted by Ulusoy et al. (21). The aim of this scale, which consists of 21 items with 4-point Likert type, is to determine anxiety symptoms and their intensity experienced by adult individuals, in the last week. The minimum score on the scale is 0, and the maximum is 63. Higher scores indicate increased levels of anxiety. The internal consistency coefficient of the Turkish version was .93 and the test-retest reliability coefficient was .57. In the present study, a Cronbach's alpha coefficient value of .88 was calculated for the total score.

***Beck Depression Inventory (BDI)*:** It was developed by Beck et al and reliability and validity studies in Turkish was conducted by Hisli (22). The aim of this scale, which consists of 21 items with 4-point Likert type, is to determine depression symptoms experienced by adult individuals, in the last week. The minimum score is 0 and the maximum score is 63. A higher score on the scale is interpreted as an increase in the level of depression. The Cronbach's alpha coefficient was found to be 0.80. In the present study, a Cronbach's alpha coefficient value of 0.88 was calculated for the total score.review

Statistical Analysis

The data collected in the study were analyzed using Statistical Package for the Social Sciences (SPSS) 25.0 software. Before analysis, the presence of extreme data and the normality assumption were checked. No extreme data were found in the study. To check the normality assumption, skewness and kurtosis values were examined. The skewness and kurtosis values of the research scales and other descriptive statistical information are presented in Table 2. Parametric tests, including Pearson correlation and multiple regression analyses, were conducted as normality assumptions were met. Multicollinearity was assessed using tolerance (>0.10) and VIF (<10) values,

both of which were within acceptable ranges, indicating no multicollinearity issues.

Results

The sample included both male and female participants, with 54.60% employed and 45.40% unemployed. Detailed information about the study group is presented in Table 1.

Table 1: Sociodemographic Information of Participants.

N= 740			
Variables		**F**	**%**
Employment Status	Employee	336	45.40
	Not working	404	54.60
Education Level	Primary School	273	36.90
	Middle School	195	26.40
	High School	147	19.90
	University	127	16.80
Marital Status	Married	655	88.50
	Single	53	7.20
	Widow	32	4.30
Child Status	There is	696	5.90
	No	44	94.10
Place of Residence	City	302	40.80
	District	179	24.20
	Village	259	35.00
Income Status	Very low	50	6.80
	Low	324	44.00
	Middle	339	46.00
	Above average	24	3.30
Mental Illness	Yes	50	6.80
	No.	685	93.20
Physical Injury in an Earthquake	Yes	255	34.60
	No.	483	65.40
Physical Injury to a Relative	Yes	402	54.30
Receiving	No.	338	45.70
That His Life Is In Danger	Yes	702	95.00
Thinking	No.	38	5.00
I'm not going to let someone close to you	Yes	703	95.00
Feeling Endangered	No.	37	5.00
Don't Feel Helpless	Yes	698	94.30
	No.	42	5.70
Living in Great Fear	Yes	708	95.70
	No.	32	4.30
Under a Subsidence	Yes	182	24.50
	No.	558	75.40
Participating in Rescue Operations	Yes	188	25.40
	No.	552	74.60
Relatives or Acquaintances	Yes	478	64.60
Loss of Life from Inside	No.	262	35.40
Loss of Property	Some loss of property	311	42.00
	Quite a loss of property	410	55.40
	Too much property loss	19	2.60
Staying in a Tent after an Earthquake	Yes	740	100.00

Table 2: Descriptive Statistics.

	$\bar{X}$	SS	Min	Max
Posttraumatic Stress Disorder (Total)	26.01	8.56	5.00	47.00
Depression (Total)	51.93	5.93	41.00	76.00
Anxiety (Total)	30.17	10.25	3.00	52.00
Impact of Events (Total)	33.63	6.43	12.00	59.00

According to Table 1, which presents the sociodemographic information of the participants, 404 participants (54.60%) were employed, while 336 participants (45.40%) were not employed. Of the participants, 273 (36.90%) graduated from primary school, 195 (26.40%) from secondary school, 147 (19.90%) from high school and 124 (16.80%) from university. Regarding marital status, 655 (88.50%) of the participants were married, 53 (7.20%) were single and 32 (4.30%) were widowed. While 696 (94.10%) of the participants have children, 44 (5.90%) do not have children. 302 (40.80%) of the participants reside in the city, 179 (24.20%) in the district and 259 (35.00%) in the village. Of the individuals included in the study, 50 (6.80%) reported very low, 324 (43.80%) low, 339 (45.80%) medium and 24 (3.30%) above medium income. While 50 (6.80%) of the participants had a mental illness, 685 (92.60%) did not have a mental illness. While 255 (34.60%) of the participants were physically injured in the earthquake, 483 (65.40%) were not physically injured in the earthquake.

It is seen that 402 (54.30%) of the participants had one of their relatives or acquaintances physically injured in the earthquake, while 338 (45.70%) did not have one of their relatives or acquaintances physically injured in the earthquake. While 702 (94.90%) of the participants think that their lives were in danger in the earthquake, 38 (5.10%) think that their lives were not in danger. 703 (95.00%) of the participants thought that the life of one of their relatives or acquaintances was in danger in the earthquake, while 37 (5.00%) did not think that the life of one of their relatives or acquaintances was in danger. While 698 (94.30%) of the participants stated that they felt helpless during the earthquake, 42 (5.70%) stated that they did not feel helpless. 708 (95.70%) of the participants experienced great fear during the earthquake, while 32 (4.30%) did not experience great fear. 182 (24.60%) of the participants were buried under the earthquake, while 558 (75.40%) were not buried under the earthquake. While 188 (25.40%) of the participants participated in rescue operations, 552 (74.60%) did not participate in rescue operations.

478 (64.60%) of the participants had a relative or acquaintance die in the earthquake, while 262 (35.40%) did not experience any loss of life. While 311 (42.00%) of the participants experienced some property loss, 410 (55.40%) experienced a lot of property loss and 19 (2.60%) experienced a lot of property loss. In addition, all respondents (100%) stayed in tents after the earthquake.

Table 3: Correlation Analysis.

		1	2	3	4
1. Post Traumatic Stress Disorder	r	1			
2. Impact of Events	r	0.59**	1		
3. Depression	r	0.29**	0.24**	1	
4. Anxiety	r	0.09*	0.07	0.14**	1

**p<.001, *p<.05

Table 4: Multiple Regression Analysis.

Predicted Variable	**B**	**R**	**R^2**	**Standard Error$_\beta$**			**F**	**p**
Post Traumatic Stress Disorder	-11.767	0.614	0.377	2.381			148.193	0.000
Predictor Variables	**B**			**Standard Error$_\beta$**	**β**	**t**		**p**
Impact of Events	0.736			0.040	0.553	18.432		0.000
Depression	0.219			0.044	0.152	5.005		0.000
Anxiety	0.055			0.025	0.066	2.242		0.025

A Pearson correlation analysis was performed to determine the relationships between the variables (Table 3). According to Table 3, a positive and significant relationship was found between PTSD and the impact of the events experienced (r=59, p<0.001). There was also a positive and significant relationship between PTSD and depression (r=29, p<0.001). Similarly, a positive and significant relationship was found between PTSD and anxiety (r=09, p<0.05).

According to Table 3, there is a positive and significant relationship between the impact of the events and depression (r=24, p<.001). However, no significant relationship was observed between the impact of events and anxiety levels (p>0.05). A positive and

significant relationship was found between depression and anxiety levels (r=0.14, p<0.001).

To determine the variables predicting the level of posttraumatic stress disorder in the study, multiple regression analysis was performed using the "Enter" method (Table 4). A statistically significant result was obtained after multiple regression analysis to predict the level of posttraumatic stress disorder based on the independent variables (impact of events, depression and anxiety) and it was seen that all of the independent variables explained 37% of the dependent variable (posttraumatic stress disorder) (F(3,736)=148.193, R2=37, p<0.001). Considering the significance of the regression coefficients, the impact of the events (t=18.43, p<.001), depression (t=5.00, p<001) and anxiety (t=2.24, p=025) variables positively and significantly predicted the level of posttraumatic stress disorder. This result indicates that the independent variables have a cumulative effect on the level of posttraumatic stress disorder. According to the standardized beta coefficients, the relative order of the predictor variables is the impact of the events (β=553), depression (β=152) and anxiety (β=06).

Discussion

The study examined the relationships between the effects of the earthquake, depression, anxiety, and PTSD experienced by earthquake survivors after the disaster. According to the results of the study, it was found that participants who experienced involuntary thoughts and avoidance behaviors after the earthquake had more symptoms of post-traumatic stress disorder. Natural disasters such as earthquakes affect people suddenly and severely. During these events, a person's physical safety is threatened and their ability to survive is severely challenged. This sense of uncertainty and danger can trigger involuntary thoughts and avoidance behaviors in individuals, which can be effective in the development of posttraumatic stress disorder (23).

In addition, earthquakes often cause severe physical damage and loss. The loss of loved ones, homes, possessions, or perhaps jobs can lead to cognitive and behavioral impairments. These losses may trigger the onset of PTSD symptoms (24). Indeed, examining the demographic findings, many participants believed that their lives or the lives of their relatives were in danger, felt helpless and anxious after the earthquake, and experienced property loss. In this context, it can be said that the events experienced after the earthquake may trigger involuntary thoughts and avoidance behaviors in individuals, and they may tend to avoid being in the place where the

earthquake occurred and avoid thoughts that the event may be repeated. It can be said that this situation may increase the person's stress level and cause PTSD symptoms to be experienced more intensely (25). Therefore, it seems understandable that there is a positive relationship between the impact of the experienced events and symptoms of posttraumatic stress disorder. Carmassi et al. (2013) conducted a study after the 2009 L'aquila earthquake with 512 participants and found that involuntary thoughts and avoidance behaviors increased as the level of PTSD increased in these individuals (26).

Another finding of the research is that there is a positive relationship between the impact of the events experienced and depression in earthquake survivors. This finding suggests that depressive feelings may increase in individuals due to the impact of the events experienced. Earthquakes are generally traumatic events that cause fear and anxiety. The sudden and unexpected nature of the shaking can severely disrupt people's sense of security. Traumatic experiences such as panic, loss, injury, or homelessness during or after an earthquake can lead to emotional instability. Following these traumatic experiences, depressive feelings may increase as individuals attempt to cope with feelings of helplessness, fear, and hopelessness. In addition, earthquakes often cause large-scale destruction and loss (5). This destruction may cause people to lose their homes, family members, jobs, or important possessions. Such losses can increase people's feelings of grief, sadness, and helplessness. In particular, the pain of lost loved ones can increase the risk of depression and negatively affect people's ability to carry out normal daily activities. All the participants in the study had to leave their homes and live in tents after the earthquake. It was also found that the participants experienced the loss of a loved one after the earthquake and felt helpless. In this context, it is understandable that the participants were more depressed due to the intense negativity they experienced. Jin et al. (2018) examined the relationship between PTSDand depression levels of participants after the 2013 earthquake in Ya'an, Lushan County, and concluded that the participants' involuntary thoughts and avoidance behaviors had a positive relationship with depressive feelings (27).

The study found a positive correlation between the level of PTSD and the anxiety experienced by participants because of the earthquake. This finding suggests that there is a positive correlational relationship between PTSD and anxiety. Earthquakes are moments when the individual loses control and feels unsafe. During these events, the individual's concern for their own safety and the safety of their loved

ones, the severity and unpredictability of the earthquake may undermine people's efforts to ensure their safety, and this may increase their anxiety levels (5). As individuals lose their sense of control after the earthquake, it seems natural that PTSD and anxiety levels would increase. In addition, people often experience concerns about the future after an earthquake. These concerns may include issues such as when the next earthquake will occur, the possibility of a larger earthquake, and the safety of infrastructure and buildings. These uncertainties can cause people to feel anxiety and fear. In addition, earthquakes not only cause physical effects, but also create economic uncertainty. This uncertainty can include factors such as the risk of homelessness, job loss, and economic hardship. Such stressors can increase anxiety levels and lead to long-term emotional difficulties. Many of the participants in the study have very low-, low-, or moderate-income levels. Therefore, the economic uncertainties that the participants experienced or may experience after the earthquake are also among the factors associated with anxiety. In their study, Tang et al. (2018) tested the relationship between PTSD and anxiety levels of the participants after the earthquake that occurred in Ya'an, Lushan District in 2013, found a positive relationship between PTSD and anxiety levels (28).

The study found a positive relationship between levels of PTSD and depression. A traumatic event such as an earthquake affects people emotionally and psychologically. Such events cause severe stress with the fear of feeling threatened and losing control of their lives. With these stressors, PTSD can develop and manifest itself with symptoms such as constant reminders of the event, persistent fear and anxiety caused by the traumatic experience, insomnia, and difficulty concentrating. These symptoms can negatively affect the person's quality of life and functionality and may facilitate the onset of psychopathology such as depression (29). Depression is a mental disorder that is often seen after a traumatic event such as an earthquake. It may be caused by difficulties in coping with the consequences of the traumatic event. Earthquake survivors may face several stressors, such as the losses they have suffered, the pain of losing damaged property or their community, temporary housing problems, and economic hardship. Such stressors can affect a person's overall mood and increase the risk of depression (30). Social factors also play an important role in this relationship. For example, large-scale natural disasters such as earthquakes cause widespread psychosocial stress in the community. In earthquake-affected communities, factors such as limited resources, inadequate relief services, and

weakened social support networks may facilitate the spread of posttraumatic stress and depression (31). It is well known that government aid arrived late to earthquake areas, especially in the first days after the earthquake. This situation is thought to have a negative impact on the mental health of people in the earthquake zone and to facilitate the spread of posttraumatic stress and depression. Gerstner et al. (2020) examined the levels of depression and posttraumatic stress disorder in participants following an earthquake that occurred in the Muisne region of Ecuador in 2016, 316 participants were included in this study, and a positive relationship was found between depression and PTSD levels (32).

Another finding of the study, a positive relationship was found between depression and anxiety levels in earthquake survivors. Natural disasters such as earthquakes disrupt people's daily routines and create uncertainty in their lives. Factors such as loss of home, loss of job, and difficulty meeting basic needs can increase feelings of anxiety and uncertainty about the future. These feelings of uncertainty can fuel anxiety and increase the risk of depression in people struggling with anxiety about the future. Situations such as homelessness and financial loss following an earthquake can cause individuals to become depressed (33).

In addition, natural disasters such as earthquakes can weaken social support networks. Disasters can often lead to chaos in society and make it difficult for individuals to access social support networks. This can increase individuals' feelings of abandonment and helplessness (34). The weakening of social support networks can facilitate the emergence of anxiety and depression symptoms. In the aftermath of the earthquake, individuals may have experienced these feelings of abandonment and helplessness since telephone lines were out of service for long periods of time and individuals were therefore unable to reach their loved ones, or they were unable to contact anyone due to being under the collapse. In this context, it seems understandable that individuals would develop depression and anxiety psychopathologies together after the earthquake. Bavafa et al. (2019) examined the relationship between depression and anxiety levels of participants after an earthquake in the Kermanshah region of Iran in 2017 (34). The study found a positive relationship between depression and anxiety levels of participants (999 in total) after the earthquake.

The study did not find a relationship between the impact of the events and anxiety levels. However, it was observed that many participants experienced great

fear during the earthquake. It is thought that this dissociation occurred because of the nature of the concepts of fear and anxiety. Anxiety is generally associated with uncertainty, worry, and fear of the future. The person tends to think constantly about potential dangers, uncertainties, or stressful situations. Anxiety is usually related to possible future situations, not the current situation. Fear, on the other hand, occurs in the face of an existing danger or threat. Fear is directly related to the present dangerous situation and requires a quick response. During an earthquake, people may feel that they are facing a situation that directly endangers their lives. Therefore, individuals may often experience direct fear rather than anxiety during an earthquake. In addition, emergencies such as earthquakes can trigger a biological response in individuals known as the "fight or flight" response. This response makes people feel that they are in imminent danger and that they need to respond immediately. Therefore, the fear experienced during an earthquake is a natural response to imminent danger. For this reason, it is likely that the participants in this study experienced more fear than anxiety during the earthquake, which is why there was no relationship between the impact of the event and the level of anxiety in this study.

In the study, regression analysis was performed to find the factors that trigger PTSD in earthquake survivors, and it was found that depression, anxiety, and the impact of the events experienced were among the factors that predicted post-traumatic stress disorder. Depression and anxiety were chosen as independent variables in this relationship. This is because anxiety is usually characterized by symptoms such as excessive worry, fear, and intense feelings of dread associated with certain situations or objects. Increased arousal, a common symptom in PTSD, can also be a feature of anxiety disorders. In depression, symptoms such as hopelessness, helplessness, sleep disturbances, and loss of interest can be observed (35). Therefore, in the current study, it was considered that considering these symptoms as an independent variable may help to better understand the relationship between PTSD and depression. In PTSD, unwanted and recurrent thoughts related to the traumatic event are common. These thoughts invade the person's mind and usually consist of elements that recall or trigger the moment of the trauma. These thoughts can cause the person to have difficulty coping with the traumatic experience and experience intense emotional distress (33).

In PTSD, people tend to avoid places, people, or activities that may be associated with their traumatic experiences. This avoidance behavior is used to prevent or reduce the emotional pain and suffering that may be associated with the traumatic event. However, this avoidance behavior can limit the person's normal life and lead to social isolation (36). In addition, a traumatic experience can affect a person's mood and cause symptoms of depression. Posttraumatic depression can cause the person to experience symptoms of hopelessness, helplessness, and malaise. These symptoms can negatively affect the person's functioning and may require treatment (37). PTSD is also often associated with anxiety disorders. The fear, anxiety, and arousal experienced by the person after the trauma can trigger or increase anxiety symptoms. Anxiety symptoms can include a constant feeling of worry, irritability, insomnia, and physiological symptoms (e.g., heart palpitations, sweating) (38). In this context, it is understandable that the impact of the events, avoidance behaviors, depression and anxiety are predictive of posttraumatic stress disorder (29, 39, 40).

Limitations and Strengths

This study has several limitations. Its cross-sectional design only captures data from a specific time point, thus excluding the assessment of long-term psychological effects. The sample was limited to a specific region affected by the earthquake, restricting the generalizability of the results to all survivors. Additionally, the use of self-report scales could introduce biases such as social desirability and recall errors. The study did not fully assess the participants' social support systems and psychosocial resources, limiting the scope of the findings. Finally, the lack of long-term follow-up prevents the examination of the participants' long-term psychological recovery processes after the earthquake.

This study offers several strengths. First, it provides an in-depth analysis of the psychological effects of a significant natural disaster, adding to the limited research on the mental health outcomes following earthquakes, especially in culturally specific contexts like Turkey. The large sample size of 740 participants strengthens the statistical power and the reliability of the findings. Moreover, the use of validated psychological assessment tools (PTSD Checklist-5, Impact of Events Scale, Beck Anxiety Scale, and Beck Depression Inventory) ensures the accurate measurement of PTSD, depression, and anxiety. The study also emphasizes the importance of considering the combined impact of various psychological factors (PTSD, depression, and anxiety),

highlighting the need for holistic mental health interventions for survivors. The findings contribute valuable insights that can be utilized for developing tailored interventions and informing future disaster management policies.

Conclusion

The study reveals that the February 6, 2023, earthquake in Turkey had significant psychological consequences, with survivors experiencing high levels of PTSD, depression, and anxiety. A strong association was found between PTSD, depression, and the severity of traumatic events, indicating that emotional distress escalates with the intensity of experiences. However, the absence of a significant link between anxiety and the impact of events suggests different mechanisms between immediate fear and ongoing anxiety. These findings emphasize the need for comprehensive psychiatric and psychosocial interventions, considering both immediate and long-term support for survivors. Tailored interventions and qualitative research focusing on children and adolescents can further enhance the development of culturally appropriate and effective mental health programs for disaster recovery.

The psychological impact of the February 6, 2023, Türkiye earthquake highlights the urgent need for a robust public health response to address mental health issues such as post-traumatic stress disorder (PTSD), depression, and anxiety among survivors. The study's findings reveal significant relationships between the levels of PTSD, depression, and the perceived impact of events, underscoring the necessity of prioritizing mental health interventions alongside physical recovery efforts (2, 14).

From a public health perspective, immediate and long-term strategies are essential for minimizing the psychological toll of disasters. Screening and identifying vulnerable groups, particularly those with high levels of PTSD and depression, should be an integral part of disaster response plans (1). The establishment of mobile mental health units and the integration of psychological first aid into disaster relief programs can ensure timely access to care. These interventions should be culturally sensitive and include trauma-focused therapies, group counseling, and community-based support systems to address the specific needs of affected populations (3).

Policy implications of these findings are equally critical. Governments and local authorities should institutionalize mental health support in disaster preparedness frameworks. Allocating adequate funding for training mental health professionals in trauma care and scaling up resources for

mental health services can significantly improve outcomes for survivors. Policies must also promote community resilience by strengthening social support networks and fostering awareness of mental health issues (4).

Moreover, the relationship between PTSD, depression, and the perceived impact of events suggests the need for targeted mental health awareness campaigns to destigmatize mental health problems and encourage survivors to seek help. Special attention should be given to high-risk groups such as children, the elderly, and individuals with prior mental health conditions, as they are more vulnerable to the long-term effects of trauma (15).

In conclusion, the findings emphasize the critical role of mental health in disaster recovery. Future policies should integrate psychological well-being into disaster management plans, ensuring that mental health care becomes a fundamental component of public health responses to natural disasters. By addressing the mental health needs of survivors comprehensively, policymakers can enhance individual recovery and strengthen community resilience against future disasters.

The primary limitation of this study is its cross-sectional design. Therefore, it is recommended that future research adopt a longitudinal approach to provide a more comprehensive understanding of the subject matter. A longitudinal study would allow for a deeper exploration of changes over time, enhancing the reliability and validity of the findings.

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Ethics approval: The study was approved by the Research Ethics Committee of Gelişim University Research Ethics Committee (decision number 2023-07-63). Informed consent was obtained from all participants included in the study. This research was conducted in accordance with the Declaration of Helsinki.

Data Availability Statement: The data on which the present results are based are available upon request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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Clinical Research

The Determination of Serum Adropin Level According to Concentration Levels of HbA1c in Patients with Type 2 Diabetes Mellitus

Fatih Albayrak[1]*, Kader Ugur[2], Suleyman Aydin[3]

[1]*Gaziantep University, Faculty of Medicine, Department of Internal Medicine, Division of Rheumatology, Gaziantep, Turkiye.*
[2]*Fırat University, Faculty of Medicine, Department of Internal Medicine, Division of Endocrinology and Metabolism Diseases, Elazig, Turkiye.*
[3]*Fırat University, Faculty of Medicine, Department of Biochemistry, Elazig, Turkiye.*

Abstract

Purpose: *Adropin is discovered in recent years and it has been reported to be associated with glucose and lipid metabolism . Our aim is to determine the relationship between blood serum adropin levels according to blood glycosylated hemoglobin (HbA1c) concentration values between the patient groups diagnosed with Type 2 Diabetes Mellitus and the control group.*
Methods:*A total of 60 Type 2 DM, 20 prediabetes for observation were recruited from Endocrinology clinic of Fırat University Hospital. In addition, 20 healthy subjects were recruited for comparison as the normal control group. A total of 60 DM patients were divided into 3 equal groups according to HbA1c levels as 20 patients with HbA1c levels greater than 9 %, 20 between 7-9 %, 20 less than 7 %. In addition to routine blood tests, adropin levels were measured by ELISA method.*
Results: *Patients with DM had lower serum adropin levels when compared with the controls (4,12±1,23 ng/mlversus 4,84±1,41 ng/ml, p<0.05). Adropin levels of the group with HbA1c > 9% was lower in comparison with control group (3,23±1,14 ng/ml versus 4,84±1,41ng/ml, p < 0.001). In diabetic patients we determined negative correlation between HbA1c and adropin levels (r=-0.377, p < 0.05).*
Conclusion: *In this study, we found that adropin levels were reduced with increasing levels of HbA1c. It appears that chronic hyperglycemia or poor blood sugar regulation lowers adropin levels. In the future, on this subject further studies are needed*

Keywords*: Cervical length, Early membrane rupture, Preterm premature membrane rupture, Prematurity*

***Corresponding author:** Fatih Albayrak**,** E-mail: drfalbayrak@yahoo.com, ORCID ID: 0000-0002-6052-389

Introduction

Nowdays, diabetes mellitus (DM) and non-communicable, chronic diseases that share the same risk factors constitute an important health problem. DM is a carbohydrate metabolism disorder characterized by partial or absolute insulin deficiency or insulin resistance in peripheral tissues, leading to many metabolic disorders in the body and hyperglycemia (1). DM brings serious moral and financial responsibilities for both patients and countries. It has been a task for scientists to better understand the pathogenesis of DM disease and to develop new diagnosis, follow-up and treatment models.

Recently, some factors, especially those released from the liver, have been shown to play an important role in systemic metabolism and energy metabolism in nutrition-related situations (2, 3). Adropin is a peptide hormone first discovered by Kumar et al. in 2008 (4). It is encoded over the gene related to energy balance (ENHO), and it has been shown to be produced by the liver and brain tissue in the first studies (4). It has an approximate molecular weight of 7,927 Kda and consists of 76 amino acids. Adropin is a peptide hormone released primarily to participate in the insulin response and maintenance of energy balance. The release of adropin in the body is regulated by hunger and nutrition. It acts on insulin signaling pathways, including reducing glucose production in the liver, and has effects on insulin resistance (3). Adropin is implicated in the resolution of inflammation at the tissue level, acting as an inhibitor of the pro-inflammatory cytokines TNF-α and IL-6. It has been demonstrated that adropin exerts angioprotective effects by enhancing the production of endothelial nitric oxide synthase (5).

In this study, our aim is to determine the relationship between blood serum adropin levels according to blood glycosylated hemoglobin (HbA1c) concentration values between the patient groups diagnosed with Type 2 Diabetes Mellitus and the control group.

Methods

Ethics Committee Approval: Approval for the study was obtained from the Clinical Studies Ethics Committee of Fırat University, Faculty of Medicine, with the decision dated 02.08.2013 and numbered 0208. The adropin kit used in this study was provided by me; No support was received from any institution or organization for this purpose.

Study design: Patients with a diagnosis of Type 2 DM, aged between 30 and 80, who applied to the Fırat University Hospital

Endocrinology outpatient clinic between May 2013 and October 2013 were included in the study. 20 patients with HbA1c level less than 7, 20 patients with HbA1c level between 7 and 9, 20 patients with HbA1c level higher than 9, 20 prediabetic individuals with impaired fasting glucose (IFG) and/or impaired glucose tolerance (IGT) and twenty healthy control individuals without any disease were recruited. The patients who accepted to participate in the study were informed and a consent document was issued to the patients. Patients with incomplete data were excluded. The demographic characteristics of the patients, laboratory findings were collected from the patient files and electronic records. In the patient groups, the drugs that the patients were taking were determined. The BMIs of all participants [BMI=Weight (kg)/Height (m)^2] were calculated. Individuals with severe heart failure, chronic renal failure, chronic liver disease and acute infectious disease were not included in the study. The name, surname, age, gender, date of diagnosis, medications used, and examination results of the patients included in the study were recorded in the study forms for analysis. Other clinical features and biochemical parameters of the patient groups (complete blood count, FBG, PBG, HbA1c AST, ALT, urea, creatinine, LDL, HDL, TG), are recorded. Since there was no history of diabetes in the control group, TCS measurement requirement was not sought.

Data collection: 5 ml blood samples were taken from the antecubital vein to study adropin levels after 8-10 hours of fasting for once during their routine application from the study groups. Straight biochemistry tube was used for blood samples. After the blood taken into the biochemistry tube was kept for 45 minutes, it was centrifuged at 3500-4000 rpm for 5 minutes and the serum was separated. The separated serums were stored in a deep freezer at -80ºC in the Fırat University Hospital Endocrinology clinic in order to study the Adropin levels in 2 mm eppendorf tubes. After the serums are brought to room temperature and thawed on the working day, serum adropin (Phoenix pharmaceutical Inc. catalog no: EK-032-35, lot no: 604526, Burlingame, CA, U.S.A) levels are adjusted in accordance with the working method with the appropriate ELISA kit, Fırat University Faculty of Medicine, Department of Biochemistry. Worked in the Branch Laboratory.

Statistical analysis

The data obtained in the study were shown as mean±standard deviation. SPSS 17.00 computer package statistics program (SPSS Inc. Software, Chicago, USA) was used to prepare the statistics. The normality of the

distribution of the data was evaluated with the Kolmogorov-Smirnov test. Numerical values in the obtained data were compared with One-Way ANOVA, Mann-Whitney U tests and Kruskal-Wallis test, and non-numerical values were compared with chi-square tests. Pearson correlation analysis was used to determine the relationship between the data. Values with $p<0.05$ were considered significant.

Result

The study groups consisted of 60 patients with diabetes, 20 people with prediabetes and 20 healthy control groups. Patients diagnosed with diabetes were divided into 3 groups according to their HbA1c levels, as HbA1c>9, HbA1c 7-9 and HbA1c<7. Age, gender, body mass index (BMI), fasting blood glucose (FBG), postprandial blood glucose (PBG), HbA1c, LDL, HDL, TG levels, routine laboratory data and statistical comparisons of DM, prediabetes and control groups are given in Table 1.

Table 1: Demographic characteristics and routine laboratory data in study groups.

	Control (n=20)	Prediabetes (n=20)	DM(HbA1c<7) (n=20)	DM(HbA1c7-9) (n=20)	DM(HbA1c>9) (n=20)	*P**
Age (year)	48,2±10,6	51,2±8,0	54,5±9,8	56,6±8,1$^{\times\dagger}$	57,4±8,4$^{\times\times\dagger}$	0,021
Female ratio	55.0	65.0	55.0	50.0	55.0	0,914*
BMI (kg/m²)	25,3±2,2	29,0±3,7$^{\times\times\times}$	29,4±4,4$^{\times\times\times}$	28,4±4,7$^{\times}$	28,7±3,1$^{\times\times\times}$	0,002
FBG(mg/dl)	91,8±5,2	111,1±7,2$^{\times\times}$	119,6±28,7$^{\times\times\times}$	151,4±22,8$^{\times\times\times\dagger\dagger}$	220,1±45,1$^{\times\times\times\dagger\dagger}$	<0,001
PBG(mg/dl)		142,4±16,3	161,5±43,3	181,0±37,1†††	281,2±56,6†††	<0,001
HbA1c (%)	4,9±0,4	5,0±0,6	5,9±0,7$^{\times\times\times\dagger\dagger}$	7,8±0,6$^{\times\times\times\dagger\dagger\dagger}$	10,8±1,6$^{\times\times\times\dagger\dagger\dagger}$	<0,001
LDL(mg/dl)	96,4±16,4	116,3±26,1	118,6±36,6	134,9±27,7$^{\times\times\times}$	135,2±54,5$^{\times\times}$	0,002
HDL(mg/dl)	46,6±4,2	46,6±4,2	45,3±5,8$^{\times}$	47,2±6,9	40,0±7,3$^{\times\times\times\dagger\dagger\dagger}$	<0,001
TG(mg/dl)	154,1±26,	152,4±72,5	171,7±79,3	206,4±109,6	204,6±113,4	0,266

DM: Diabetes Mellitus, BMI: Body Mass Index, FFBG: Fasting blood glucose, PBG: Postprandial blood glucose, HbA1c: Hemoglobin A1c.
* Kruskal-Wallis test is the p value. **Chi-square test is the p value.
When Mann-Whitney U test is applied; Compared with the control group; $\times p<0.05$, $\times\times p<0.01$, $\times\times\times p<0.001$. Compared with the prediabetes group; $\dagger p<0.05$, $\dagger\dagger p<0.01$, $\dagger\dagger\dagger p<0.001$.

The mean age was lower in all groups compared to the control group ($p<0.05$). When compared to the control group, BMI was higher in HbA1c>9, HbA1c 7-9, HbA1c<7 and prediabetes groups (for each, respectively; $p<0.001$, $p< 0.05$, $p<0.001$, $p<0.001$). The mean, standard deviation and statistical analysis results of serum adropin levels of the study groups are shown in Table 2.

Table 2. Adropin level of study groups.

	Control (n=20)	Prediabetes (n=20)	DM(HbA1c<7) (n=20)	DM(HbA1c7-9) (n=20)	DM(HbA1c>9) (n=20)	*p**
Adropin(ng/ml)	4,84±1,41	4,68±0,76	4,67±1,04	4,47±0,99	3,23±1,14$^{\times\times\times\dagger\dagger\dagger}$	<0,001

*Kruskal-Wallis test p value.

When Mann-Whitney U test is applied;

Compared with the control group; × p <0.05, ×× p <0.01, ××× p <0.001.

Compared with the prediabetes group; †p <0.05, ††p <0.01, †††p <0.001

It was observed that the adropine level was the lowest in the group with HbA1c>9 and the highest in the control group.

In the statistical analysis of adropin levels measured in these five groups using the Kruskal-Wallis test, a very strong statistically significant difference was found in terms of adropin levels (p<0.001). In Mann-Whitney U pairwise analyzes performed to determine the source of the statistical difference, a very strong statistically significant difference was found between the group with DM (HbA1c>9) and the control group in terms of serum adropin levels (3.23±1.14, 4.84, respectively). ±1.41 ng/ml) (p<0.001). In addition, when the group with DM (HbA1c>9) and the prediabetes group were compared (3.23±1.14.4.68±0.76 ng/ml, respectively) (p<0.001), and the DM(HbA1c<7) group was compared (respectively, 3.23±1.14, 4.67±1.04 ng/ml) (p<0.001), compared to the group with DM (HbA1c 7-9) (3.23±1.14, 4, respectively) .47±0.99 ng/ml) (p<0.001), there was a very strong statistically significant difference.

Serum adropin levels were measured between the diabetes mellitus group and the prediabetes and control groups. In the statistical analysis of the adropin level measured between the groups using the Kruskal-Wallis test, it was found to be statistically significantly lower in the DM group (p=0.027) (Table 3).

Table 3: Serum adropin level among DM, prediabetes and control groups.

	Control (n=20)	Prediabetes (n=20)	DM (n=60)	*p**
Adropin(ng/ml)	4,84±1,41	4,68±0,76	4,12±1,23	0,027

*Kruskal-Wallis test was applied (p <0.05).

The relationship between the duration of diabetes age and serum adropin level in the group with diabetes mellitus was examined and is shown in Table 4.

Table 4: Serum adropin level according to diabetes age.

	DM age>10 years (n:18)	DM age<10 years (n:42)	*p**
Adropin (ng/mL)	3,48±1,13	4,40±1,17	0,014

Adropin level was found to be lower in the group with diabetes age >10 years and there was a statistically significant difference (p=0.014).

Another result of our study was that there was a negative correlation between adropin level and diabetes age in the DM group (r= -0,261, p <0,05), FBG (r= -0,294, p <0,05), PBG (r=-0,276, p <0,05), HbA1c(r= -0,377, p <0,01,respectively).

Discussion

Serum adropin levels were found to be 4,84±1,41ng/mL in healthy controls, 4,68±0,76 ng/mL in the prediabetes group, 4,12±1,23 ng/mL in the DM group (p=0.027). In the DM group with HbA1c>9, adropin level was found to be significantly lower than in the other groups (p<0.001). In our study, we found that as the Hba1c level increased, the adropin level decreased and we found an inverse correlation between them.

The effects of peptides secreted from peripheral organs on insulin sensitivity, lipid and energy metabolisms have been demonstrated. Adropine deficiency has been shown to be associated with increased adipose tissue and insulin resistance. Apart from its metabolic role, most importantly being the suppression of hepatic glucose production and improvement of insulin sensitivity, adropin seems to be an important gatekeeper of vascular health, and thus, an integral component of cardiometabolic diseases. Specifically, the vasoprotective role of adropin is achieved mainly by affecting endothelial NO synthesis (6).In the animal experiment study conducted by Kumar et al. (4), it was shown that the level of adropin hormone decreased in rats formed obese by diet. In the clinical study conducted by Butler et al. (7), adropin level was found to be low in obese patients and there was a negative correlation between adropin and BMI. In addition, Wu et al. (8) and Çelik et al. (9) in their clinical study, serum adropin levels were found to be low in obese patients, but no statistically significant difference was

found. Contrary to these studies, Lian et al. (10) looked at serum adropin levels in heart failure patients. In their study, they found a positive correlation between adropin and BMI. In this study, adropin level was found to be low in obese patients, but there was no statistically significant difference compared to non-obese patients. Another study found an inverse correlation between serum adropin levels and BMI. It was observed that adropin levels decreased as BMI increased (11). In the group of diabetic patients with HbA1c>9, a negative correlation was found between BMI and adropin, and the result we found is similar to the clinical study of Butler et al.

In this study, the highest serum adropin level was detected in the healthy control group and the lowest in the diabetic patient group with HbA1c>9. In the DM group with HbA1c>9, adropin level was found to be significantly lower than the control and prediabetes groups. Also, when we compared the DM patient group with the control and prediabetes groups in terms of serum adropin levels, the serum adropin level was found to be lower in the DM group and it was statistically very significant. In another study conducted by Celik et al. (12), serum adropin levels of 20 patient groups diagnosed with gestational DM and healthy control women were compared. In this study, the blood serum adropin level in the patient group with gestational DM was found to be statistically significantly lower than the control group. In another study, they found that adropin levels in patients with type 2 diabetes mellitus were significantly lower than in healthy individuals (11).

In contrast to these clinical studies, Aydın et al. (13) found higher serum adropin levels in streptozin-induced diabetic mice compared to non-diabetic mice. Although the authors explained why adropin levels were found to be higher in diabetic mice, it was thought that the difference from the clinical studies was probably due to the stress caused by streptozin. Another possibility is that it may have been elevated as a compensatory mechanism as suggested by the authors.

The results of the studies mentioned above and our study results show that adropin levels are low in diabetes. The lack of significant decrease in prediabetes and well-controlled patients suggests that adropin levels decrease as a result of chronic hyperglycemia.

Additionally, low adropin levels have been shown to correlate with a risk of developing diabetic complications such as diabetic retinopathy (14), diabetic nephropathy (15) and gestational diabetes mellitus (16). In another study, they found higher adropin

levels in patients with GDM than in healthy individuals (17, 18). In our study, we found that serum adropin levels were lower in diabetic patients with hypertension and diabetic neuropathy compared to diabetic patients without complications, but it was not statistically significant. In this study, we found that adropin levels decreased as the HbA1c level increased. After the HbA1c level exceeded 9%, there was a dramatic decrease in adropin level and statistically we found a negative correlation between HbA1c level and adropin level. As the HbA1c level increases, the risk of micro and macrovascular complications in diabetes increases. We suggest that low adropin levels may be a risk factor for complications in diabetes, especially endothelial dysfunction. Adropin may be a follow-up criterion to determine the risk of complications in diabetic patients in the long term. It may be a new marker in addition to HbA1c, which shows blood glucose regulation in diabetic patients.

The limitation of the study is that the number of patients was lower in this study compared to the study by Wu et al. Studies with larger patient series can be performed. There was a statistically significant difference between the BMI values of the selected patients and the BMI values of the control group. This may have affected the results. Since the relationship between serum adropin level and HbA1c level was aimed in the planning of this study, the relationship between diabetic complications and adropin could not be fully demonstrated in this study due to the limited number of diabetic patients with complications, and studies with larger series of patients with diabetic complications can be performed.

Conclusion

Diabetes is a condition that causes many diseases and whose etiology has not been fully elucidated. HbA1c levels are utilized in long-term follow-up. In this study, we found that adropin levels decreased as HbA1c levels increased. It is understood that chronic hyperglycemia or poor regulation decreases adropin levels. This suggests that there may be a relationship between adropin levels and complications of DM. Further and larger studies on this subject are needed.

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K.U,S.A Data acquisition: F.AF Analysis and interpretation: F.A,S.A Writing manuscript: F.A Critical revision of manuscript: F.A,S.A

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Research Article

The Effect of Compassion Fatigue on Medical Error Tendency in Nurses Working in Intensive Care Units

Ilyas Celik[1], Meryem Kilic[2*]

[1]*Bingol State Hospital, Bingol, Turkiye.*
[2]*Gaziantep Islam Science and Technology University, Department of Nursing, Faculty of Health Sciences, Gaziantep,Turkiye.*

Abstract

***Purpose**: This study was planned as a descriptive study to determine the effect of compassion fatigue on medical error tendency in nurses working in intensive care units.*
***Methods**: The study was conducted between October 2022 and January 2023 in the intensive care units of Bingol State Hospital and Bingol Maternity and Children's Hospital. The study was conducted with 78 nurses. Data were collected through the Personal Information Form, the Compassion Fatigue Short Scale, and the Medical Error Tendency Scale. Data analysis was performed using one-way analysis of variance (ANOVA), Mann Whitney U, Kruskal Wallis, Pearson correlation, and linear regression tests.*
***Results**: The average age of participating nurses was 32.43 (±5.61) years, 56.4% (44) were female, 61.5% (48) had a bachelor's degree, and 55.1% (43) had worked in intensive care units for 0-5 years. The participants were found to have a moderate level of compassion fatigue (55.96±14.27; min:13-max:130) and a low level of medical error tendency (4.37±.339). Compassion fatigue was found to be significantly higher in nurses who were married and had children. The medical error tendency score was significantly higher in female nurses (p<.05). Although compassion fatigue was found to explain the medical error tendency by 12%, the result was not significant (p=.294).*
***Conclusion**: The results of the study showed that compassion fatigue did not affect medical error tendency. It is recommended to increase evidence-based scientific studies to reduce compassion fatigue and medical errors and to develop and implement training programs that empower nurses and enhance their resilience.*

***Key words**: Compassion fatigue, Intensive care, Medical error, Nursing,*

*** Corresponding author:** Meryem Kilic, E-mail: meryem.kilic@gibtu.edu.tr , ORCID ID: 0000-0003-4807-5346

Introduction

Nursing is a complex profession that includes science and art and requires some special knowledge and skills. Therefore, nursing should be performed in an approach that prioritizes the sense of compassion as well as current knowledge (1). Strauss et al. (2016) defined compassion as "*The feeling that arises in witnessing another's suffering and that motivates a subsequent desire to help*" (2). Providing a sense of compassion in patient care could increase patients' satisfaction, reinforce a sense of trust in nurses among patients and their relatives, and help patients recover (1, 3). The feeling of compassion could have positive consequences such as happiness and the development of social relations, yet it may also create negative emotions such as anxiety, anger, and fear (4).

Nurses work in a complex environment and are exposed to a variety of work-related problems. On the other hand, providing care to patients can be physically, emotionally, and spiritually exhausting for them while they witness patients' pain and trauma in their work every day (5). For a person experiencing compassion, this condition may turn into chronic fatigue over time (3).

The literature has documented higher levels of compassion fatigue among nurses working in intensive care units compared to nurses working in different clinics (6, 7). A meta-analysis on nurses' compassion fatigue levels showed that nurses working in intensive care units had the highest level of compassion fatigue (6). Another systematic review on compassion fatigue among healthcare professionals in intensive care units reported the prevalence of compassion fatigue ranging from 7.3% to 40% (7). Hence, there is ample evidence indicating that nurses are more at risk.

Compassion fatigue affects nurses both physiologically and psychologically. Compassion fatigue may lead to decreased empathy, decision-making ability, care skills, and care quality; disruption of patient care; and increased work errors, which affects patient safety negatively (3, 8, 9). Psychological parameters are known to affect medical error tendency. The primary goal in providing healthcare services is commonly reported not to harm the patient but rather to provide benefit. However, the high mortality rates caused by unsafe health services indicate the importance of patient safety (10).

It should not be forgotten that compassion fatigue and patient safety are elements that will affect each other. Nurses experiencing compassion fatigue affect patient safety and increase their tendency to make medical errors (11, 12). The literature includes almost no studies that evaluated the effect

of compassion fatigue on medical error tendency in intensive care units. Only two studies in Turkey were found to have investigated the effect of compassion fatigue on medical error tendency in intensive care units (13, 14). Sabancioğulları et al. (2021) also stated that medical errors occur with a decrease in the level of compassion. Therefore, this study aimed to examine the effect of compassion fatigue on medical error tendency in nurses working in intensive care units.

What is the level of compassion of nurses and their tendency to make medical errors?

Does the level of compassion of nurses affect the tendency to make medical errors?

Methods

Study design

This study used a descriptive and cross-sectional design.

Setting and time of the study

The study was conducted in the intensive care units of two state hospitals in Bingol province, which is located in eastern Turkey. Data were collected between October 2022 and January 2023. The study was conducted in a total of six intensive care units, which included five adult and one neonatal intensive care as primary, secondary, and tertiary intensive care units.

Target population and sample of the study

The target population of the study consisted of 97 nurses who worked in the intensive care units of two state hospitals. The purpose was to reach the entire population, but the study was completed with 78 nurses because 13 nurses did not want to participate in the study and 6 nurses were relocated. The study reached 80.4% of the population. Post hoc power analysis was performed after the study was conducted. Considering the correlation coefficient between the Compassion Fatigue Scale score and the Medical Error Tendency Scale score, the power was found to be 88.6% when alpha=0.05, and the sample size was calculated as 78. Inclusion criteria of the study were working in intensive care units, agreeing to participate in the study, and being aged 18 years or older. Exclusion criteria were not agreeing to participate in the study and working in different clinics other than intensive care units.

Data collection

Data were collected through the “Personal Information Form”, the ‘Compassion Fatigue Short Scale’, and the 'Medical Error Tendency Scale’ forms. The data collection forms were administered to the nurses. The completed forms were collected by the researcher at different times. The data

collection forms were administered to four nurses for piloting to evaluate the comprehensibility of the questions; no changes were made in the questions. 4 nurses who participated in the pilot test were included in the sample group. Filling in the data collection forms took about 15 minutes.

Personal information form

The Personal Information Form, which was developed in line with the literature, included a total of 19 questions, which were composed of 12 questions about the participating nurses' socio-demographic and professional characteristics (age, gender, years of experience in the profession, type of working, education level, marital status); three questions about compassion fatigue (whether they experienced compassion fatigue, problems that may cause compassion fatigue and whether it is related to medical errors); and four questions about medical errors (frequency of medical errors, types of medical errors, things encountered after medical errors occur and problems that may cause medical errors) (16, 17).

Compassion fatigue scale

The Compassion Fatigue Short Scale (CFS) was developed by Adams et al. (2006). Turkish validity and reliability of the scale were conducted by Dinç and Ekici (2019) to measure compassion fatigue (18). The items are responded on a 10-point Likert scale and include two sub-scales (trauma and work burnout). The scale is a self-report assessment tool that asks participants to indicate the extent to which each item reflects their experiences. No scoring algorithm and cut-off point were specified for the scale. The scale consists of 13 questions and the scores to be obtained range between 13 and 130. The items are responded between very often (10) and rarely/never (1), with a maximum score of 130 and a minimum score of 13. While lower mean scores indicate a lower level of compassion fatigue, higher scores indicate a higher level of compassion fatigue experienced by individuals. Cronbach's α coefficient of the CFS was found 0.876. In this study, Cronbach's α coefficient was calculated as 0.75.

Medical error tendency scale

The validity and reliability of the Medical Error Tendency Scale were performed by Ozata and Altunkan (2010) to determine nurses' medical error tendency. The scale consists of five sub-scales and 49 items, which include 18 items related to medication and transfusion practices, 12 items related to nosocomial infections, nine items related to patient monitoring and material safety, five items related to falls, and 5 items related to communication. The

scale is responded on a 5-point Likert scale using options as (1. Never; 2. Very rarely; 3. Sometimes; 4. Usually and 5. Always). The scale has no cut-off point. While higher mean scores indicate lower medical error tendency lower mean scores indicate higher medical error tendency. Cronbach's α reliability coefficient was found 0.95 (19). In this study, Cronbach's α coefficient was found 0.94.

Statistical analysis

This study used numbers, percentages, means, standard deviations, and minimum-maximum values for descriptive statistics. The normality distribution of the data was analyzed using the Shapiro-Wilk test. As for differences, the Independent Sample T-test and Mann-Whitney U Test were used to see the differences between categorical variables consisting of two groups and continuous variables. Differences between categorical variables with more than two categories and continuous variables were determined using the one-way ANOVA Test and Kruskal Wallis Test. Statistically significant differences were detected using Post Hoc tests to see the source of the differences. Pearson correlation tests and linear regression tests were performed to analyze the relationship between the scales. SPSS Windows version 23.0 package program was used for statistical analysis, and $p<0.05$ was considered statistically significant.

Limitations and generalizability of the study

Since this study was conducted only with nurses working in the intensive care units of hospitals in Bingol province, the results can only be generalized to nurses working in intensive care units in Bingol.

Ethical considerations

The study followed the principles of the Declaration of Helsinki. Ethics committee approval was obtained from Bingol University Ethics Committee on 07.09.2022 (no: 2022/16 - decision 9). Institutional permission was obtained from Bingol Provincial Directorate of Health on 20.09.2022. Necessary permissions for the scales used in the study and written consent from all participating nurses were obtained.

Results

The average age of the participants was 32.43±5.61 years; 56.4% were female; 53.8% (42) were married, 50% had at least one child; 67.9% had income equal to expenses; 61.5% had a bachelor's degree; 43.6% had been performing their profession for 6 to 10 years; 55.1% had been working in intensive care for 0-5 years, and 59% worked in night shift.

While the Compassion Fatigue Scale total mean score (55.96±14.27) and work burnout (36.07±9.17) sub-scale mean scores were found to be at a moderate level, secondary trauma (19.88±6.81) sub-scale mean score was found to be below the average (Table 1).

Table 1. Scales mean scores.

Scales and Sub-scales	X̄±SD	Min	Max	Scale min -max scores
Compassion fatigue scale total score	55.96±14.27	24	94	13-130
Secondary trauma	19.88±6.81	8	38	5-50
Work burnout	36.07±9.17	16	57	8-80
Medical error tendency scale total score	4.37±0.33	3.57	4.98	1-5
Medication and transfusion practices	4.47±0.33	3.17	5	1-5
Nosocomial infections	4.43±0.39	3.50	5	1-5
Patient monitoring and material safety	4.03±0.49	2.89	5	1-5
Falls	4.44±0.36	3.80	5	1-5
Communication	4.36±0.55	3	5	1-5

X:Mean; SD:Standard deviation, min:minumum, max: maximum

The Total Medical Error Tendency Scale (4.37±.339) mean scores as well as medication and transfusion practices (4.47±0.33), nosocomial infections (4.43±0.39), patient monitoring and material safety (4.03±0.49), falls (4.44±0.36) and communication (4.36±0.55) sub-scale scores were found to be high. This result indicates that the participants had low medical error tendency (Table 1).

Levels of compassion fatigue were higher in married nurses (X̄=60.59±14.28) compared to single nurses (X̄=50.55±12.38) and in nurses who had children (X̄=37.38±10.09) compared to those who did not have children (X̄=34.76±8.06), and the difference between the scores was statistically significant (p=0.002, d=0.751; p=0.015, d=0.286). The level of compassion fatigue indicated no significant differences with gender, education level, years of experience, type of working, working hours, choosing the profession willingly and preference of working place (p>0.05, Table 2).

Table 2. Comparison of descriptive characteristics of nurses with scale scores.

Variables		n(%)	Compassion fatigue scale total score			Medical error tendency scale total score		
			X̄±SD	Cohen d/eta^2	Test(p)	X̄±SD	Test(p)	Cohen d/eta^2
Gender	Male	34 (43.6)	57.14± 12.64	d=0.148	0.642 (0.523)	4.24± 0.28	3.14 **(0.002)**	d=0.738
	Female	44 (56.4)	55.04± 15.49			4.47± 0.34		
Marital status	Married	42 (53.8)	60.59± 14.28	d=0.751	3.28 **(0.002)**	4.40± 0.32	0.518 (0.382)	d=0.208
	Single	36 (46.2)	50.55± 12.38			4.33± 0.35		
Having children	Yes	39 (50.0)	37.38± 10.09	d=0.286	2.50 **(0.015)**	4.40± 0.31	0.760 (0.450)	d=0.178
	No	39 (50.0)	34.76± 8.06			4.34± 0.36		
Education level	High school (a)	10 (12.8)	51.90± 9.73	η^2=0.056	4.87 (0.181)	4.11± 0.30	8.98 **(0.030) b>a,c,d**	η^2=0.142
	Associate degree (b)	16 (20.5)	56.62± 15.32			4.48± 0.34		
	Undergraduate degree (c)	48 (61.5)	55.47± 14.74			4.40± 0.31		
	Postgraduate degree (d)	4 (5.1)	69.25± 8.38			4.03± 0.33		
Years of experience	0-5 years	14 (17.9)	48.14± 9.24	η^2=0.090	3.25 (0.071)	4.37± 0.34	0.039 (0.843)	η^2=0.009
	6-10 years	34 (43.6)	55.38± 14.93			4.33± 0.38		
	11 years and above	30 (38.5)	60.26± 14.13			4.40± 0.28		
Years of experience in the intensive care unit	0-5 years	43 (55.1)	55.62± 14.34	η^2=0.186	0.797 (0.671)	4.34± 0.36	0.393 (0.822)	η^2=0.117
	6-10 years	25 (32.1)	56.04± 14.50			4.40± 0.32		
	11 years and above	10 (12.8)	57.20± 17.83			4.39± 0.27		
Type of working	Day shift	10 (12.8)	61.80± 18.68	η^2=0.025	1.55 (0.460)	4.48± 0.36	4.62 (0.099)	η^2=0.061
	Night shift	46 (59)	55.21± 11.05			4.30± 0.35		
	Night and day shift	22 (29.2)	54.86± 17.80			4.46± 0.27		
Working hours	40-47 hours	28 (35.9)	55.32± 15.90	η^2=0.087	2.64 (0.266)	4.41± 0.36	0.657 (0.720)	η^2=0.089
	48-55 hours	41 (52.6)	57.60± 12.07			4.32± 0.33		
	56 hours and over	9 (11.5)	50.44± 18.15			4.42± 0.29		

Table 2. Comparison of descriptive characteristics of nurses with scale scores (continued).

Choosing the profession willingly	Yes	60 (76.9)	55.20± 13.68	d=0.219	490 (0.553)	4.35± 0.32	0.384 (0.933)	d=0.227
	No	18(23.1)	58.50± 16.25			4.43± 0.38		
Preference of working place	My own preference	66(84.6)	56.62± 13.44	d=0.265	326 (0.336)	4.36± 0.34	0.384 (0.933)	d=0.029
	Out of my own preference	12(15.4)	52.33± 18.48			4.37± 0.34		

p<0.05, t test, Kruskal Wallis test, Mann Whitney U test, X:Mean; SD:Standard deviation; n:number of patients; %:percentage, a,b,c,d: Post Hoc tests

Medical Error Tendency Scale score was statistically significantly higher in female nurses ($\bar{X}$=4.47±0.34) compared to male nurses ($\bar{X}$=4.24±0.28) and in nurses with an associate degree ($\bar{X}$=4.48±0.34) compared to nurses with undergraduate and graduate degrees ($\bar{X}$=4.40±0.31, $\bar{X}$=4.03±0.33) (p=.0002, d=0.738; p=0.030, η^2=0.142) (Table 2). Medical error tendency was found to have no statistically significant differences between marital status, having children, years of experience, type of working, working hours, choosing the profession willingly, and preference of working place (p>0.05, Table 2).

Table 3 shows that the Compassion Fatigue Scale and the Compassion Fatigue sub-scales had a negative and statistically nonsignificant relationship with the Medical Error Tendency Scale and Medical Error Tendency Scale sub-scales (r <0.3; p> 0.05 in all parameters; Table 3).

Table 3. Correlation between the compassion fatigue and the medical error tendency.

	Medical error tendency scale					
Compassion fatigue scale	**Medical Error Tendency Scale total**	**Medication and transfusion practices**	**Nosocomial infections**	**Patient monitoring and material safety**	**Falls**	**Communi-cation**
	r(p)	r(p)	r(p)	r(p)	r(p)	r(p)
Compassion Fatigue Scale total score	-.121(.294)	-.072(.533)	-.139(.229)	-.073(.527)	-.124(.281)	-.130(.255)
Secondary trauma	-.006(.961)	-.045(.693)	-.012(.916)	.079(.493)	-.066(.564)	.004(.973)
Work burnout	-.184(.109)	-.078(.499)	-.207(.071)	-.172(.133)	-.143(.211)	-.206(.071)

Spearman Test, r: correlation coefficient, p<0.05

The findings showed that compassion fatigue explained medical error tendency at a proportion of 12%, which was not statistically significant (p= 0.294; Table 4).

Table 4. Linear regression analysis.

	Medical error tendency scale		
	R	R^2	p
Compassion fatigue scale	0.12	0.015	0.294

Linear regression analysis, R: Korelasyon katsayısı, R^2 : Korelasyon açıklama oranı, $p<0.05$

Discussion

The concepts of nursing and care and compassion cannot be separated from each other (20). Compassion has an important place in the care relationship between the nurse and the patient and in the success of the treatment (21) In this study, it was investigated whether compassion fatigue of intensive care nurses has an effect on the tendency to medical errors.

In the present study, it was determined that the mean scores of compassion fatigue among nurses were at a moderate level (Table 1). A meta-analysis study showed that nurses working in intensive care units had the highest level of compassion fatigue (6). Another systematic review on compassion fatigue among healthcare workers in intensive care units reported that the prevalence of compassion fatigue ranged between 7.3% and 40% (7). In a study conducted with intensive care nurses, compassion fatigue of nurses was found to be at a moderate level as in this study (22). In a systematic review on compassion fatigue in nursing students, it was determined that students' compassion fatigue was at a moderate level (23). Intensive care units are places where nurses may experience high levels of compassion fatigue due to workload, fatigue, extreme stress and witnessing the constant pain of patients (7). Compassion fatigue can not only induce a variety of physical and mental diseases, but also lead to a decline in the level of work engagement, resulting in loss of work enthusiasm, low-level work efficiency and even medical disputes and medical negligence (24). It may be possible to obtain different results in terms of compassion fatigue between studies conducted with different sample groups under different working conditions.

Compassion fatigue is affected by many factors related to demographic characteristics and working conditions of individuals (16, 25). In the present study, no difference was determined between the total compassion fatigue scale score and factors

such as gender, socioeconomic status, educational level, years of working in the intensive care unit, working style, working hours, and voluntary choice of profession (Table 2). A meta-analysis including 21 studies determined that gender, age and working hours did not affect compassion fatigue (26), which is similar to this study. As in the study conducted by Wijdenes et al. (27) with trauma nurses, it was determined that compassion fatigue increased as the years of working increased, but the result was not significant (Table 2). A systematic review study obtained contradictory results indicating that being female increased/decreased compassion fatigue (7). Unlike this study, nurses who chose the profession willingly were determined to have lower compassion fatigue (3, 28). Practicing the profession willingly is a condition that is considered to give morale and motivation to individuals. This study found that compassion fatigue was higher in nurses who did not choose the profession willingly, but the result was not statistically significant. This finding may be related to the small sample size. Compassion fatigue total mean scores in the study were determined to be statistically significantly higher in married nurses compared to single nurses and in nurses who had children compared to those who did not have children (Table 2). Similar to this study, a study conducted with 1521 nurses by Ruiz-Fernández et al. (2020) determined that compassion fatigue was higher in married individuals (5). Unlike this study, Sacco et al. (2015) determined that compassion fatigue was higher in single nurses (29). Hinderer et al. (2014) reported no differences between compassion fatigue and marital status (30). This finding can be explained by the fact that the majority of the nurses participating in the study were married and half of them had children. Compassion fatigue is considered to increase with the presence of a person/people who are obliged to take care of the outside of work life in nurses or other professional groups. For this reason, it is recommended to investigate the effect of nurses' roles in their social life other than nursing.

Medical errors encountered in the provision of healthcare services cause patient harm, prolonged hospitalization periods, and negative issues in the healthcare system. For this reason, preventing medical errors is crucial (31). Due to the characteristics of the patient group and strenuous working conditions, especially intensive care units are places where medical errors are frequently encountered (32). This study found that women had a low level of medical error tendency (Table 2). The literature includes studies with similar results (33, 34). Some studies reported no

differences between gender and medical error tendency (35, 36). This finding could be associated with the high number of female nurses participating in the study because male and female nurses go through the same education process. Therefore, gender is considered to indicate no differences. Of the nurses participating in this study, 61.5% had undergraduate degree. It was determined that the tendency for medical errors in nurses with an associate's degree was statistically significantly higher compared to nurses with bachelor's and master's degrees (Table 2). It is similar to the results obtained by Büyük et al. (2021) (37). Dikmen et al. (2014) reported that the level of education did not affect the tendency for medical errors (38). Unlike these studies, Tuncay and Kilic (2023) found that the tendency for medical errors in nurses with an associate's degree was statistically significantly lower compared to nurses with bachelor's and master's degrees (39). As a result, undergraduate nurses seem to have higher levels of medical error tendency. The reason for this high medical error tendency among nurses who had an undergraduate degree should be investigated. In addition, in recent years many nursing schools with no educational infrastructure have been opened in our country, and these schools have a large number of graduates. Besides, many new graduates are being appointed to numerous newly opened hospitals in our country. The effect of the current situation on the medical error tendency is considered to be another issue that needs to be investigated because many things related to institutional and educational infrastructure and management processes can affect medical error tendency.

Limitation

Furthermore, only the subjective opinions and perceptions of the nurses about their tendency to medical errors were evaluated. No observation of the nurses in the clinical setting was performed to objectively assess whether medical errors were made. Compassion fatigue was also evaluated only quantitatively and not qualitatively.

Conclusion and Recommendations

This study found a moderate level of compassion fatigue and a low level of medical error tendency; there was no relationship between compassion fatigue and medical error tendency; and there was a statistically significant difference between compassion fatigue and marital status, having children, years of experience, and between medical error tendency and gender, socio-economic status, and education level. In line with these results, it is recommended; to increase evidence-based

scientific studies, to provide nurses with alternative complementary methods such as empathy trainings, communication trainings, psychologist consultations, or yoga, to design resilience training programs as well as treatments to reduce nurses' compassion fatigue, and nurses should be supported with deep breathing exercises, emotional care, positive thinking, the development of social support systems, and artistic activities, to reduce compassion fatigue, a work environment should be established where nurses can freely express their emotions and thoughts, Rest areas should be created for nurses working in closed units, and their spiritual needs should be taken into consideration.

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Clinical Research

Comparison of Supraclavicular or Infraclavicular or Axillary Blocks Accompanied by Ultrasonography and Nerve Stimulator for Upper Extremity Surgery

Asuman Ocaklar[1*], Riza Hakan Erbay[1]

[1]*Pamukkale University, Faculty of Medicine, Anesthesiology and Reanimation Department, Denizli, Turkiye.*

Abstract

Objective: *Supraclavicular (SC), infraclavicular (IC) and axillary (Ax) brachial plexus blocks can be applied for upper extremity surgeries. In this study, we aimed to compare the infraclavicular or supraclavicular or axillary block types using a combination of fentanyl and 0.5% bupivacaine, accompanied by USG and nerve stimulator.*

Materials and methods: *In this prospective randomized study, after obtaining the approval of the Local Institutional Ethics Committee, 91 patients aged between 18-65 years with ASA I-II physical status who underwent upper extremity surgery by the departments of Orthopedics and Traumatology and Plastic and Reconstructive Surgery were included in the study. Patients were allocated into three groups: Group SC (n=31), Group IC (n=30), Group Ax (n=30). Two patients who underwent unsuccessful block in Group Ax were excluded from the study. The patients were evaluated preoperatively and verbal and written consents were obtained by giving information about the anesthesia method to be applied. Demographic data of the patients, ASA scores, onset times of motor and sensory blockades, postoperative block resolution times, complications during or after the procedure, patient and surgical satisfaction data were recorded.*

Results: *The performance time in Group SC was found to have a shorter compared to the other two groups. Although motor and sensory block onset times were slightly longer in Group Ax, there is no statistical differences between the all three groups at the end of 30 minutes. It was observed that postoperative sensory and motor functions returned faster in Group Ax than in the other two groups.*

Conclusion: *All the three brachial plexus block techniques could be used in cases requiring upper extremity surgery. It was thought that the application of the appropriate type of block for the patient, accompanied by ultrasound and nerve stimulator, with an experienced practitioner will increase the success of the block and decrease the complication rate.*

Key Words: *Axillary block, Infraclavicular block, Supraclavicular block, Ultrasonography (USG)*

*** Corresponding author:** Asuman Ocaklar, e-mail: Asuman-kcygt@hotmail.com, ORCID ID: 0009-0003-2456-1398

Introduction

Currently, regional anesthesia and analgesia techniques are considered to be more reliable and preferable than general anesthesia due to their many advantages (1, 2). Among the factors considered to be the advantages of regional anesthesia over general anesthesia are the following: preservation of airway reflexes and no need for tracheal intubation, low consumption of analgesics and antiemetics, stable hemodynamics, no additional time required for awakening and extubation, shorter length of stay in postanesthesia care unit (PACU) and hospital, adequate intraoperative muscle relaxation, adequate intraoperative and postoperative analgesia, increased blood flow in the extremity with sympathetic blockade, and positive contribution to postoperative wound healing (3, 4).

The development of ultrasonography (USG) and the increasing use of peripheral nerve blocks have made safer, faster and more comfortable block application possible (5). Direct visualization of the spread of local anesthetic around the nerve with USG increases the success of the block and shortens the duration of the block application. One of the most important advantages of USG in regional block application is that it reduces the dose of local anesthetic, the risk of local anesthetic toxicity and complications (6).

In this study, we aimed to compare the infraclavicular or supraclavicular or axillary block types using a combination of fentanyl and 0.5% bupivacaine, accompanied by USG and nerve stimulator.

Material and Methods

In this study, 91 patients aged between 18-65 years and with ASA I-II physical status who applied to Departments of Pamukkale University Medical Faculty Hospital Orthopedics and Traumatology and Plastic &Reconstructive Surgery for upper extremity surgery were included. Ethical approval for the study was obtained with the decision of Pamukkale University Non-Interventional Clinical Research Ethics Committee dated 30.01.2018 and numbered 03.

The patients were preoperatively evaluated, and verbal and written consents were obtained by giving information about the anesthesia method to be applied. Demographic data and ASA scores of the patients were recorded. Those who refuse the regional block, cannot cooperate, have coagulopathy, have known allergy to any of the drugs used, have infection at the injection site or have anatomical disorders, neuropathy in the arm to be blocked, pregnant and severe chronic obstructive

pulmonary disease (COPD), morbidly obese (BMI>40) patients were excluded from the study.

Ninety one patients were included in the study, randomization was done by the closed envelope method. Cases that were planned to be operated on the hand, wrist, forearm and elbow and with brachial plexus block were included in the study. The patients were divided into three groups. The first group was defined as infraclavicular group (Group IC), the second group as supraclavicular group (Group SC), and the third group as axillary group (Group Ax).

The patients were taken to the operation room and ECG monitoring was performed, peripheral oxygen saturation (SpO_2) was monitored, and blood pressure (BP) follow-ups with 5-minute intervals were taken. All patients were premedicated with 1-2 mg midazolam and 25µg fentanyl. 0.5% bupivacaine 20 mL + 50 µg (1 mL) fentanyl was administered to all patients for the block procedure. All blocks were performed with ultrasonography (GE Logiq-e, USA, 5-13 MHz linear probe) and nerve stimulator (Braun, Stimuplex Dig RC, Germany). In all blocks, stimulation at 1 mA was obtained with a nerve stimulator, and when the stimulation disappeared at 0.5 mA, local anesthetic was administered. Demographic data, ASA scores, motor and sensory block onset times, intraoperative data, block resolution time, early complications, and patient and surgical satisfaction were recorded for all patients.

Data were analyzed with the SPSS 24 (SPSS Inc, Chicago, IL, USA) package program. Demographic data and continuous variables were expressed as mean ±standard deviation, and categorical variables were expressed as numbers and percentages. The conformity of the examined variables to the normal distribution was examined with the Shapiro-Wilk test. ANOVA and Kruskal Wallis analysis of variance were used in independent groups. In dependent groups, analysis of variance and Friedman test were used for repeated measurements. Differences between categorical variables were analyzed by Chi-square analysis. $p<0.05$ was considered statistically significant in all analyses.

Results

The study was started with 91 patients, and these 2 patients were excluded because 2 patients had unsuccessful block after the block procedure and they were returned to general anesthesia. All patients were given 2L/min oxygen by nasal cannula. ECG monitoring was performed, heart rate (HR), peripheral oxygen saturation (SpO_2) were monitored, and blood pressure (BP) follow-ups were taken at 5-minute intervals. All patients were premedicated with 1-2 mg midazolam and 25 µg fentanyl.

Demographic data and ASA scores of the patients were similar (Table 1).

Two of 91 patients were excluded from the study because of the failure of the regional block. Then general anesthesia was given to these two patients. Oxygen was given at 2 L/min by nasal cannula. ECG monitoring was performed, heart rate (HR), peripheral oxygen saturation (SpO_2) were monitored, and blood pressure (BP) follow-ups were taken with 5-minute intervals. All patients were premedicated with 1-2 mg midazolam and 25 µg fentanyl (Table 1).

Tablo 1. Demographic data of patients (Mean±SD), n (%).

	Group IC (n=30)	**Group SC (n=31)**	**Group Ax (n=28)**	
	Mean ± S.S	**Ort ± S.S**	**Ort ± S.S**	p
Age	36,47±15,25	37,81±16,27	41,29±13,43	0,460†
Height	169,50±7,56	171,19±8,55	171,43±8,85	0,625†
Weight	70,17±12,97	71,97±10,15	75,18±5,50	0,167†
BMI	24,37±3,78	24,53±2,68	25,77±3,33	0,145†
Gender (Female/Male)	5/25	6/25	5/23	0,963‡
ASA 1/2	21/9	24/7	18/10	0,538‡

*p< 0.05 statistically significant difference; †: One-way Analysis of Variance (ANOVA) ‡: Chi-square Analysis, Mean: mean, sd: standard deviation.

59 patients (66.1%) out of 89 patients included in the study, were patients who underwent wrist surgery, 27 patients (30.7%), sub-elbow surgery with forearm tendon and muscle incision and 3 (3.2%) patients were going to undergo elbow surgery.

SpO_2 measurements of the patients during the surgery were similar. SAB-DAB measurements were similar in group SC and group IC, they were significantly higher in Group Ax. HR values were found to be significantly higher between group Ax and IC only at the 15th minute measurement.

When the block application time was examined, Group SC had a statistically shorter application time than the other two groups (p=0,0001) (Table 2). There was no statistically significant difference between the groups in the onset of sensory block and motor block initiation times (Table 2). No statistically significant difference was found between the groups in the time of onset of surgery and duration of surgery (Table 2).

Tablo 2: Block procedure times and operation times.

	Group IC (n=30)	Group SC (n=31)	Group Ax (n=28)	
	Mean ± S.D	**Mean ± S.D**	**Mean ± S.D**	**p**
Block Procedure Time (min)	7,56 ± 2,44	5,13 ± 1,51	8,57±2,74	0,0001*
Sensory Block(min)	11,10 ± 2,85	11,40 ± 4,27	12,30±4,66	0,496
Motor Block (min)	15,17 ± 5,06	14,26 ± 4,91	17,04±5,48	0,116
Surgery start time(min)	13,43±3,80	13,72±5,65	14,14±4,91	0,856
Operation Time(min)	64,67±31,97	74,58±34,16	65,07±32,55	0,418

* p<0.05 statistically significant difference; †: One-way analysis of variance (ANOVA); ‖: Friedman testmean: mean, sd: standard deviation.

Additional analgesic measurements required an average of 62.86 µg in 7 patients in Group IC, 46.88 µg in 8 patients in Group SC, and 75.00 µg in 12 patients in Group Ax. Failed block did not occur in Group IC and Group SC. In Group Ax had two failed blocks. These two patients who underwent general anesthesia in Group Ax were not included in the study (Table 3).

Tablo 3: Additional analgesic requirement and complications.

	Group IC (n=30)	Group SC (n=31)	Group Ax (n=30)
	Mean ± S.D	**Mean ± S.D**	**Mean ± S.D**
Additional Analgesic	(n=7) 62,86 ± 33,40	(n=8) 46,88 ± 16,02	(n=12) 75,00 ± 30,15
Failed Block (yes/no)	0/30	0/31	2/28
Complications*	0	3	5
General anesthesia (yes/no) **	0/30	0/31	2/28

*Complications seen = vascular puncture ;Mean: mean, sd: standard deviation, **Two patients who returned to general anesthesia were excluded from the study.

While no complications were observed in Group IC, vascular puncture was observed in 3 patients in Group SC and 5 patients in Group Ax. No pneumothorax was observed in any patient and respiratory distress did not develop in the follow-up. There was no statistically significant difference between the groups when the postoperative motor functions were compared at the 24th hour.

There was no significant difference between patient and surgeon satisfaction (Table 4).

Tablo 4: Patient and surgeon satisfaction between groups.

	Group IC (n=30)	**Group SC (n=31)**	**Group Ax (n=28)**	
	Good/Medium/Bad	**Good/Medium/Bad**	**Good/Medium/Bad**	**Intergroup p**
Patient Satisfaction	25/5/0	25/6/0	21/7/0	0,724
Surgeon Satisfaction	30/0/0	29/2/0	27/1/0	0,377

*p< 0.05 statistically significant difference; chi square test

While the recovery of postoperative block was faster in the axillary group, it was found to be similar between the other two groups (Table 5).

Tablo 5. Comparison of postoperative sensory function test (pinprick) measurements and postoperative motor functions (Bromage) between groups.

	Mean± S.S	**Group IC (n=30)**	**Group SC (n=31)**	**Group Ax (n=28)**	**p**
	30. min	0,00 ± 0,00	0,00 ± 0,00	0,00 ± 0,00	-
Postoperative	2. hour	0,00 ± 0,00	0,00 ± 0,00	0,21±0,50	0.005*(Ax-SC, Ax- IC)
Sensory	4. hour	0,23 ± 0,43	0,19 ± 0,4	0,82±0,82	0.0001*(Ax-SC, Ax- IC)
Function	6. hour	0,8 ± 0,61	0,84 ± 0,52	1,54±0,69	0.0001*(Ax-SC, Ax- IC)
(pinprick)	12. hour	1,63 ± 0,56	1,74 ± 0,44	1,96±0,33	0.023*(Ax- IC)
0/1/2	24. hour	2,03 ± 0,18	2 ± 0	2,04±0,18	0.587
	p	0.0001*	0.0001*	0.0001*	
	30. min	2,73 ± 0,45	2,9 ± 0,3	2,46±0,51	0.001*(Ax-SC, Ax- IC)
Postoperative	2. hour	2,7 ± 0,47	2,81 ± 0,4	2,14±0,65	0.0001*(Ax-SC, Ax- IC)
Motor	4. hour	2,33 ± 0,71	2,19 ± 0,48	1,39±0,79	0.0001*(Ax-SC, Ax- IC)
Function	6. hour	1,5 ± 0,63	1,68 ± 0,65	0,58±0,74	0.0001*(Ax-SC, Ax- IC)
(Bromage)	12. hour	0,57 ± 0,68	0,48 ± 0,63	0,07±0,38	0.004*(Ax-SC, Ax- IC)
0/1/2/3	24. hour	0 ± 0	0 ± 0	0 ± 0	-
	p	0.0001*	0.0001*	0.0001*	

* p<0.05 statistically significant difference; †: One-Way Analysis of Variance (ANOVA); Friedman Test ; Mean: mean, sd: standard deviation.

Discussion

Regional anesthesia has some advantages over general anesthesia. These include not requiring tracheal intubation, increasing blood flow in the extremity, providing a mild transition to pain control, low consumption of analgesics and antiemetics, and short postoperative care unit and hospital stay (1, 3). Considering that a significant portion of trauma patients have a full stomach in emergency conditions, it is possible to avoid the possible complications of general anesthesia with regional anesthesia to be applied in these

patients (7).

However, in addition to these positive factors, complications due to regional block procedure or local anesthetic drugs can also be seen in regional anesthesia applications (7). As with any regional anesthesia technique, there is a possibility of nerve injury and nerve damage in brachial plexus block (8). Ultrasound guidance aids in real-time visualization of the needle and the relevant anatomy. The use of ultrasound has also resulted in faster block performance time and onset time (9). As the practitioner gains experience in the use of USG, the success rate of the block increases, the onset time of the block gets shorter, the side effects and the volume of local anesthetic decrease. Thus, the quality of the block increases, complications decrease, and the need for additional anesthetic and analgesics decreases (10, 11).

In the study presented here, we planned to compare the supraclavicular, infraclavicular and axillary block methods for brachial plexus block by applying them with USG and peripheral nerve stimulator (PSS) in suitable patients. More than 40 different intervention methods have been reported in the literature for brachial plexus block, which is the most common major peripheral nerve block to provide anesthesia in upper extremity surgeries. Mainly; interscalene, supraclavicular, axillary and infraclavicular intervention methods are used (12, 13). The choice of the technique and intervention method to be used in the patient for whom brachial plexus block will be performed should be decided by considering various factors such as whether the surgery is for diagnostic, therapeutic or operative purposes, the location and duration of the surgery, the need for postoperative analgesia, the general condition of the patient, the presence of an additional disease (respiratory, renal, etc.) and whether the operation will be performed on an outpatient.

In this study, we aimed to both increase the success rate of the block and decrease the incidence of complications by performing the block procedure using a nerve stimulator accompanied by ultrasonography. It is recommended to obtain a motor response with a current equal to or less than 0.5 mA prior to local anesthetic injection. It is thought that the success rate of the block will increase as the distance between the nerve and the needle tip will decrease in localizations below 0.5 mA (14). For this purpose, under the guidance of USG, we received a stimulus at 1 mA and fixed the needle at the point where the stimulus disappeared at 0.5 mA, and we preferred to inject local anesthetic there.

In our study, we applied low volume LA using the multiple injection technique with USG guidance. Thus, we aimed to keep the local anesthetic volume low while increasing the success of the block. In the study of Vazin et al. (15), it is recommended that multiple injections be performed with USG for success in block volumes as low as 20 mL. In many studies, it has been shown that successful block can be obtained by using low-volume local anesthetic in blocks performed with USG (4, 16, 17). Contrary to our study, there are also studies in the literature that say that the use of low volume LA will not be sufficient. Schroeder et al. (18) stated that the volume of local anesthetic used for axillary block (48±8 mL) was significantly higher than the volume of local anesthetic used for supraclavicular (39±7mL) and interscalene block (41±12 mL).

In the literature, there are studies suggesting that the volume of local anesthetic should be kept high in order to block Nervus musculocutaneus with the axillary approach (18, 19). In our study, we compared IC, SC, and Ax blocks by using a combination of bupivacaine as a local anesthetic and fentanyl as an opioid analgesic in equal volume (21mL) for all groups with multiple injection technique accompanied by USG and PSS.

As far as we have experienced while applying the blocks, we think that in supraclavicular and axillary blocks where the nerves are more superficial, USG alone may be sufficient for the block procedure, but in infraclavicular block where the nerves are more deeply located, it should be performed with a nerve stimulator.

In our study, the block application time was found to be statistically significantly shorter in Group SC compared to the others. We think that this is due to the fact that the plexus is more superficial and tightly packed in a sheath in the supraclavicular region, and the number of needle guidance is less in this block (20). In the study of Vazin et al. (15), who compared the three blocks in a similar way, the block application times were found to be similar. In the study of Tran et al. (21), the block application time was found to be longer in the Ax group than in the SC and IC groups, and no difference was found between these two groups.

In our study, IC, SC and Ax groups were found to be similar in terms of onset time of sensory block, onset time of motor block, time to start of surgery and duration of surgery. Sufficient motor and sensory block was observed at the end of 30 minutes in all groups. Similarly, in a randomized controlled study conducted by Dhir et al. (22), SC and IC blocks were compared and no significant difference

was found between the blocks in terms of sensory block.

In the study of Koscielniak-Nielsen et al. (13) and Abnihaya et al. (23) comparing SC and IC blocks, the sensory block was completed faster in the IC group, and no significant difference was found between the IC and SC groups in terms of motor block. Also, Kyung et al.(24) comparing IC and SC block, no significant difference was found between the blocks in terms of block application time, motor and sensory block, but it was observed that the radial or ulnar nerve block did not fit or remained incomplete in the IC block. Again in this study, complication rates were higher observed in SC block.

In our study, although the Ax block was slightly lower, the success of the block was similar. We think that this slight decrease in Group Ax is due to the distance of the musculocutaneous nerve from other nerves. In the study of Vazin et al. (15) that compared Ax, SC and IC blocks with multiple injection technique, the success of the block was also compared, and the success of the block was found to be more unsuccessful in the Ax group; There was no significant difference between the IC and SC groups. In the same study, while the time to block application and pain associated with the application were similar between the groups, the onset time of block was found to be significantly shorter in the SC group compared to the other groups. They stated that the separation of the radial nerve in the Ax group and the medial cord in the IC group were difficult.

One of the most important causes of unsuccessful peripheral nerve block is the initiation of the operation before the local anesthetic applied completely creates an effective block. This time can be as short as 5 minutes or as long as 30 minutes.

Premature insertion of the needle to test adequacy of anesthesia (pinprick test); may cause the patient to lose confidence in successful anesthesia (25). So that, it is stated that the first tests to evaluate the anesthesia should be done after sufficient time (15-20 minutes) for the local anesthetics to become effective (26).

In order for sufficient block to occur, different times are specified for each intervention method, which are close to each other. It has been reported that it is usually sufficient to wait for 15-20 minutes for local anesthesia to become effective (26). In another study, it was stated that at least 20 minutes should be waited for the maximum effect to occur in major nerve block (27). In our study, sufficient sensory block was achieved in all groups starting from the 20th minute.

Complications such as pneumothorax,

phrenic nerve palsy, Horner's syndrome (stellate ganglion block), vascular injury (hematoma), subarachnoid injection/ dissemination can be observed in upper extremity blocks. When our study was evaluated in terms of complications, no complications other than vascular puncture were observed in the patients and there was no respiratory distress in the first 24 hours follow-up of the patients. Vascular puncture was observed in 3 patients in the SC group and in 5 patients in the Ax group.

The needle tip was noticed on USG and the needle direction was changed without injection, after blood came out with aspiration. However, hematoma did not occur in any of these patients, and no neurological damage was observed in the patient follow-ups. Vascular puncture was not observed in the IC group. Pneumothorax, Horner's syndrome, local anesthetic toxicity, etc. other complications were not seen in any of the patients.

In our study, additional analgesics were needed in 12 patients in Group Ax, 8 patients in Group SC, and 7 patients in Group IC; however, general anesthesia was applied in only 2 patients in Group Ax because adequate analgesia/anesthesia did not occur in the operation area. The success rate in Group Ax was 93.3%, which was similar to other studies in the literature (21).

Most of the patients stated that they were satisfied with the anesthesia method applied when their postoperative satisfaction was questioned. There was no statistically significant difference between the three groups in terms of complications that developed during and after the block, and patient and surgeon satisfaction. Similar to our study, patient satisfaction was found to be similar between the groups in Vorobeichik et al.'s study (28) and Yang et al.'s study (29) comparing IC and SC blocks.

The limitations of this study

1. Sample Size and Diversity: The number of patients included in the study (91) is limited, and results obtained from studies with larger sample sizes may be more generalizable. Additionally, the exclusion of patients from different hospitals or with varying demographic characteristics may restrict the generalizability of the results.

2. Single-Center Nature: The study was conducted in a single medical center (Pamukkale University Faculty of Medicine Hospital). This can limit the applicability of the methods and results when compared with studies conducted in different medical centers.

We believe that more multicenter studies would be beneficial to improve our results.

Conclusion

It was determined that all three brachial plexus block techniques could be used in cases requiring upper extremity surgery. It was concluded that the application of the block type that is suitable for the patient and experienced by the operator, accompanied by ultrasound and nerve stimulator, will increase the success of the block and decrease the complication rate.

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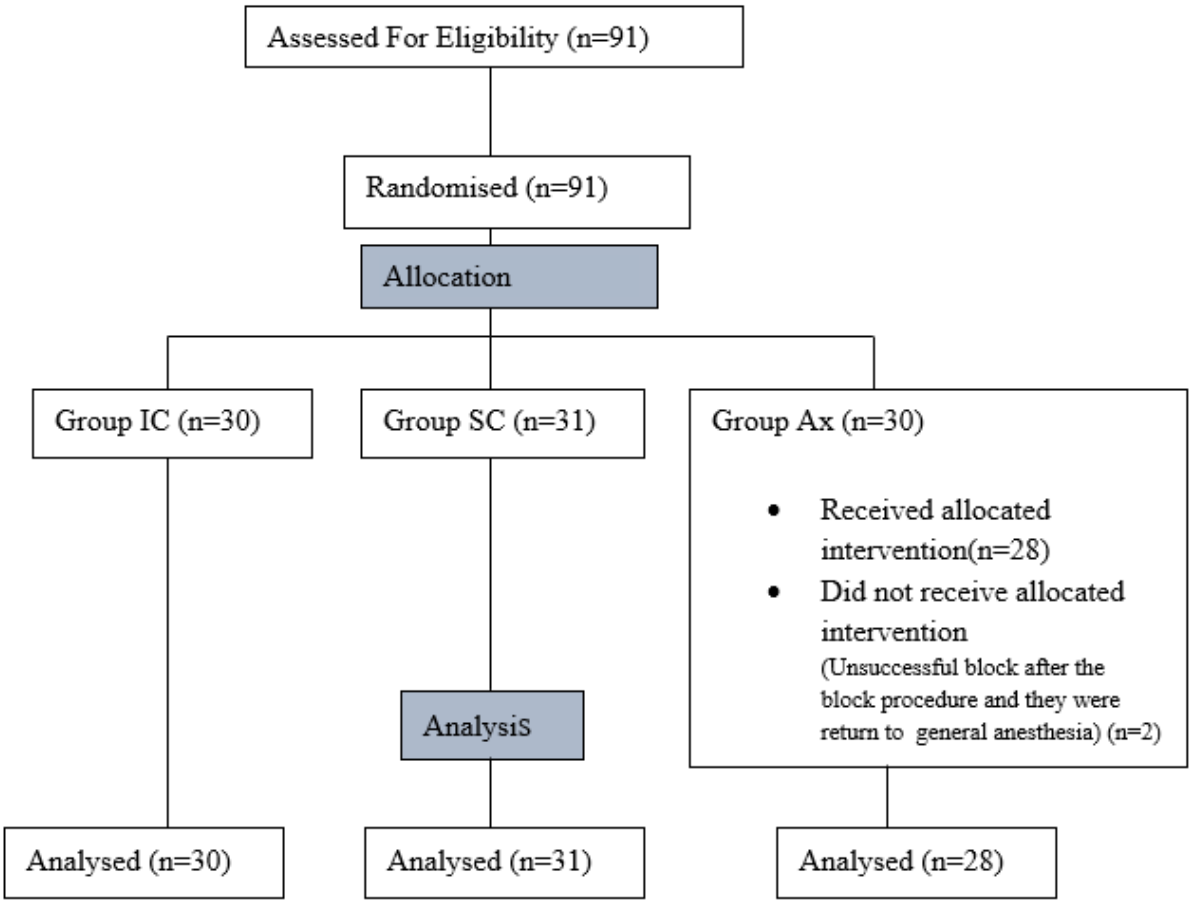
Consort Diagram



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Clinical Research

Transobturator Tape and Kelly's Plication Procedures Comparison: A Case-Control Study with One-Year Follow-Up

Fatma Tulucu Kalkan[1*], Ibrahim Taskum[1], Seyhun Sucu[1], Ayse Kubra Tiryaki[2], Muhammed Hanifi Bademkiran[2], Ozge Komurcu Karuserci[2], Sumeyra Mert Kanbas[2]

[1]Gaziantep City Hospital, Department of Gynecology and Obstetrics, Gaziantep, Turkiye.
[2]Gaziantep University Faculty of Medicine, Department of Gynecology and Obstetrics, Gaziantep, Turkiye.

Abstract

***Objective**: To investigate the factors that may affect urinary incontinence and compare the outcomes of surgical methods used to treat it, specifically Transobturator Tape (TOT) and Kelly's plication procedures.*
***Method:** The data of 213 patients who underwent TOT and Kelly's Plication procedures for urinary incontinence at the Department of Obstetrics and Gynecology, Gaziantep University Faculty of Medicine, between January 2016 and December 2021, were retrospectively analyzed with consideration of their evaluations one year postoperatively. The patients' age, type of surgery, complete urinalysis, urea, creatinine results, chronic disease status, menopausal status, gravidity and parity, body mass index, type of urinary incontinence, whether the stress test was positive or not, degrees of vaginal prolapse, and whether urinary incontinence complaints persisted during postoperative follow-up were examined. The patients were divided into two groups: those who underwent TOT and those who underwent Kelly's's Plication. The differences between the two groups were evaluated. Subsequently, the urinary incontinence complaints of both groups were assessed one year later, and the risk factors for patients whose complaints persisted were examined using logistic regression analysis.*
***Results**: One year postoperatively, the success of the TOT procedure was higher than that of the Kelly's's Plication. However, multivariate regression analysis revealed that patients who underwent the TOT procedure had a higher likelihood of persistent complaints compared to those who underwent Kelly's's Plication (OR: 2.07 [1.12-3.93], P=0.02). While there was a significant difference between the two groups in terms of parity and gravidity, no significant differences were observed in terms of age, BMI, menopausal status, type of urinary incontinence, and the presence of chronic diseases.*
***Conclusion:** The success rate of the TOT procedure in terms of the improvement of urinary incontinence symptoms in patients was found to be higher compared to Kelly's plication. However, regression analysis indicated that patients who underwent the TOT procedure were more likely to have persistent urinary incontinence complaints.*

***Key words**: Kelly's Plication, Urinary incontinence, Stress urinary incontinence , Transobturator tape*

*** Corresponding author:** Fatma Tulucu Kalkan, E-mail: tulucufatma@gmail.com, ORCID ID: 0000-0001-5417-3773

Introduction

The International Continence Society (ICS) defines incontinence as the involuntary loss of urine under any condition (1). One in two women experience urinary incontinence, which causes a decline in quality of life for women both socially and hygienically. The prevalence increases with age, yet only a small fraction of women with urinary incontinence seek medical treatment (2-4).

The primary risk factors are gender and age. Aging and female gender are significant risk factors, with urinary incontinence being approximately three times more common in women than in men. The risk of incontinence is about 8% in women aged 40-50, while it increases to 28% in those over 65 years old (5-7). Some studies also list obesity, menopausal status, pelvic organ prolapse (POP), the number and type of deliveries, smoking, and race as risk factors for urinary incontinence (8). Among the types of urinary incontinence, the most common is stress urinary incontinence, which occurs with an increase in intra-abdominal pressure and is most frequently seen in women aged 45-49 (9, 10). Urge incontinence is defined as the involuntary loss of urine accompanied by a sudden urge to urinate, while mixed incontinence includes symptoms of both stress and urge incontinence. TOT and Kelly's plication are commonly performed surgical treatments for urinary incontinence. TOT is a mid-urethral sling procedure that supports the urethra by placing a synthetic mesh through the obturator foramen. Kelly's plication is a traditional method that reinforces the urethral sphincter by suturing the bladder neck. These techniques aim to restore urinary continence by improving urethral support and function. Both conservative and surgical methods are used to treat urinary incontinence. Conservative treatments include pharmacotherapy, pelvic floor exercises, and behavioral therapy. In the presence of a true SUI condition, surgical treatment should be planned for moderate to severe SUI cases, cases that do not respond to medical treatment and conservative approaches, and especially for advanced incontinence cases where other treatment methods have failed (11). Despite the development of numerous surgical techniques, a gold-standard method with high success and low complication rates has not yet been identified.

In our research, we aimed to examine the effects of various variables on the success of Transobturator Tape (TOT) and Kelly's Plication surgery, as well as success rates and the reasons for patients' continuing complaints.

Material and Methods

Patient Selection

This study was conducted with the ethical approval of the Gaziantep University Non-Interventional Clinical Research Ethics Committee, under approval number 2022/244, date:03.08.2022. Data were obtained using the high-security information management system and archives of Gaziantep University Şahinbey Research and Application Hospital. Initially, 253 patients who underwent surgery for urinary incontinence between January 2016 and December 2021 at the Department of Obstetrics and Gynecology, Gaziantep University Şahinbey Research and Application Hospital were identified. Among these, 30 patients underwent minisling procedures, eight had Burch colposuspension, and two patients with insufficient data were excluded. As a result, 213 patients remained, with 122 undergoing Kelly's plication and 91 undergoing the TOT procedure. Of these patients, 122 underwent Kelly's Plication, and 91 underwent Transobturator Tape (TOT). Archive records for each patient were reviewed, and if any data were missing, patients were contacted to obtain the necessary information. The recorded data included age, gravidity, parity, body mass index, type of urinary incontinence, stress test results, degree of pelvic organ prolapse, presence of chronic diseases (DM, HT, CAD, asthma, goiter), and menopausal status.

Patients with incomplete data on the type of urinary incontinence and type of operation, those who underwent surgery for pelvic organ prolapse without urinary incontinence, those who had urinary incontinence complaints but received medical treatment, those who did not attend postoperative follow-ups, and those with insufficient information about the continuation of incontinence complaints were excluded from the study. Additionally, data from patients who met the inclusion criteria but were deceased were not included in the study.

Surgical Technique and Follow-Up

The surgical methods for incontinence surgery performed in our clinic adhere to standard procedures. Kelly's Plication is a surgical technique used in the treatment of stress urinary incontinence, typically performed under general or spinal anesthesia. In this procedure, a suprapubic or transvaginal incision is made, and tissues are carefully dissected to reach the pelvic floor muscles and connective tissue beneath the bladder neck and urethra. Then, the pelvic floor muscles and connective tissue beneath the bladder neck and urethra are tightened using sutures Kelly's plication, as described by Howard Kelly, begins with a

midline incision in the anterior vaginal mucosa at the level of the bladder neck. Through this incision, the bladder is carefully dissected. The lax tissues beneath the bladder neck are plicated using 2/0 absorbable sutures. Then, the excess vaginal tissue is excised, and the vagina is closed with 2/0 absorbable sutures (12).

The TOT procedure begins with a vertical incision made at the mid-urethral level of the anterior vaginal wall, followed by the dissection of the bladder. The cleavage is advanced to the ischiopubic rami. As described by Delorme, the trocars are inserted through the skin at 1 cm lateral to the ischiopubic rami at the level of the clitoris, advancing from outside to inside, and the mesh is brought out to the skin with the help of the trocars. A macroporous polypropylene mesh is attached to the eye of the trocar on both sides and placed beneath the bladder neck. Then, the excess vaginal tissue is excised, and the vagina is closed with 2/0 absorbable sutures (13).

Postoperatively, patients were evaluated at the end of one year to determine whether their urinary incontinence complaints persisted. Based on their feedback, patients were grouped into those whose urinary incontinence persisted and those whose complaints were resolved.

Statistical Methods

The Shapiro-Wilk test was used to determine whether the data were normally distributed. Descriptive statistics for normally distributed data were reported as mean ± standard deviation (SD). Data that did not show normal distribution were presented as median (minimum-maximum). Categorical data were expressed as numbers (n) and percentages (%). For group comparisons, the independent samples t-test was used for normally distributed data, while the Mann-Whitney U test was used for data that did not show normal distribution. The chi-square test or Fisher's exact test was applied for the comparison of categorical data. All statistical analyses were performed using R version 4.4.1, and a p-value of <0.05 was considered statistically significant.

Results

In this study, the demographic and clinical characteristics of patients who underwent TOT (trans obturator tape) and Kelly's Plication procedures for urinary incontinence complaints were examined in detail. Logistic regression analysis was used to identify factors that might affect the persistence of urinary incontinence complaints postoperatively.

The analyses included variables such as the patient's age, gravidity, parity, body mass index (BMI), menopausal status, stress test results, type of incontinence, degree of prolapse, and type of surgery performed. Table 1 compares the demographic data of patients who underwent Kelly's and TOT procedures.

Table 1. Demographic Data of Patients Who Underwent Tot and Kelly's Plication.

Variables	Kelly's's Plication (n=122)	TOT (n=91)	p-value
Age			
Median (Min-Max)	51.0 (24-88)	50.0 (32-94)	0.895
Gravity			
Median (Min-Max)	4.0 (2-11)	5.0 (1-12)	**0.012**
Parity			
Median (Min-Max)	4.0 (1-11)	4.0 (1-12)	**0.007**
BMI			
Median (Min-Max)	27.27 (21.33-35.40)	27.68 (21.45-40.79)	0.513
Menopause Status			
Premenopause	45 (36.9%)	34 (37.4%)	1.0
Postmenopause	77 (63.1%)	57 (62.6%)	
Comorbidity			
None	66 (54.1%)	47 (51.6%)	
DM	23 (18.9%)	12 (13.2%)	0.352
Other	33 (27.0%)	31 (34.1%)	
Stress Test			
Negative	15 (12.3%)	6 (6.6%)	0.251
Positive	107 (87.7%)	85 (93.4%)	
Incontinence Type			
Stress	85 (69.7%)	69 (75.8%)	0.608
Urge	29 (23.8%)	5 (5.5%)	
Mix	8 (6.6%)	17 (18.7%)	
Degree of Prolapse	2(0-5)	2(0-5)	0.10

The median gravidity was 4.0 (min 2-max 11) in the Kelly's group and 5.0 (min 1- max 12) in the TOT group, with a significant difference between the groups in terms of gravidity (p =0.01). The median parity was 4.0 in both groups, but a significant difference was observed in terms of parity (p=0.007). There was no significant difference in BMI (p = 0.51). The success of the operations performed on the patients is shown in Figure 1.

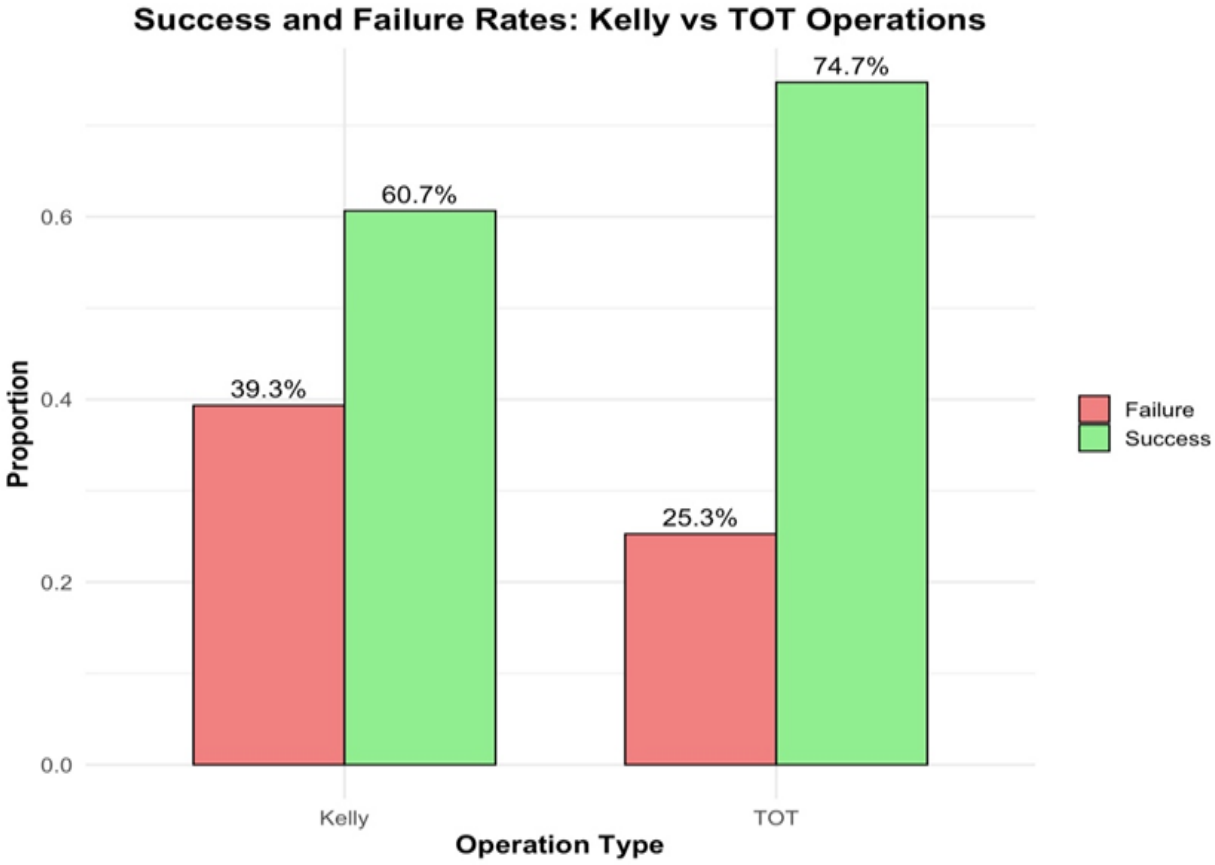

Figure 1. Success and Failure Rates: Kelly's vs TOT Operations.

Table 2 presents the demographic and clinical data of patients in the Kelly's group regarding the status of urinary incontinence complaints at the end of the first year.

Table 2. Evaluation of Urinary Incontinence Complaints in Patients Underwent Kelly's's Plication.

Variables	Persistent Symptoms (n=48)	No Symptoms (n=74)	p-value
Age			
Median (Min-Max)	52.56 ±13.60	52.62 ± 13.85	0.98
Gravity			
Median (Min-Max)	4 (2-11)	4 (2-11)	0.59
Parity			
Median (Min-Max)	4.0 (1-11)	4.0 (2-11)	0.89
BMI			
Median (Min-Max)	26.8 ±62.52	27.95±3.47	0.06
Comorbidity			
None	24 (%50.00)	30 (%40.00)	
DM	16 (%33.33)	22 (%29.33)	0.22
Other	8 (%16.67)	23 (%30.67)	
Menopause Status			
Premenopause	16 (%33.33)	29 (%39.19)	0.64
Postmenopause	32 (%66.67)	45 (%60.81)	
Stress Test			
Negative	5 (%10.42)	8 (%10.81)	
Positive	43 (%89.58)	66 (%89.19)	0.43
Incontinence Type			
Stress	29 (%60.42)	48 (%64.86)	
Urge	10 (%20.83)	12 (%16.22)	0.68
Mix	9 (%18.75)	14 (%18.92)	
Degree of Prolapse	2.0 (0-5)	2.0 (0-5)	0.76

These findings indicate that demographic and clinical factors do not have a decisive effect on the persistence of urinary incontinence complaints in patients who underwent the Kelly's procedure.

Table 3 summarizes the urinary incontinence complaint status of patients in the TOT group.

Table 3. Evaluation of Urinary Incontinence Complaints in Patients Undergoing TOT.

Variables	Persistent Symptoms(n=23)	No Symptoms (n=68)	p-value
Age			
Median (Min-Max)	53.22±11.02	52.34±13.52	0.77
Gravity			
Median (Min-Max)	6.0(3-11)	5.0(1-12)	0.39
Parity			
Median (Min-Max)	5.0 (3-10)	4.0(1-12)	0.27
BMI			
Median (Min-Max)	27.38, ±2.30	27.99±3.64	0.45
Comorbidity			
None	10(%43.48)	31 (%42.47)	
DM	8(%34.78)	20 (%27.40)	0.88
Other	5 (%21.74)	22 (%30.14)	

Table 3. Evaluation of Urinary Incontinence Complaints in Patients Undergoing TOT (continued).

Menopause Status			
Premenopause	13 (%56.52)	41 (%56.16)	0.96
Postmenopause	10 (%43.48)	32 (%43.84)	
Stress Test			
Negative	1 (%4.35)	2 (%2.74)	0.98
Positive	22 (%95.65)	71 (%97.26)	
Incontinence Type			
Stress	15 (%65.22)	45 (%61.64)	
Urge	4 (%17.39)	15 (%20.55)	0.32
Mix	4 (%17.39)	13 (%17.81)	
Degree of Prolapse	2.0 (0-5)	2.0 (0-5)	0.20

Various demographic and clinical characteristics were compared between the group with persistent complaints and the group without complaints. No significant differences were found between the groups in terms of comorbidities, BMI, menopausal status, stress test results, type of incontinence, and degree of prolapse. These findings suggest that demographic and clinical factors do not play a decisive role in the persistence of urinary incontinence complaints in patients who underwent the TOT procedure.

Table 4 presents the results of the logistic regression analysis, including the coefficients, standard errors, z-values, and p-values for the independent variables affecting the persistence of urinary incontinence complaints. Age did not have a significant effect. The likelihood of persistent urinary incontinence complaints increased with higher BMI (OR=1.10, 95% CI: 1.00-1.22)

Table 4. Logistic Regression Analysis Results of Patients Underwent Incontinence Surgery.

Variables	Estimate	SE	z value	OR (%95 CI)	P value
Age	0.006	0.0195	0.312	1.006(0.968-1.046)	0.75
Gravidity	-0.127	0.1132	-1.123	0.881(0.705-1.103)	0.26
Parity	0.049	0.139	0.352	1.05(0.797-1.38)	0.72
BMI	0.103	0.049	2.101	1.108(1.009-1224)	**0.03**
(Ref:Premenopause)					
Postmenopaz	-0.402	0.4602	-0.875	0.668(0.269-1.644)	0.38
Stress Test	-0.078	0.5081	-0.155	0.924(0.325-2.448)	0.87
Incontinence Type	0.162	0.19	0.854	1.176(0.817-1.727)	0.39
Prolapse Degree	0.102	0.1434	0.716	1.108(0.838-1.476)	0.47
(Ref: Kelly's's Plication)					
TOT	0.73	0.3189	2.289	2.075(1.121-3.931)	**0.02**

Additionally, patients who underwent the TOT procedure had a higher likelihood of persistent urinary incontinence complaints compared to those who underwent the Kelly's procedure (OR=2.07, 95% CI: 1.12-3.93). Other variables, such as age, gravidity, parity, menopausal status, stress test results, type of incontinence, and degree of prolapse, did not significantly affect the persistence of urinary incontinence complaints.

Discussion

Urinary incontinence is a common health problem that can be seen at any age. While it is not life-threatening, it significantly impairs the quality of life. Patients who underwent anti-incontinence surgery over a 5-year period in our clinic were evaluated. We assessed the study results by considering certain values. The relationships between pre-treatment variables such as age, height, weight, BMI comorbidities (DM, HT, and other diseases such as CAD, goiter, asthma), gravidity, parity, and menopausal status with post-treatment success were examined for statistical significance.

In a study conducted in Norway investigating the prevalence of urinary incontinence in the female population, it was observed that 25% of women experienced incontinence. Among those with incontinence complaints, 50% had stress incontinence, 11% had urge urinary incontinence, and 36% had mixed urinary incontinence (14). In our study, examining patients who underwent surgery for urinary incontinence over a five-year period, the most common type of urinary incontinence was stress urinary incontinence, followed by mixed type urinary incontinence. While non-surgical treatment methods are initially tried for stress urinary incontinence, surgical treatment is often required (15). Studies have shown that urinary incontinence increases with advancing age (2, 16). A retrospective study found that the incidence of incontinence or prolapse surgery increases with age, with a lifetime risk of 11.1% up to the age of 80 (17). Another study indicated that, although the rate of increase is not constant, the incidence of urinary incontinence peaks post-menopause and begins to decrease after the fifth decade, while urge incontinence shows a bimodal distribution, peaking twice in early and late adulthood (18). The logistic regression results obtained in our study indicate that the effect of age on urinary incontinence is not statistically significant (OR:1, 95% CI: 0.96-1.04, p=0.75). This finding suggests that age alone is not a determinant of urinary incontinence and that other factors should also be considered. Consistent with the existing literature, while an increase in the incidence of urinary incontinence is

observed with advancing age, the results of our study suggest that age alone is insufficient to explain this condition.

Many studies have shown that the rate of urinary incontinence is higher in women who have had one or more births compared to those who have never given birth. It is particularly noted that the rate increases with each additional birth after the first (19). A community-based cohort study evaluating the mode and number of births in 15,307 women found that the age-standardized prevalence of incontinence was 10.1% in nulliparous women, 15.9% in the cesarean section group, and 21% in the vaginal birth group. Consequently, the risk of urinary incontinence was highest with vaginal delivery, while it was still higher in cesarean deliveries compared to nulliparous women (20). Our study also examined the effects of gravidity and parity on urinary incontinence. However, neither variable was found to be statistically significant, indicating that they did not independently contribute to the risk of urinary incontinence in our study population. While previous research has consistently identified gravidity and parity as significant risk factors, our findings did not confirm this association. This discrepancy may be due to differences in study populations and sample sizes.

One of the risk factors strongly associated with incontinence is obesity. Obesity increases intra-abdominal pressure, exacerbating stress incontinence. Women with true stress incontinence and detrusor instability are more likely to be obese compared to continent women (21). In a study of 148 patients who underwent urinary incontinence surgery, BMI values were examined, and higher surgical failure rates were observed in obese patients (22). Conversely, another study investigating whether BMI affects the outcomes of urethral sling procedures for SUI found no significant difference in success rates among 285 women classified as normal weight (18.5-23 kg/m²), overweight (23-27.5 kg/m²), and obese (over 27.5 kg/m²), and no significant difference in postoperative voiding symptoms was observed (23).

The logistic regression results obtained in this study evaluated the effects of BMI on urinary incontinence. The BMI variable was found to be statistically significant (OR: 1.10, 95% CI:1.00-1.22, p=0.03). This finding indicates that an increase in BMI increases the risk of urinary incontinence. Despite differing results in the literature regarding the impact of obesity on urinary incontinence, our study determined that BMI has a significant impact as an independent risk factor. This result

underscores that obesity is a factor that should be considered in the development of urinary incontinence.

A recent study examined 60 patients undergoing surgery for stress urinary incontinence (SUI) in two groups: TOT and anterior colporrhaphy combined with Kelly's plication. The success rates in the TOT group were reported as 86.7%, 80%, and 80% at 1, 6, and 12 months, respectively, while in the anterior colporrhaphy and Kelly's plication group, the rates were 80%, 70%, and 66.7%, respectively. This study highlighted that while there was no significant difference in success rates between the two surgical methods in short-term follow-ups, long-term results could differ (24).

In our study, the overall success rate of urinary incontinence treatment in the follow-up of 253 operated patients was found to be 65.12%. Patients followed for one year in three-month periods were observed to need longer follow-ups. When patients were examined in two groups-TOT and Kelly's plication—the success rate in those who underwent the TOT procedure (75%) was statistically significantly higher compared to those who underwent Kelly's plication (61%) (p=0.03). However, the likelihood of persistent urinary incontinence complaints was significantly higher in patients who underwent the TOT procedure compared to those who underwent Kelly's plication (OR: 2.07, 95% CI: 1.12-3.93, p=0.02).

These results suggest that while the TOT procedure has higher success rates in the short term, the likelihood of persistent urinary incontinence complaints is higher in the long term compared to Kelly's plication. In our study, we examined some factors that might affect the treatment success in patients who underwent Kelly's plication and TOT procedures for the treatment of SUI and the etiology of urinary incontinence.

This study has several limitations. The single-center design may limit the generalizability of the findings. Additionally, its retrospective nature imposed data constraints, making it challenging to access all desired information. The absence of urodynamic and uroflowmetry tests, as well as the lack of pre- and post-operative anxiety and satisfaction surveys, may have concealed factors influencing surgical outcomes. Furthermore, the short-term follow-up period is another limitation, preventing a comprehensive evaluation of long-term success and complications.

Conclusion

In conclusion, this study compared the outcomes of TOT and Kelly's plication

procedures for urinary incontinence, showing that while TOT had higher short-term success rates, it was associated with a greater likelihood of persistent urinary incontinence complaints in the long term. Additionally, BMI was identified as a factor influencing the persistence of symptoms, whereas other demographic and clinical variables did not show a significant effect. Further prospective, multi-center studies with extended follow-up periods are needed to confirm these results and provide more robust clinical guidance.

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Conflict of Interest:

The authors report no conflicts of interest.

Data availability statement

The authors confirm that the data supporting the findings of this study are available within the article and its supplementary materials.

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Research Article

The Relationship between The Demographic and Clinical Characteristics of Peripheral Facial Paralysis Patients and The Physiotherapy Program

Gulseren Demir Karakilic[1*], Sercan Cikrikci[2]

[1]*Yozgat Bozok University, Department of Physical Medicine and Rehabilitation, Yozgat, Turkiye.*
[2]*Yozgat City Hospital, Department of Otolaryngology, Head and Neck Surgery, Yozgat, Turkiye.*

Abstract

Objective: *What are factors for patients diagnosed with peripheral facial paralysis (PFP) to apply to Physical Medicine and Rehabilitation (PMR) clinic. The aim of this study was to examine the demographic characteristics, stage at the first application, comorbidities, recovery rates, success rates of the treatments given and physiotherapy programs, if applied from the archive data of patients diagnosed with PFP in this study*
Methods: *Our study was obtained using the medical records of patients admitted to clinic for PFP from January 2017 to October 2022.*
Results: *A total of 833 patients with PFP were included in the study. Four hundred eleven (49.3%) were female and 422 were male, and the mean age of the patients was 43.33. One hundred ninety nine (23,9%) patients with a diagnosis of PFP applied to PMR clinic and a physiotherapy program was used to 92 (11%) patients. There was a difference in terms of comorbid diseases and it was more common in female patients (p:0,004); facial paralysis (FP) recurrence was more frequent in female patients (p:0,025). There was a significant correlation between admission to the PMR clinic and having left-sided PFP (p:0.012). There was a positive significant correlation between admission to the PMR clinic and House-Brackman (HB) stage (p:0.000)*
Conclusions: *Ours is the first study which investigated percentage of apply to PMR clinic patients who applied to otolaryngology outpatient clinic diagnesed PFP. We found that patients with PFP on the left side and with high HB stage were more likely to refer to the PMR clinic.*

Key words: *Correlation, House-Brackman stage, Peripheral facial paralysis, Physiotherapy program*

*** Corresponding author:** Gulseren Demir Karakilic, E-mail: gulserendmr58@hotmail.com, ORCID ID: 0000-0003-1292-0835

Introduction

Peripheral facial paralysis (PFP) is a disease characterized by partial or complete paralysis of the facial muscles as a result of compression or cutting of the 7th cranial nerve. Idiopathic peripheral facial nerve palsy or Bell's palsy (BP) is the most common cause of facial nerve palsy (1). The incidence of BP is between 15-30/100.000. It usually occurs between the ages of 15-45, equally in male and female. 9% of the patients have a history of facial paralysis (FP) (2). Although many cases are idiopathic, some are associated with identifiable causes. Whatever the cause, 85% of patients partially regain function, and more than 70% achieve a full recovery (3).

FP not only has a devastating effect on the patient's mood and quality of life, but also puts a serious physiological burden on the person's daily life. Therefore, FP treatment, which includes conventional pharmacological therapy, physical therapy and surgical options, may often require a complex multidisciplinary approach (4).

In the prognosis of FP, especially grade of the disease and the time of its onset, as well as the accompanying pathologies, if any, play a major role. The duration of paralysis and accompanying comorbid diseases both regulate the management of the patient's treatment options and play a predictive role in the prognosis, especially with age (5).

PFP remains a common epidemiological problem in otolaryngology practice and is extremely distressing, especially for patients with delayed or partial recovery (6). It is very important to determine which patients will have a poor prognosis of FP, which patient will need physiotherapy and when they should be referred. Twenty one patients who were diagnosed with BP and received a physical therapy program consisting of electrotherapy, infrared and mimic exercises, who received 15 sessions of treatment and 21 patients who received 30 sessions of treatment were examined in a retrospective study conducted in Turkey in 2022; It was reported that 15 sessions of physical therapy provided significant functional improvement in patients with BP receiving physical therapy and that increasing the number of physical therapy sessions to 30 sessions had no additional effect on functionality (7). Randomized controlled trials in which Proprioceptive Neuromuscular Facilitation (PNF) technique was applied to 184 patients with dysfunctions resulting from facial paralysis, and the rate of improvement measured using the House Brackmann Scale and clinical improvement were evaluated in a 2022 review; PNF was used

in combination with other interventions in all of the included studies, and it was reported that PNF showed very low evidence that it was more effective than minimal intervention in the treatment of FP (8). Current physiotherapy approaches in patients with FP were examined in a review conducted in 2024; physical therapy approaches aimed at increasing muscle strength for a better result in all age groups, the importance of combining various methods such as electrical stimulation, massage, PNF, taping and mirror exercise that can be given for BP with traditional medical treatment was emphasized (9). Studies on physiotherapy in patients with PFP are mostly focused on the applied method and its effect (10, 11).

PFP is an important clinical condition that significantly reduces patients' quality of life, causes functional losses and psychosocial problems. Although many studies have been conducted on PFP today, there is no study in the literature how many patients with PFP require physiotherapy, on when it was done and what factors affected this situation. Although treatment protocols and prognosticators have been investigated in studies conducted to date, critical clinical questions, such as defining the patient group requiring physiotherapy, timing of treatment and the effect of comorbidities on the risk of recurrence, remain unanswered. This uncertainty makes it difficult for physicians to personalize the rehabilitation process and prevent complications. For example, it is not known how comorbidities such as diabetes or hypertension affect the response to physiotherapy or at which stage the intervention is most effective. We thought that The FP stage is worse than in those who do not apply, and comorbidities such as Diabetes or Hypertension are more common in PFP patients who apply to the PTR clinic; and the risk of recurrence is higher patients with comorbidities than in those without comorbidities. We aimed to examine the demographic characteristics, stage at the first application, comorbidities, recovery rates, success rates of the treatments given and physiotherapy programs, if applied from the archive data of patients diagnosed with PFP in this study. These findings aim to reduce permanent sequela rates and improve patient outcomes by providing clinicians with early intervention strategies.

Material And Methods

Study design

This retrospective study was undertaken between January 2017 and October 2022. The study protocol was approved by University the Clinical Research Ethics Committee with decision number 2017-KAEK-189_2022.10.27_04, Provincial

Health Directorate's Scientific Research Commission and adhered to the principles of the Helsinki Declaration.

Patients selection

The study included patients who were examined in the City Hospital Ear Nose Throat, Head and Neck Surgery (OHNS) and Physical Medicine and Rehabilitation (PMR) clinics.

Inclusion criteria for patients:

- Patients between the ages of 18-65,
- Having been diagnosed with PFP,
- Having accessible communication, demographic, imaging, clinical information in the hospital data system
- Patients who regularly attend their follow-ups

Patients whose contact information could not be accessed in the hospital data system, who did not come for regular check-ups, who had incomplete file information, who had middle ear and central nervous system pathology detected using methods such as computerized tomography (CT) and magnetic resonance imaging (MRI), and who had FP due to trauma were excluded from the study.

Patients' age, gender, comorbidity, duration of admission, side of direction of paralysis, stage of paralysis at the first application, and whether a application to the PMR clinic, whether a physiotherapy program was applied, and whether FP is recurrent or not, were taken from hospital archive records.

FP physiotherapy was applied to the patients in the form of physiotherapy consisting of mimic exercises, therapeutic electrical stimulation, facial muscle massage, and mirror therapy, with an average of 20-30 sessions in total, each session lasting approximately 1 hour on a weekday.

The House-Brackmann (HB) staging system

HB is the most commonly used subjective staging system in practice to evaluate facial nerve function. Moreover, HB is the facial nerve staging system officially accepted by the American Academy of Otolaryngology-Head and Neck Surgery (4). HB has been considered accurate in describing the patient's facial function and in supervising the patient's status periodically to assess the course of recovery and the effects of treatment[9]. There are 6 stages in total and the number of stages increases as the severity of the disease increases. The stages are listed as stage I-normal, stage II-mild dysfunction, stage III-moderate dysfunction, stage IV-moderate severe dysfunction, stage V-severe dysfunction and stage VI-total paralysis according to HB (Table 1).

Table 1. The House-Brackmann Grading System.

	Grade	**Defined by**
1	Normal	Normal facial function in all areas.
2	Mild dysfunction	The forehead is in normal symmetry at rest; Eye, slight asymmetry, can close with minimal effort; Corner of mouth, slight asymmetry, can move with maximum effort.
3	Moderate dysfunction	There is asymmetry in both halves of the face that does not distort the appearance Forehead movements are mild to moderate The eye can cover it fully with effort A slight mouth movement occurs with maximum effort
4	Moderately severe dysfunction	Obvious weakness and/or disfiguring asymmetry. There is asymmetry in both halves of the face that distorts the appearance There are no forehead movements The eye cannot close completely with effort There is an asymmetrical mouth appearance with maximum effort
5	Severe dysfunction	Only barely perceptible motion. There is asymmetry at rest There are no forehead movements The eye cannot close completely with effort The mouth moves very slightly
6	Total paralysis	There is a very obvious asymmetry There is no muscle movement

Statistical analysis

Before the study, a "Power Analysis" was performed using G-Power 3.1 to ensure that the data obtained from the study could be used and evaluated and it was found that 472 patients should be included in the study with a 95% confidence interval for this study.. All analyses were carried out with SPSS 26.0 (IBM, USA). The findings of the study are expressed as frequency and percentages. Normality analysis was carried out using Kolmogorov-Smirnov test. The variables that did not normally distribute are presented as the median and interquartile range (IQR) with 25-75th percentiles. Descriptive statistics mean and standard deviation (mean±SD) were used for normally distributed variables, mean and minimum-maximum values ere used for non-normally distributed variables. Numeric dependent variables with abnormal distribution were compared with the Mann-Whitney U Test. Categorical variables were compared using the Chi-

Square Test. P value less than 0.05 with a 95% confidence interval was considered to be statistically significant.

Results

A total of 833 patients were included in the study. Of the patients, 411 (49.3%) were female and 422 (50.7%) were male. The mean age of the patients participating in the study was 43.33±0,669. At presentation, the direction of FP was on the right in 344 (41.3%) patients and on the left in 489 (58.7%). The mean days to admission to the outpatient clinic after the onset of symptoms was 1.9 days. According to the HB staging of our patients, the most common admission stage was 404 (48,25%) grade 2. The number of patients with comorbid diseases accompanying the patients was 333 (40%). The most common of these was Hypertension with 30.73% (n:256), followed by 20.28% (n:169) Diabetes Mellitus. 3.8% of patients have recurrent FP. A total of 199 (23.9%) patients diagnosed with PFP applied to the PMR clinic, and 92 (11%) patients received a physiotherapy program with an average of 22.5±3.4 rehabilitation sessions (Table 2).

Table 2. Demographic features and clinical findings of the patients.

Parametres		Patients (n/%)
Gender	Female	411 (%49,3)
	Male	422 (%50,7)
Age	Mean±standard deviation	43,30± 0,669
Facial Paralysis Direction	Right	344 (%41,3)
	Left	489 (%58,7)
The mean days to admission to the outpatient clinic after the onset of symptoms	Mean±standard deviation	1,9± 0,23
HB Classification of Facial Function	1	4 (%0,5)
	2	404 (%48,5)
	3	226 (%27,1)
	4	153 (%18,4)
	5	32 (%3,8)
	6	14 (%1,7)
Comorbid disease	None	500 (%60)
	HT	50 (%6)
	DM	35 (%4,2)
	HT+DM	134 (%16,1)
	HT+CAD	72 (%8,6)
	Others	42 (%5)
Recurrens	No	801 (%96,2)
	Yes	32 (%3,8)

Table 2. Demographic features and clinical findings of the patients (continued).

Application to PMR	Yes	199 (%23,9)
	No	634 (%76,1)
Practice of a Physiotherapy Program	Yes	92 (%11)
	No	741 (%89)
Total number of rehabilitation sessions	Mean±standard	22.5± 3.4

HT: Hypertension, DM: Diabetes Mellitus, CAD: Coronary Artery Disease, PMR: Physical Medicine and Rehabilitation.

When we looked at the distribution of patients by gender, there was a difference in terms of comorbid diseases and it was more common in female patients (p:0,004); FP recurrence was more frequent in female patients (p:0,025) (Table 3).

Table 3. Distribution of data by gender.

		Female Patients (n=411)	**Male Patients (n=422)**	***p***
Facial Paralysis Direction	Right	164	180	0,420*
	Left	247	242	
HB Classification of Facial Function	1	3	1	0,721*
	2	194	210	
	3	109	117	
	4	81	72	
	5	16	16	
	6	8	6	
Co-diseases	none	233	277	**0,004***
	HT	31	19	
	DM	17	18	
	HT+DM	84	50	
	HT+CAD	34	38	
	Others	22	20	
Recurrence	Yes	22	10	**0,025***
	No	389	412	
Application to PMR	Yes	108	91	0,111*
	No	303	331	
Practice of a Physiotherapy Program	Yes	41	51	0,331**
	No	370	371	

PMR: Physical Medicine and Rehabilitation, HB: House-Brackmann, HT: Hypertension, DM: Diabetes Mellitus, CAD: Coronary Artery Disease, p-value <0.05 was considered statistically significant, † **Chi-square Test, ** Mann-Whitney U Test.*

There was a significant correlation between admission to the PMR clinic and having left-sided FP (p:0,012). There was a positive significant correlation between admission to the PMR clinic and HB stage (p:0.000) (Table 4).

Table 4: The relationship of application to PMR clinic and the demographic and clinical characteristics of PFP patients

	Gender	**Facial Paralysis Direction**	**HB grade**	**Comorbid disease**
	p	***P***	***p***	***p***
Application to PMR (+)	0.111 *	**0.012** *	**0.000** *	0.217 *

*PMR: Physical Medicine and Rehabilitation, PFP: Peripheral facial paralysis, HB grade: The House-Brackmann grading system, p-value <0.05 was considered statistically significant, *Chi-square Test.*

Discussion

PFP has an acute onset in patients and presents with asymmetry due to weakness in the mimic muscles of the unilateral face. The most common cause of the disease is BP, known as idiopathic. Its incidence is 17-32/ 100,000 (2). If it is not diagnosed and treated early, it causes negative cosmetic results. However, the rate of recovery can be increased without sequelae with treatments applied in the early period. While the rate of spontaneous recovery was reported as 71-94% in BP cases that were not treated within the first 3 months, it was reported that this rate increased to 82-95% in cases who received any treatmen (12-14). BP treatment should be planned with a multidisciplinary approach. The aim of the treatment is to accelerate the recovery and to heal the disease without leaving any sequelae. The current treatment of BP consists of alternative and complementary treatments such as corticosteroid, antiviral treatment, surgical treatment, electrical stimulation, exercise, massage application, botox application and acupuncture (13).

Kang et al. reported that 54,8% of 250 patients with FP were female and 45,2% were male, and reported that the frequency of their patients peaked between the ages of 50-60 (15). While Garanhani et al. drew attention to the superiority of female gender with a rate of 60,9% in FP patients diagnosed between 1999 and 2003 (16). However, Rowlands et al. reported that there was no significant difference in terms of gender in 2473 patients with Bell's palsy, and the incidence of FP increased significantly in patients with 0 onset age and divided into 15-year periods (17). BP can occur at any age, but it is mostly seen between the ages of 10-40 or 15-45 (18). Similarly, in our study, 49,3% of our patients were female and 53% were male, and the mean age was 43,30± 0,669 years. Valença et al. reported localized paralysis on the left side with a rate of 55,6% in 180 patients with a diagnosis of BP (15). Özdemir et al. found that 54% of the patients had paralysis in the right face half

in their study on 100 patients with PFP (19). Paralysis was found on the left side in 54 of 102 patients with PF (53%), in a study conducted in 2020 (20). There are also studies where the involvement rates of the right and left sides of the face are equal (6, 21). We found that the direction of paralysis was left side in 58% of our patients in our study.

Hypertension and diabetes mellitus are factors that increase the risk of PFP (22). This is likely because diabetic patients are more prone to nerve degeneration. There is a hypothesis that hypertension may cause vasodilation, edema and FP by creating hemorrhage in the facial canal with direct pressure effects. Valenca et al. reported a relationship between 11,7% hypertension and 11,1% DM in 180 patients with a diagnosis of BP localized on the left side with a rate of 55,6% (23) Kang et al. reported 18,8% hypertension, 10.85% DM, and 4,4% cardiovascular diseases in 250 patients diagnosed with FP (15). Eliçora et al concluded that diabetes did not affect the severity, recovery rate from or healing of FP (24). The most common comorbid disease in our patients was Hypertension with 30.73% (n:256), followed by Diabetes Mellitus with 20.28% (n:169). No difference was found in the incidence of comorbid FP according to gender in a review conducted in 2020 (6). There was a difference in terms of comorbid diseases and it was more common in female patients in our study. The reason why comorbid diseases are more common in female patients in our study may be due to the higher average age of female patients.

Recurrent paralysis can be seen in approximately 8% of patients with BP. In recurrent paralysis, the tumor should be ruled out first and it should be evaluated whether facial functions worsen between attacks (25). Cirpaciu et al. found a recurrence rate of 12% in 185 patients with BP that they followed for 10 years (26). Differently when we look at our hospital data, we found that 32 (3,8%) of 833 patients who applied with the diagnosis of PFP during the 69 months of the study had a history of recurrent FP. In our study, we may have found the recurrence frequency to be less because the number of patients was higher and the follow-up period was shorter. Recurrent FP was found more frequently in female patients, similar to our study (6, 27). The reason why FP recurrence was more common in female patients in our study may be that the average age of female patients is higher and comorbid diseases are more common in female patients in our study.

There is no data on how many of the patients who applied to the OHNS outpatient clinic with the diagnosis of PFP

applied to PMR clinics and which patients received physiotherapy according to which factor in the literature, It has been seen that studies in the field of PFP rehabilitation are mostly related to the therapy method applied. Cappeli et al. reported that all physical therapy modalities in PFP applied showed the same results in their cohort study on 33 patients with PFP (28). The effectiveness of facial rehabilitation a non-invasive treatment, was evaluated in 76 patients with chronic facial nerve palsy in a study in 2019; after treatment, all patients showed improvement in the Facial Rating System Scale, and an increased number of therapy sessions, treatment of the right side of the face for chronic facial nerve palsy, and a lower initial Facial Rating System Scale score were seen as favorable prognostic factors (29). The effectiveness of the Mirror Effect PLUS Protocol, the first facial rehabilitation protocol specifically designed for acute Bell's palsy, was examined in ten patients with acute moderate to severe, severe, and total BP in a study in 2020; no difference in recovery was found between the rehabilitation and control groups; however, for the subset of patients with severe paralysis, the Mirror Effect PLUS Protocol was reported to improve and accelerate recovery (30). Twenty one patients who were diagnosed with BP and received a physical therapy program consisting of electrotherapy, infrared and mimic exercises, who received 15 sessions of treatment and 21 patients who received 30 sessions of treatment were examined in a retrospective study conducted in Turkey in 2022; It was reported that 15 sessions of physical therapy provided significant functional improvement in patients with BP receiving physical therapy and that increasing the number of physical therapy sessions to 30 sessions had no additional effect on functionality (7). Randomized controlled trials in which Proprioceptive Neuromuscular Facilitation (PNF) technique was applied to 184 patients with dysfunctions resulting from facial paralysis, and the rate of improvement measured using the House Brackmann Scale and clinical improvement were evaluated in a 2022 review; PNF was used in combination with other interventions in all of the included studies, and it was reported that PNF showed very low evidence that it was more effective than minimal intervention in the treatment of FP (8). Current Physiotherapy Approaches in Patients with FP were examined in a review conducted in 2024; Physical therapy approaches aimed at increasing muscle strength for a better result in all age groups, the importance of combining various methods such as electrical stimulation, massage, PNF, taping and mirror exercise that can be given for BP

with traditional medical treatment was emphasized (9). We applied an average of 22.5 sessions of physiotherapy including exercise, electrical stimulation and mirror therapy to 92 patients in our study as per the recommendation of this review. Similar to the 2019 study, we found that patients on the left side and with a higher stage received physical therapy. The reason why the number of physical therapy sessions was higher compared to the study conducted in Turkey in 2022 may be due to the higher average age and stage of our patients.

There was a positive significant correlation between admission to the PMR clinic and HB stage in our study. Cappelli et al. reported that those with higher HB Stage required more physiotherapy in their cohort study on 33 patients with PFP (28). It was reported that HB Stage was a poor prognostic factor in 47 adult PFP patients evaluated in the rehabilitation department of a tertiary hospital and these patients required more physical therapy sessions in a 2014 study. It was reported that those with a higher HB stage had less recovery after physical therapy in a review evaluating physiotherapy in FP (10). Similar to this review, the effectiveness of physical therapy for patients with PFP was investigated in a review published in 2024; it was reported that physical therapy reduced the rate of non-recovery in patients with PFP and that HB stage was a poor prognostic factor (31). This may explain that in our study, those with worse HB stage applied more to physical therapy. Seventy-six patients patients with chronic facial nerve palsy were examined in a study in 2019; treatment of the right side of the face due to chronic facial nerve palsy and a lower initial Facial Rating System Scale score were seen as favorable prognostic factors (29). Similarly, there was a significant correlation between admission to the PMR clinic and having left-sided FP in our study (p:0,012). This may be caused by the fact that the side of paralysis was on the left side in 58% of the patients with PF and the HB stage was higher on the left side, in our study.

Conclusion

Ours is the first study which investigated percentage of apply to PMR clinic patients who applied to the OHNS outpatient clinic diagnesed PFP and the relationship between this application and demographic and clinical characteristics. We found 23,9% patients with a diagnosis of PFP applied to the PMR clinic and a physiotherapy program was used to 11% patients. We found that patients with FP on the left side and with high HB stage were more likely to refer to the PMR clinic.

More studies are needed to contribute to the recommendation of which patients should be referred to the PMR clinic priority

Limitations

Limitations of our study were that it was retrospective, single-center, possible missing data, medical treatment received by the patients was not evaluated, disease degree could not be reached after physical therapy, and long-term follow-up data was not available.

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Research Article

The Relationship between Abdominal Circumference and Columna Vertebralis Length with Intraoperative Hypotension in Cesarian Cases with Spinal Anesthesia

Bahar Uslu Bayhan[1*], Ali Ihsan Yurekli[1], Osman Uzundere[1]

[1]*Diyarbakir Gazi Yasargil Training and Research Hospital, Department of Anesthesia and Reanimation Medicine, Diyarbakir, Turkiye.*

Abstract

Introduction: *Most pregnant women develop varying degrees of abdominal hypertension due to the enlarged uterus . Increased abdominal circumference and shorter columna vertebralis length have been found to be associated with increased with increased abdominal pressure and an enlarged uterus. We hypothesized that this was associated with the incidence of hypotension after spinal anesthesia. We conducted this study to investigate the relationship between abdominal circumference and columna vertebralis length and intraoperative hypotension in cesarean section operations under spinal anesthesia.*

Materials And Methods: *This study was conducted in Gazi Yaşargil Training and Research Hospital, Obstetrics and Gynecology annex building as a prospective observational study after ethics committee approval. Patients who were 18 years of age or older, had elective cesarean section under spinal anesthesia, had ASA (American Society of Anesthesiologists) I-II, were over 150 cm tall, and had a term (37-42 weeks) singleton pregnancy were included in the study. High-risk pregnancies (placenta previa, abruptio placenta, eclampsia, preeclampsia), multiple pregnancies, patients with additional disease related to other systemic diseases including cardiovascular disease, patients with spinal anesthesia contraindications, and a total of 102 patients were included in the study. Abdominal circumference, columna vertebralis lengths, and symphysis-fundus distance were measured after the patients' name-surname, protocol number, age, height, weight, body mass index, gestational week, and parity values were recorded. The patients were seated and the standard 11 mg Heavy Marcaine injection rate was 1 mL/sec to each patient with a 26 G – 27 G Quincke spinal needle through the L3-L4 interspinous space. After the procedure, the patients were placed on the operating table in the supine position and the operating table was deviated 10 degrees to the left. Heart rate, mean arterial pressure and saturation were recorded as 1 minute values. Afterwards, the 3rd minute, 5th minute, 10th minute, 15th minute and 30th minute values were recorded. Sensory block examination was evaluated with pinprick test and motor block levels were evaluated with modified Bromage scoring and recorded. A decrease of 30% from the systolic blood pressure value measured before spinal anesthesia or a*

decrease in the systolic blood pressure value below 90 mmHg was considered as hypotension and 10 mg of ephedrine was administered simultaneously to all patients with hypotension. After surgery, newborn APGAR score, newborn weight, time to zero Bromage score, time until sensory blockage regressed to T10, and presence of nausea and vomiting were recorded.

Results: *A significant correlation was found between the length of the vertebral column and the level of sensory block in patients after spinal anesthesia. There is a significant relationship between the length of the columna vertebralis and the time elapsed until the sensory block level regresses to T10. There was no correlation between abdominal circumference and and symphysis fundus distance and hypotension. However, a significant relationship was found between abdominal circumference and nausea.*

Conclusion: *There are multiple mechanisms associated with intraoperative hypotension after spinal anesthesia. Abdominal circumference and columna vertebralis length are important parameters for measuring and providing prediction.*

Key Words: *Abdominal circumference, Columna vertebralis, Cesarean section, Hypotension, Spinal anesthesia*

*** Corresponding author:** Bahar Uslu Bayhan, e-mail: dr.b.uslu@gmail.com, ORCID ID: 0009-0009-3052-2604

Introduction And Purpose

Spinal anesthesia is the most commonly used form of anesthesia in obstetric surgery (1). The incidence of hypotension occurring during spinal anesthesia varies between 55% and 90% (2). Spinal anesthesia, in addition to being an easy and fast induction, surpasses general anesthesia by not having any significant effect on the fetus. However, physiological changes that occur during pregnancy have led to increased sensitivity to local anesthesia (3).

The spread of local anesthetics in the subarachnoid space determines the level of sympathetic blockade. High levels of sensory blockade after spinal anesthesia increase the incidence of hypotension in pregnant women (4). Lumbosacral cerebrospinal fluid (CSF) volume is a crucial determinant of the spread of drug injected into the subarachnoid space (5).

In pregnant women, pressure on the inferior vena cava (IVC) by the gravid uterus causes the lumbar vein and vertebral artery to dilate around the spinal cavity (6) and the subarachnoid space to shrink with decreased CSF. This may increase the cephalad spread of intrathecally administered drug. However, many variables have been suggested to influence the ultimate spread of sensory blockade, such as height, weight, patient body mass index, and fetal weight, but the roles of these factors are controversial (7).

The size of the gravid uterus may affect local anesthetic dissemination by affecting the pressure in the subarachnoid space and thus affecting sympathetic blockade (8). Symphysiofundal distance (SFD) and abdominal circumference (AC) measure the size of the gravid uterus and have classically been used to assess fetal growth during pregnancy. SFD and AC measurements provide an indirect measure of the degree of IVC compression that may affect lumbosacral CSF volume. High abdominal pressure is one of the factors affecting the spread of local anesthetic agents in the cephalad (9).

Most pregnant women have developed varying degrees of abdominal hypertension due to an enlarged uterus (9, 10). However, measuring abdominal pressure is impractical and attempts to do so may increase the risk of infection. Previous studies have shown associations between larger abdominal circumference and higher abdominal pressure (11) and level of sensory blockade (12).

We hypothesized that increased abdominal circumference and short columna vertebralis length, previously found to be associated with increased abdominal pressure and enlarged uterus, are

associated with an increased incidence of hypotension after spinal anesthesia. The aim of this study is to evaluate the relationship between abdominal circumference and columna vertebralis length and the incidence of intraoperative hypotension in cesarean section cases with spinal anesthesia.

Materials and Methods

This study was conducted as a prospective observational study in the Gynecology and Gynecology annex building of Gazi Yaşargil Training and Research Hospital, after receiving ethics committee approval. Patients who were 18 years of age and older, had an elective cesarean section with spinal anesthesia, were ASA (American Society of Anesthesiologists) I- II, were over 150 cm tall, and had a term (37-42 weeks) singleton pregnancy were included in the study. High-risk pregnancies (placenta previa, abruptio placenta, eclampsia, preeclampsia), multiple pregnancy, patients with comorbidities related to other systemic diseases including cardiovascular disease, and patients with spinal anesthesia contraindications were excluded from the study, and a total of 102 patients were included in the study.

Patients taken to the operating room preoperative room were informed about the study. Name- surname, protocol number, age, height, weight, body mass index, gestational week, and parity values of the patients who signed the consent form and met the criteria were recorded. The patients whose information was recorded were taken to the operating table. Abdominal circumference and columna vertebralis lengths were measured with a non-flexible tape measure in the sitting position of the patients placed on the operating table. Abdominal environment; It was measured from the lower level of the umbilicus. Columna vertebralis length was recorded by measuring the distance from protuberantia occipitalis externa to sacral hiatus. Then, the patients were stretched and the symphsiofundal distance was measured from the upper edge of the uterine fundus to the upper edge of the pubic symphysis. The patients were placed in a sitting position again, three-channel electrocardiography, pulse oximetry and blood pressure monitoring were performed, and the first values were recorded. All preoperative patients received 10 ml/kg intravenous fluid loading.

Spinal anesthesia was performed on patients in a sitting position. The area where spinal anesthesia would be applied was surgically sterilized with a solution containing povidone- iodine, and after it was covered with a surgical sterile drape, the spinal needle was duly advanced using a spinal needle (26 G - 27 G) from the L3-

L4 level. After clear CSF was seen, no aspiration or barbituration was performed. Standard 11 mg Heavy Marcaine injection rate was administered to each patient at a rate of 1 mL/sec. After the procedure, the patient was placed on the operating table in a supine position and the operating table was deviated 10 degrees to the left. Heart rate, mean arterial pressure and saturation were recorded as 1st minute values. Afterwards, the 3rd minute, 5th minute, 10th minute, 15th minute and 30th minute values were recorded. During postoperative follow-up, measurements were continued every 15 minutes.

Sensory block examination in patients was performed with the pinprick test. Level measurements at the 1st minute, 5th minute, 15th minute and 30th minute were recorded. Motor block levels were evaluated with modified Bromage scoring.

Bromage Scale

0. There is no motor block, the leg can be lifted easily.
1. Partial block, hip cannot be moved, foot and knee joints can be moved.
2. Full block limit, only ankle can be moved

Complete block, no movement in the ankle.

Surgery was started after sensory block and motor block developed and the sensory block level reached the T4 dermatome level.

A 30% decrease from the systolic blood pressure value measured before spinal anesthesia or a systolic blood pressure value below 90 mmHg was considered hypotension, and all patients with hypotension were given 10 mg ephedrine simultaneously. A heart rate of 50/min was considered bradycardia and the patients were atropinized. Patients were given 10-15 ml/kg/h crystalloid solution during the intraoperative period.

After surgery, newborn APGAR score, newborn weight, time until Bromage Score reached zero, time until sensory block decreased to T10, and presence of nausea and vomiting were recorded.

The data obtained in our study were evaluated on a computer using the SPSS 24.0 for Windows statistical package program. Independent Samples t-test and Chi Square tests analyzes were used in the evaluation, and One Way Anova was used to compare more than two groups. $p<0.05$ was considered significant.

Table 1. Demographic data of patients.

	Mean±STD	Minimum	Maximum	Number
Age	29.3±5.8	19	42	102
Body Mass İndex	29.99±4.03	22.2	44.4	102
Pregnancy week	38.06±0.52	37	39	102
Parity	3.24±1.15	1	8	102
Abdominal Circumference	109.05±8.01	89	128	102
Columna Vertebralis Length	64.47±3.65	58	72	102
Symphysiofundal Distance	31.05±2.73	24	40	102
Operation Time	29.88±3.62	23	35	102
Newborn weight (gram)	3176±356	2350	4150	102
Time until sensory block regresses to t10	101.45±13.32	80	130	102
Time until Bromage score reaches 0	179.85±27.12	120	240	102
Mean arterial pressure before anesthesia	97.25±9.27	79	118	102
Heart rate before anesthesia	96.56±12.83	72	130	102
Saturation before anesthesia	98.93±1.22	95	100	102
1st minute mean arterial pressure	86.18±12.9	57	129	102
1st minute heart rate	95.53±15.47	67	151	102
1st saturation	99.01±1.47	89	100	102
3rd minute mean arterial pressure	78.01±15.76	48	122	102
3rd minute heart rate	90.53±19.36	65	149	102
3rd saturation	98.98±1.4	94	105	102
5th minute mean arterial pressure	79.92±14.99	41	114	102
5th minute heart rate	89.43±15.58	55	150	102
5th saturation	97.86±9.92	95	100	102
10th minute mean arterial pressure	83.69±11.61	54	111	102
10th minute heart rate	90.19±13.07	57	123	102
10th saturation	98.71±2.66	92	100	102
30th minute mean arterial pressure	88.09±8.37	66	114	102
30th minute heart rate	91.06±10.89	72	127	102
30th saturation	99.16±1.76	84	100	102

Results

All 102 patients who agreed to be included in the study were included in the study. No patients were excluded from the study. Demographic data of the patients are available in Table 1. In Table 2 below, data on intraoperative complications are available.

Table 2. Intraoperative Complications.

Complication	n	%
Nausea		
Yes	28	22.5
No	74	72.5
Vomiting		
Yes	7	6.9
No	95	93.1
1st minute hypotension		
Yes	3	29
No	99	97.1
3rd minute hypotension		
Yes	22	21.6
No	80	78.4
5th minute hypotension		
Yes	17	16.7
No	85	83.3
10th minute hypotension		
Yes	6	5.9
No	96	94.1
30th minute hypotension		
Yes	0	0
No	102	100

In our study, the relationship between abdominal circumference, columna vertebralis and symphysiofundal distances and hypotension in cesarean section cases under spinal anesthesia were grouped separately and examined in detail.

When Table 3 is examined, the mean arterial pressure values measured at the 1st minute, 3rd minute, 5th minute and 10th minute were lower in patients with larger abdominal circumference. But this was not statistically significant ($p>0.05$).

Likewise, in the group with larger abdominal circumference, the time until sensory block decreased to T10 was longer, but was not significant.

Table 3. Relationship Between Abdominal Circumference and Intraoperative Data.

	Group 1 ≤ (109 cm) Mean±STD	Group 2 (>109 cm) Mean±STD	p
Time until sensory block regresses to t10	99.4±13.67	103.67±12.69	0.92
Time until Bromage score reaches 0	178.02±28.15	181.84±26.11	0.47
Mean arterial pressure before anesthesia	96.51±8.82	98.06±9.76	0.4
Heart rate before anesthesia	95.79±11.77	97.39±13.97	0.53
Saturation before anesthesia	99.09±1.16	98.76±1.28	0.13
1st minute mean arterial pressure	86.94±13.91	85.35±11.08	0.53
1st minute heart rate	95.04±15.66	96.06±15.41	0.74
1st saturation	99.15±1.11	98.86±1.78	0.39
3rd minute mean arterial pressure	80.09±14.52	75.76±16.86	0.2
3rd minute heart rate	90.66±19.04	90.39±19.89	0.94
3rd saturation	98.92±1.28	99.04±1.54	0.97
5th minute mean arterial pressure	80.13±13.32	79.69±16.75	0.66
5th minute heart rate	89.25±16.12	89.63±15.13	0.9
5th saturation	98.79±1.86	96.86±14.19	0.7
10th minute mean arterial pressure	84.47±10.4	82.84±12.85	0.48
10th minute heart rate	89.98±12.4	90.41±13.88	0.87
10th saturation	98.92±1.29	98.47±3.6	0.8
30th minute mean arterial pressure	88.96±8.4	87.14±8.3	0.1
30th minute heart rate	91.7±10.77	90.37±11.09	0.34
30th saturation	99.23±1.01	99.08±2.32	0.73
Total n(%)	**53(52)**	**49(48)**	**102**

(Group 1: Patients with an abdominal circumference of 109 cm and less than 109 cm. Group2: Patients with an abdominal circumference of more than 109 cm. n: Number of patients.).

Table 4 shows the relationship between sensory block level measurements and abdominal circumference, and no significant difference was found.

Table 4. Relationship Between Abdominal Circumference and Sensory Block.

Sensory Block Level	Group 1 (≤109 cm) n(%)	Group 2(>109 cm) n(%)	p
1st			
T6	0(0)	1(2)	0.49
T8	15(28.3)	16(32.7)	
T10	38(71.7)	32(65.3)	
5th			
T4	0(0)	1(2)	0.055
T5	15(28.3)	16(32.7)	
T6	38(71.7)	32(65.3)	
15th			
T4	32(60.4)	36(73.5)	0.17
T5	21(39.6)	12(24.5)	
T6	0(0)	1(2)	
30th			
T4	3(5.7)	13(26.5)	
T5	25(47.2)	17(34.7)	0.08
T6	13(24.5)	15(30.6)	
T8	12(22.6)	4(8.2)	

(Group 1: Patients with an abdominal circumference of 109 cm and less than 109 cm. Group2: Patients with an abdominal circumference of more than 109 cm. n: Number of patients.).

In Table 5, abdominal environment and intraoperative complications were examined, and a significant relationship was found with nausea with a p value of <0.05.

Table 5. Relationship Between Abdominal Circumference And İntraoperative Complications.

Complication	Group 1 (≤109 cm) n(%)	Group 2 (>109 cm) n(%)	p
Nausea			
Yes	8(15.1)	20(40.8)	0.04
No	45(48.9)	29(59.2)	
Vomiting			
Yes	20(3.8)	5(10.2)	0.19
No	51(96.2)	44(89.8)	
1st minute hypotension			
Yes	1(1.9)	2(4.1)	0.51
No	52(98.1)	47(95.9)	
3rd minute hypotension			
Yes	6(11.3)	16(37.2)	0.09
No	47(88.7)	33(67.3)	
5th minute hypotension			
Yes	6(11.3)	11(22.4)	0.13
No	47(88.7)	38(77.6)	
10th minute hypotension			
Yes	2(3.8)	4(8.2)	0.34
No	51(96.2)	45(91.8)	
30th minute hypotension			
Yes	0(0)	0(0)	*
No	53(100)	49(100)	

(Group 1: Patients with an abdominal circumference of 109 cm and less than 109 cm. Group2: Patients with an abdominal circumference of more than 109 cm. n: Number of patients.).

Symphysiofundal distance created two groups according to its average value (31 cm) and was classified as Group 1 and Group 2.

When the data were examined, it was determined that the symphysiofundal distance did not make a significant difference.

Columna vertebralis length was divided into 3 groups considering previous studies (17).

Table 6. Relationship Between Symphysiofundal Distance and An Intraoperative Data.

Group 1 (≤31 cm) Mean±STD	Group 2(>31 cm) Mean±STD	p	p
101.02±13.09	102.05±13.77	0.8	0.8
179.66±26.06	180.12±28.83	0.82	0.82
97.42±10.24	97.02±7.86	0.83	0.83
96.14±13.79	97.14±11.52	0.69	0.69
98.9±1.3	98.98±1.12	0.93	0.93
84.37±12.15	88.65±13.61	0.98	0.98
94.86±15.7	96.44±15.28	0.61	0.61
98.98±1.69	99.05±1.11	0.75	0.75
79.92±16.23	75.4±14.88	0.22	0.22
91.88±20.64	88.67±17.51	0.94	0.94
98.98±1.16	98.98±1.69	0.96	0.96
81.19±14.9	78.19±15.11	0.44	0.44
90.8±15.96	87.56±15.02	0.9	0.9
96.97±12.97	99.09±1.21	0.2	0.2
84.05±11.61	83.19±11.74	0.48	0.48
91.07±12.83	88.98±13.44	0.87	0.87
98.61±2.99	98.84±2.15	0.61	0.61
88.81±7.48	87.09±9.47	0.78	0.78
92.2±11.45	89.49±9.99	0.26	0.26
99.02±2.19	99.35±0.87	0.6	0.6
59(57.8)	43(42.2)	102(100)	102(100)

(Group 1: Patients with Symphysiofundal Distance 31 cm and less than 31 cm. Group2: Patients with Symphysiofundal Distance greater than 31 cm, n: Number of patients).

Table 7. Relationship Between Symphysiofundal Distance and Sensory Block.

Sensory Block Level	Group 1 (≤31 cm) n(%)	Group 2(>31 cm) n(%)	p
1st			
T6	1(1.7)	0(0)	0.6
T8	19(32.2)	12(27.9)	
T10	39(66.1)	31(72.1)	
5th			
T4	29(49.2)	14(32.6)	0.12
T5	25(42.4)	27(62.8)	
T6	5(8.5)	2(4.7)	
15th			
T4	39(66.1)	29(67.4)	0.69
T5	19(32.2)	14(32.6)	
T6	1(1.7)	0(0)	

(Group 1: Patients with Symphysiofundal Distance 31 cm and less than 31 cm. Group2: Patients with Symphysiofundal Distance greater than 31 cm, n: Number of patients).

Table 8. Relationship Between Columna Vertebralis Length and Intraoperative Data.

	Group 1 (≤62 cm) Mean±STD	**Group 2(63-66 cm) Mean±STD**	**Group 3(>67cm) Mean±STD**	**p**
Time until sensory block regresses to t10	97.6±13.14	102.58±13.54	105±12.24	0.04
Time until Bromage score reaches 0	173.82±25.34	185.13±28.1	180±27.29	0.14
Mean arterial pressure before anesthesia	98.35±9.46	96.66±9.57	96.77±8.85	0.7
Heart rate before anesthesia	97.35±14.88	97.08±11.18	95±12.59	0.73
Saturation before anesthesia	98.85±1.14	98.92±1.14	99.03±1.12	0.88
1st minute mean arterial pressure	87.29±14.17	84.13±11.83	87.5±12.8	0.5
1st minute heart rate	96.53±18.25	93.76±12.6	96.63±15.66	0.8
1st saturation	98.62±2.13	99.21±1.01	99.2±0.88	0.58
3rd minute mean arterial pressure	78.29±18.98	78.55±14.17	77±14.06	0.92
3rd minute heart rate	90.97±21.21	89.79±19.69	90.97±17.24	0.95
3rd saturation	98.76±1.47	98.79±1.29	99.47±1.38	0.18
5th minute mean arterial pressure	76.85±16.87	83.34±13.96	79.07±13.51	0.23
5th minute heart rate	89.85±20.55	90.58±12.19	87.5±13.01	0.71
5th saturation	95.71±17.04	98.58±1.51	99.4±0.89	0.04
10th minute mean arterial pressure	83.41±13.36	85.76±9.89	81.37±11.43	0.3
10th minute heart rate	89.56±15.71	89.95±9.97	91.2±13.62	0.87
10th saturation	98.85±1.35	98.66±2.25	98.6±4.01	0.48
30th minute mean arterial pressure	89.44±9.74	87.84±6.76	86.87±8.61	0.42
30th minute heart rate	98.79±13.27	90.66±8.68	89.6±10.51	0.65
30th saturation	98.82±2.8	99.24±0.88	99.16±1.76	0.59
Total n(%)	**34(33.3)**	**38(37.3)**	**30(29.4)**	**102(100)**

(Group 1: Patients with Columna Vertebralis Length 62 cm and less than 62 cm, Group 2: Patients with Columna Vertebralis Length 63-67 cm, Group 3: Patients with Columna Vertebralis Length greater than 67 cm, n: Number of patients).

When Table 9 is examined, the time until the sensory block decreases to T10 differed significantly between the groups ($p<0.05$). As the length of the columna vertebralis increases, the time until the level drops to T10 increases. Likewise, according to the data obtained when Table 9 was examined, the relationship between the length of the vertebral column and the sensory block level was found to be significant at the 5th minute ($p<0.05$). The number of patients whose sensory block reached T4 at the 5th minute was found to be higher in those with short vertebralis column length.

Table 9. Relationship Between Columna Vertebralis Length and Sensory Block.

Sensory Block Level	Group 1 (<62 cm) n(%)	Group 2(63-66cm) n(%)	Group 3(>67cm) n(%)	p
1st				
T6	0(0)	1(2.6)	0(0)	
T8	17(50)	8(21.1)	6(20)	0.29
T10	17(50)	29(76.3)	24(80)	
5th				
T4	21(61.8)	15(39.5)	7(23.3)	
T5	12(35.3)	20(52.6)	20(66.7)	0.04
T6	1(2.9)	3(7.9)	3(10)	
15th				
T4	22(64.7)	26(68.4)	20(66.7)	
T5	12(35.3)	11(28.9)	10(33.3)	0.74
T6	0(0)	1(2.6)	0(0)	
30th				
T4	4(11.8)	7(18.4)	5(16.7)	
T5	12(35.3)	17(44.7)	13(43.3)	0.52
T6	9(26.5)	11(28.9)	8(26.7)	
T8	9(26.5)	3(7.9)	4(13.3)	

(Group 1: Patients with Columna Vertebralis Length 62 cm and less than 62 cm, Group 2: Patients with Columna Vertebralis Length 63-67 cm, Group 3: Patients with Columna Vertebralis Length greater than 67 cm, n: Number of patients).

Discussion

Intraoperative complications are an important determinant of mortality and morbidity. Intraoperative hypotension, which occurs especially during cesarean section in pregnant women, is a serious complication associated with maternal nausea-vomiting and fetal hypoxia. This issue, which anesthesiologists should know with all its mechanisms, forms the basis of our study.

Measuring intra-abdominal pressure is an invasive and impractical procedure. H.Sugerman et al. showed in their study that there is a direct proportion between abdominal circumference and intra-abdominal pressure (13). In our study, we used abdominal circumference measurement because it can be easily measured in every hospital and by all personnel. We divided the patients participating in our study into two groups, those with an abdominal circumference of 109 cm and less than 109 cm constituted Group 1, and those with an abdominal circumference greater than 109 cm constituted Group 2. We found that in Group 2, which had a larger abdominal

circumference, the time until the sensory block decreased to T10 was longer than the other group. However, this was not statistically significant.

We showed that there was no significant difference between the two groups in terms of the development of intraoperative hypotension after anesthesia according to abdominal circumference. In a similar study conducted by P. Thomard et al. in 2018, they showed that there was no difference in abdominal circumference measurement between the two groups in terms of hypotension (14). However, both in our study and in the study by P. Thomard et al., it was found that the mean arterial pressure values measured after anesthesia were lower in the group with a larger abdominal circumference.

Abdominal circumference is positively related to abdominal pressure. High abdominal pressure has been shown to cause high spinal anesthesia and hypotension (9). A study was conducted by

Khan et al. in which they measured the intra-abdominal pressure before and after birth in pregnant women undergoing cesarean section at term, and the intra-abdominal pressure before birth was found to be 22 mmHg and 16 mmHg after birth. This difference, which is considered significant, is due to the uterine content (15). However, we did not measure abdominal pressure in this study. Therefore, we conclude that the decrease in mean arterial pressure in our study is due to larger abdominal circumference, which may be the result of an enlarged uterus causing aortocaval compression or increased abdominal pressure. A limitation of this study was the lack of abdominal pressure data that could be used to explain the mechanism of this finding. Contrary to our expectations, symphsiofundal distance measurement did not show a significant relationship with the level of sensory blockade. Kim et al reported that Symphsiofundal distance and cerebrospinal pressure were not significantly related to the level of sensory blockade (16). In our study, we did not find a significant relationship between symphsiofundal distance and intraoperative hypotension.

The length of the columna vertebralis in an adult male is 73-76 cm, and in a female this length is 7-10 cm less (17). In our study, patients were divided into three groups according to the length of the vertebralis column. An important factor affecting the spread of spinal anesthesia is the length of the vertebral column. Zhou et al found that there was an inversely positive relationship between columna vertebralis length and cephalad spread (11). In our study, the time until the sensory block level decreased to T10 was found to be statistically

significant ($p<0.05$). Again, when the results of our study were examined, the level of sensory block was found to be higher in those with shorter vertebralis column length.

When we think logically, we can predict that the longer the vertebralis column, the less spread it will have to the cephalad when an equal dose of bupivacaine is applied. Hartwell et al found a significant relationship between the spread of spinal anesthesia and vertebral column length in term pregnant women (18). In our study, we reached results that support this.

The association of hypotension and nausea is known. While 28 of the 102 patients in our study had nausea, only 7 of the patients with nausea had vomiting. All patients with nausea were accompanied by hypotension. However, nausea was not observed in every patient with hypotension. Kang et al reported that the incidence of intraoperative emetic symptoms during spinal anesthesia for cesarean delivery was correlated with the development of hypotension (19). In our study, a statistically significant relationship was found between abdominal circumference and nausea. ($p<0.05$) Nausea was observed in more patients in the group with larger abdominal circumference.

Conclusion

There are multiple theories for the mechanism of intraoperative hypotension following spinal anesthesia (2). Likewise, there are multiple factors that affect intraoperative hypotension (3, 4). In our study, we found that there was an inverse relationship between abdominal circumference and mean arterial pressure after spinal anesthesia. We found that as the abdominal circumference increased, the measured mean arterial pressures were lower. A positive correlation was also found between columna vertebralis length and sensory block level. However, no significant relationship was found between symphysiofundal distance measurement and intraoperative complications.

Limitations

Our study also has some limitations. More patients could have been included in the study. No invasive measurements were made for abdominal pressure. Since measurements are made manually, there may be different results between people measuring. However, in our study, we made measurements by a single person.

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Research Article

Evaluation of Anthropometric Risk Parameters and Meal Habits in University Students According to Gender

Bircan Ulas Kadioglu[1*], Pinar Soylar[2]

[1]*Osmaniye Korkut Ata University, Faculty of Health Sciences, Department of Nutrition and Dietetics, Osmaniye, Turkiye.*
[2]*Fırat University, Faculty of Health Sciences, Department of Nursing, Elazig, Turkiye.*

Abstract

Purpose*: The aim of the study is to evaluate anthropometric risk parameters and meal habits regarding nutrition-related chronic diseases in university students according to gender.* ***Methods****: This study was conducted on a total of 898 university students. A questionnaire was used to determine the demographic characteristics and meal habits of university students. Body weight, height, waist circumference (WC), hip circumference (HC) was measured and, body mass index (BMI), waist-to-hip ratio (WHR), waist-to-height ratio (WHtR) were calculated.* ***Results:*** *The mean age of the participants was 20.9 ± 2.0, 76.5% were female, 82.5% skipped meals. Mean values of all anthropometric parameters respectively body weight, height, BMI, WC, HC, WHR and WHtR; 61.0±11.7 kg, 166.7±8.4 cm, 21.8±3.0 kg/m2 ,75.3±9.3 cm, 96.3±7.8 cm, 0.78±0.07 and 0.45±0.05. Mean values of all parameters were found to be significantly different according to gender (p <0.05). According to BMI group 11.7% of females and 26.5% of males were pre-obese or obese. The prevalence of the participants at risk (above the cut-points) was 4.7% in men and 3.2% in women for abdominal obesity according to WC. 14.8% of the females and 32.7% of the males have the risk according to WHR. Abdominal obesity was found in 13.1% of the participants according to WHtR cut-off degree (WHtR> 0.5)* ***Conclusion:*** *There was statistically significant relationship between the meal skipping status and the mean WC (cm) of the participants. It was observed that WC was higher in male students and those who frequently skipped meals.*

Key words: *Anthropometric risk parameters, Meal habits, University students*

*** Corresponding author:** Bircan Ulas Kadioglu, E-mail: bircanulaskadioglu@osmaniye.edu.tr, ORCID ID: 0000-0002-1150-8761

Introduction

It is a common idea that the daily diet should be divided into three meals: breakfast, lunch and dinner. Meal skipping is the skipping or non-consumption of one or more of the traditional main meals during the day. Regularly skipping meals, especially breakfast, has been associated with lower diet quality, lower total energy, vitamin and mineral intake, increased risk of central obesity, insulin resistance markers and cardio metabolic risk factors (1).

Diet is a risk factor for the development of many chronic conditions (2). Diet-related chronic diseases such as obesity, coronary heart disease, diabetes and hypertension are common and increasing worldwide (3). Obesity is associated with various cardiovascular risk factors including hypertension, type 2 diabetes, and dyslipidemia (4).

Skipping breakfast increases the risk of diet-related chronic diseases and all-cause mortality. Also, those who tend to consume more refined and sweet products at night skip breakfast, which increases the risk of cardiovascular disease and type 2 diabetes (5).

According to World Health Organization (WHO), globally, 43% of adults were overweight and 16% were obese in 2022 (6). The prevalence of central obesity in TURDEP-I was 34% (49% female, 17% male) in the general population. In TURDEP-II, it increased to 53% (female 64%, male 35%) (7).

WHO recommends measuring body mass index (BMI) universally to determine overweight and obesity. Measurements such as waist circumference (WC) or waist-hip ratio (WHR) are also used, which measure the distribution of abdominal fat. As a more sensitive measure of visceral obesity, WC has been suggested as an indicator of cardiovascular risk (8). WHR and waist-to-height ratio (WHtR) are alternative methods to WC that can be applied to determine anthropometric risk factors (4). WHtR has been suggested as a better predictor of cardiovascular risk, mortality, and intra-abdominal fat than WC (8). WHtR and other anthropometric measurements (BMI, WC and WHR) are considered risk determinants of chronic diseases such as cardiovascular diseases and Type 2 diabetes mellitus (9). The relationship between WC or WHR with chronic diseases in adults has been shown by epidemiological studies (10). The type of obesity in which the WC or WHR is increased is called central (visceral or abdominal) obesity.

Central obesity is an important risk factor for cardiovascular health. According to WHO, WC is ≥88 cm in females and ≥102 cm in males, indicating the presence of central obesity. According to the data of Turkey Endocrinology and Metabolism Society (TEMD) obesity-lipid metabolism-hypertension study group, abdominal obesity criterion was recommended as ≥100 cm in men and ≥90 cm in women (11).

Research indicates that inadequate dietary habits are prevalent among university students, predisposing them to health risks such as obesity, cardiovascular diseases, and eating disorders (12). These dietary habits are influenced by multiple factors, including gender, with varying implications for health and well-being. Moreover, the university setting often exacerbates the vulnerability to poor nutritional choices due to factors like food insecurity, limited access to healthy food options, and the temptation of convenient but unhealthy fast food. Young adulthood, a pivotal developmental phase, necessitates a deeper investigation into the dietary habits, anthropometric risk factors, and their implications for chronic disease risk among university students (13, 14).

Evidence points to widespread inadequate dietary habits within this demographic, increasing susceptibility to various health risks such as obesity, cardiovascular diseases, and eating disorders (14). Through a comprehensive understanding of the interplay between anthropometric measures, meal habits, and gender differences, health promotion interventions can be more precisely tailored to address the specific needs and vulnerabilities of university students, thus contributing to the prevention of nutrition-related chronic diseases in this population. Evaluating these parameters not only furnishes crucial insights into the efficacy of health-promoting interventions aiming at enhancing dietary habits and nutritional cognizance within the university milieu but also aspires to shape future initiatives and programs to offset the risks of nutrition-related chronic diseases, fostering healthier lifestyle choices among university students. By integrating a holistic analysis of meal habits and anthropometric indices with a focus on gender disparities, our study augments the ongoing discourse on public health enhancement, disease deterrence, and the welfare of young adults as they navigate the pivotal transition into university life, thereby making a significant contribution to the corpus of nutritional health research.

The aim of the research was to evaluate the meal habits and anthropometric risk parameters of regarding nutrition-related chronic diseases as diabetes and

cardiovascular diseases of university students according to gender. Additionally, in this study, the relationship between anthropometric risk parameters and meal habits in university students was evaluated.

Material and Methods

Participants

This cross-sectional study population consisted of university students in the eastern part of Turkey. The universe of the study consists of 27151 undergraduate students. The sample size was calculated as 1027 using the sample size calculation formula $n=Nt^2(pq)/d^2(N-1)+t^2(pq)$ in groups with known population numbers ($t=1.96$, $d=0.03$, $p=0.5$). Recruitment consisted of an informative talk, explaining details to the students inside the college about the research. Those who volunteered to participate were included. The exclusion criteria consisted of the students with chronic diseases. And any responses from outside the college were excluded.

Study plan

The data were collected between February-May 2019. The datas of socio-demographic characteristics and meal habits were obtained by a questionnaire consisted of 32 questions applied by the researchers using face to face interview technique.

Anthropometric measurements

Trained dieticians obtained the body weight, height, waist circumference (WC) and hip circumference (HC) in the study. Height, WC and HC was measured using a stadiometer. Weight was measured with a portable scale. BMI was calculated as weight (kg)/height (m^2). The participants were classified in four groups according to their BMIs: underweight (BMI <18.5), normal weight (BMI 18.5 to 24.9), preobese (BMI 25 to 29.9) and obese (BMI above 30 kg /m2). According to the data of Turkey Endocrinology and Metabolism Society (TEMD) obesity-lipid metabolism-hypertension study group, abdominal obesity criterion was recommended as ≥100 cm in men and ≥90 cm in women according to WC. WC ≥90 and ≥80 cm for male and female, respectively was defined as overweight (11). WHR was determined by dividing WC to HC. WHR <0.90 and <0.85 for male and female, respectively is defined as a normal healthy fat level (15). WHtR was calculated by dividing WC by height length. WHtR >0.5 for male and female are defined as markers of increased risk of chronic disease (16). WHtR≥0.5 was defined as a measure of central obesity (11).

Statistical analyses

SPSS Statistics was used for analysis. Meal habits and anthropometric risk parameters were analyzed using frequency tables.

Counts (n), percentage (%), and mean± standard deviation (SD) values were taken to evaluate of the data. Pearson chi-squared test and Student's t-test was used. Statistical tests were regarded as statistically significant if *p* value <0.05.

Results

The results of the study indicated that the mean age of 898 university students aged between 18-30 was determined as 20.9±2.0. 76.5% of them were female, 23.5% were male. 59.5% of them stay in dormitories. 2.3% of the students dieting.

Mean values of all anthropometric parameters respectively body weight, height, WC and HC; 61.0±11.7 kg, 166.7±8.4 cm, 75.3±9.3cm, 96.3±7.8cm. BMI, WHR and WHtR were assessed. Distribution of anthropometric parameters according to gender are shown in Table 1.

Table 1. Distribution of anthropometric parameters according to gender among university students.

	Female (n=687)	**Male (n=211)**	**Total (n=898)**		
Parameters	Mean ± SD	Mean ± SD	Mean ± SD	t	p-value
Body weight (kg)	57.0±8.6	73.9±11.1	61.0±11.7	23.296	<0.001
Height (cm)	163.2±5.6	177.8±5.9	166.7±8.4	32.816	<0.001
Body mass index (kg/m2)	23.3±3.2	21.4±2.8	21.8±3.0	8.636	<0.001
Waist circumference (cm)	72.4±7.4	84.8±8.6	75.3±9.3	20.548	<0.001
Hip circumference (cm)	95.9±7.4	97.7±8.8	96.3±7.8	2.857	0.004
Waist/hip ratio	0.76±0.05	0.87±0.07	0.78±0.07	26.674	<0.001
Waist/height ratio	0.44±0.05	0.48±0.05	0.45±0.05	9.309	<0.001

Student's t-test, significance at p<0.05

Body weight, height, WC, HC, WHR and WHtR were significantly higher (p<0.05) in males than females. BMI was significantly higher (p<0.05) in females than males (Table 1).

Table 2 shows the distribution of anthropometric risk parameters according to gender among university students.

Table 2. Distribution of anthropometric risk parameters according to gender among university students.

Anthropometric risk parameters	Female n(%)	Male n(%)	Total n(%)
Body mass index (BMI) (kg/m2)			
Underweight (<18.5)	86(12.6)	5(2.4)	91(10.1)
Normal (18.5-24.9)	520(75.7)	150(71.1)	670(74.6)
Pre-obese (25.0-29.9)	69(10.0)	46(21.8)	115(12.9)
Obese (≥30.0)	12(1.7)	10(4.7)	22(2.4)
Waist circumference (WC) (cm)			
Normal	590(85.9)	147(69.7)	737(82.1)
Overweight	75(10.9)	54(25.6)	129(14.3)
Obese	22(3.2)	10(4.7)	32(3.6)
Waist/hip ratio (WHR)			
Normal	585(85.2)	142(67.3)	727(81.0)
Risk	102(14.8)	69(32.7)	171(19.0)
Waist/height ratio (WHtR)			
<0.4 (No increased risk)	72(10.5)	5(2.4)	77(8.6)
0.4-0.5 (Increased risk)	554(80.6)	149(70.6)	703(78.3)
>0.5 (Very high risk)	61(8.9)	57(27.0)	118(13.1)

Measure of Body mass index: underweight <18.50; 18.50-24.99 overweight, > 25–29.99 kg/m2; obesity, > 30 kg/m2
Waist circumference (WC: overweight: > 94 cm(M); > 80 cm(F), obesity: > 102 cm(M); > 88 cm(F)
Waist-to-hip ratio (WHR): obesity ≥ 0.90 cm(M); ≥ 0.85 cm(F)
** Pearson Chi-square test is for a difference in frequency of obesity between males and females as measured by each method

According to BMI group 11.7% of females and 26.5% of males were overweight or obese. 75.7% of females and 71.1% of males had normal weight. We found that the prevalence of obesity was 2.4% of participants according to BMI. In this study WC<90 cm in men and <80 cm in women was accepted as normal. W≥90 and ≥80 cm for male and female, respectively was defined as overweight. WC ≥100 and ≥90 cm for male and female, respectively was defined as obese according to the data of Turkey Endocrinology and Metabolism Society (TEMD, 2018). The prevalence of the participants at risk according to WC was 4.7% in men and 3.2% in women for abdominal obesity (Table 2). WHR<0.90 and <0.85 for male and female, respectively was defined as a normal healthy fat level. 14.8% of the females and 32.7% of the males have the "risk" WHR. WHtR≥0.5 was defined as a measure of central obesity. Abdominal (central) obesity was found in 13.1% of the participants according to WHtR cut-off degree (WHtR>0.5) (Table 2). Meal habits of the study participants according to gender are given in Table 3.

Table 3. Distribution of meal habits according to gender among university students.

	Female n(%)	Male n(%)	Total n(%)	χ2	*p*-value
Number of Main meal					
1	12(1.7)	9(4.3)	21(2.3)	5.116	**0.036**
2	271(39.4)	93(44.1)	364(40.5)		
3	404(58.9)	109(51.6)	513(57.2)		
Number of snacks					
None	137(19.9)	49(23.2)	186(20.7)	0.119	0.140
1	233(33.9)	83(39.3)	316(35.2)		
2	223(32.5)	59(28.0)	282(31.4)		
3 and more	94(13.7)	20(9.5)	114(12.7)		
Meal Skipping					
Yes	556(80.9)	185(87.7)	741(82.5)	5.092	**0.024**
No	131(19.1)	26(12.3)	157(17.5)		
Skipped meal (n=741)					
Breakfast	234(42.1)	82(44.3)	316(42.7)	0.291	0.864
Lunch	270(48.6)	86(46.5)	356(48.0)		
Dinner	52(9.3)	17(9.2)	69(9.3)		
Meal Skipping Reason (n=741)					
Don't want to eat	253(45.5)	90(48.6)	343(46.3)	2.482	0.478
Lack of time	238(42.8)	68(36.8)	306(41.3)		
To lose weight	20(3.6)	8(4.3)	28(3.8)		
Other reasons	45(8.1)	19(10.3)	64(8.6)		

** Pearson Chi-square test, significance at p<0.05

Participants consumed the average of 3.9± 1.1 meals a day (min-max: 1-6) and 82.5% (n=741) of them (80.9% female and 87.7% male) skipped meals. There was statistically significant relationship between the number of main meals consumed by the participants and meal skipping status according to gender (p<0.05). Table 4 shows the comparison of anthropometric parameters with skipping meals among university students.

Table 4. Comparison of anthropometric parameters with skipping meals among university students.

	Skipping meal				
Parameters	**Yes (n=741)**	**No (n=157)**	**Total (n=898)**		
	Mean ± SD	Mean ± SD	Mean ± SD	t	p-value
Body weight (kg)	61.2±11.9	59.6±10.4	61.0±11.7	-1.553	0.121
Height (cm)	166.8±8.4	166.0±8.2	166.7±8.4	-1.044	0,297
Body mass index (kg/m2)	21.9±3.1	21.5±2.6	21.8±3.0	-1.309	0.191
Waist circumference (cm)	75.6±9.4	74.0±8.7	75.3±9.3	-2.027	**0.043**
Hip circumference (cm)	96.5±8.1	95.7±6.5	96.3±7.8	-1.234	0.218
Waist/hip ratio	0.78±0.07	0.77±0.07	0.78±0.07	-1.667	0.096
Waist/height ratio	0.45±0.05	0.44±0.04	0.45±0.05	-1.833	0.067

*Student's t-test, significance at p<0.05.

There was no statistically significant difference between body weight, height, BMI, HC, WHR and WHtR according to meal skipping status ($p>0.05$). There was statistically significant relationship between the meal skipping status and the mean WC (cm) of the participants ($p=0.043$).

Discussion

This study was planned and conducted in order to evaluate anthropometric risk parameters regarding nutrition-related chronic diseases and meal habits in university students according to gender. In this study, BMI, WHR and WHtR were assessed among 898 university students. Anthropometric measurements are important in determining nutritional status because they are indicators of protein and fat storage. In practice, BMI is frequently used in the assessment of body weight and it is a useful and simple method for determining obesity. A study conducted on 382 university students showed that 24.87% of women and 33.53% of men had body weights above normal, according to their BMI values (17). In another study conducted on 424 university students, 78.6% of the students were normal and 18.0% were above normal, according to their BMI values (18). Also in another study conducted on 1271 university students, it was observed that 86.5% of the students had a normal BMI (19). In a study conducted on medical faculty students, 19.7% were above normal, according to their BMI values (20). A crosssectional study among undergraduate students at the University of Barcelona, Spain showed that 83.3% of the students were normal weight, 9.4% were underweight and 7.3% were overweight or obese (21).

In our study, 74% of the students (75.7% of females and 71.1% of males) had a normal BMI. According to BMI group 11.7% of females and 26.5% of males were overweight or obese. According to the results of the "Turkey Chronic Diseases and Risk Factors" study conducted by the Ministry of Health, 22.1% of males and 19.9% of the females were found to be overweight and obese between the ages of 15-24 in our country (22).

Body fat distribution is an important indicator of health risk associated with obesity. WC and WHR are important indicators of abdominal obesity. Abdominal obesity is a high risk factor for hypertension, type II diabetes, hyperlipidemia and coronary artery disease. In this study, the prevalence of the participants at risk according to WC was 4.7% in men and 3.2% in women for abdominal obesity. In a study conducted among medical faculty students, obesity rates according to WC were found to be 5.8% in girls and 8.0% in boys (20).

In another study conducted on 506 university students; the prevalence of abdominal (central) obesity was 5.0% (1.3% in men and 8.4% in women) based on WC and 20% (12.3% in men and 26.5% in women) based on WHR (23). In this study, the prevalence of abdominal obesity was found 19.0 % (14.8% in men and 32.7% in women) of the participants based on WHR. The results were similar to those obtained in our study.

According to Turkey Nutrition and Health Research data, normal WHtR ratio (0.4-0.5) show a distribution between 20.0-39.2% in men and 19.0-29.1% in women. WHtR increases with age. In addition, as WHtR increases, the risk of chronic disease increases. It is lowest in the 19-30 age group and highest in the 65 and over age group (10). WHtR is more sensitive than BMI as an early warning of health risks. It is significantly associated with all risk factors for obesity and metabolic syndrome. It is stated that it can predict morbidity and mortality, often better than BMI (24). In this study, abdominal obesity was found in 13.1% of the participants according to WHtR cut-off degree (WHtR >0.5).

The start of college is characterized by a variety of life changes, such as moving away from the family home and having more responsibilities. This change can affect lifestyle and eating habits. Accordingly, this population tends to have certain eating habits that increase their tendency to gain weight, including: skipping meals, snacking, and eating larger portions (21).

The number of meals is important in adequate and balanced nutrition. In this study, 57.2% of the students have 3 main meals, 17.2% of them have 3 snacks. 82.5% of students skipped meals. Skipping meals is quite common among university students. A study of 503 university students conducted in Lagos State, Nigeria showed that less than one third (31.0%) of university students' ate three daily meals (23). In another study, the rate of skipping breakfast among those who skipped meals was 42.7% (5).

In various studies conducted among university students in Turkey, show that carbohydrate-based food consumption is common, and skipping meals is very high. The frequency of meal skipping varies between 48-96% (18, 19, 25-28).

A systematic review reported that meal skipping rates among youth aged 18–30 ranged from 5% to 83%. Breakfast skipping rates ranged from 14-89%, lunch skipping rates ranged from 8-57%, and dinner skipping rates ranged from 5-47% (1).

The transition to university life represents a critical period marked by significant

changes in lifestyle and behavior, including those related to nutrition and health. University students, often living independently for the first time, are confronted with new challenges in managing their diet and nutrition, potentially impacting their health and academic performance (29, 30).

Research shows that young adults have poor eating behaviors, frequently skipping meals and not eating regular meals. Gender was the most frequently assessed correlate of skipping meals. Studies have found that men are more likely to skip breakfast, while women are more likely to skip lunch or dinner (1).

In a study investigating the effect of skipping meals on BMI in university students, it was determined that students' skipping meals was related to BMI classification (24). One study showed that the number of meals was positively associated with obesity and overweight. Another study showed that higher main meal and snack frequency increased the likelihood of overweight/obese and central obesity among US adults (5).

Different anthropometric indices have been developed in defining obesity. In similar studies investigating some anthropometric indicators of university students, BMI, WC, WHR are emphasized as health risk predictors (31, 32). A lower WHR is associated with a lower risk of cardiovascular disease and other obesity-related health problems, indicating a healthier body fat distribution. A study of Southern Nigerian University Undergraduate students suggests that there are notable gender differences in health risk distribution. This highlights the importance of gender-specific health interventions (31).

In our study, there was statistically significant relationship between the number of main meals consumed by the participants and meal skipping status according to gender. Although there was not statistically significant relationship between BMI and skipping meal status. There was statistically significant relationship between the meal skipping status and the mean WC (cm) of university students. This result is important because waist circumference is an indicator of central obesity. Healthy body weight can be maintained when adequate and regular meal habits are provided.

Conclusion

In conclusion, the findings of our study showed that the prevalence of abdominal obesity according to WC was higher than general obesity according to BMI among university students. Our study additional delineates an elevated WC among male students and those who frequently omitted meals, underscoring the influence of irregular meal patterns on students'

anthropometric parameters. Poor eating habits emerge as an important factor contributing to nutrition-related chronic diseases among university students. By identifying the critical relationship between meal habits, gender disparities, and obesity indices among university students, this study provides a clear direction for health promotion strategies. Developing healthy meal habits in university students may increase the likelihood of individuals maintaining this behavior later in their lives. Emphasizing the cultivation of healthy eating behaviors among university students is crucial, as it not only addresses immediate health concerns but also sets the stage for sustained beneficial practices throughout adulthood. Future studies might explore the efficacy of tailored nutritional education programs, digital health initiatives, or campus-wide policy changes aimed at improving the availability of healthy food options. Moreover, investigating the long-term outcomes of early dietary interventions on adult health behaviors will be crucial in understanding the best approaches to instigating lasting change.

Ethical considerations

Necessary permissions and "Ethical Commission Approval" were obtained from the Firat University (Elazig, Turkey) before conducting the study (decision dated and numbered 13/06/2018-04-04). Participating students were informed about the study and their verbal consent was obtained.

Limitations

The present study has a number of limitations. Firstly, we could only assign the relations not the causal connection between variables. Secondly, the results should not be generalized to the entire country. It is only carried out on university students from central Elazig, Turkey. The participation of students from every department in the university could not be ensured. Thirdly, since it is predicted that the nutritional habits of students living in dormitories will differ from those living at home with their families, the effect of this situation could not be eliminated.

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Conflict of Interest Statement

The authors declare no conflict of interest.

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Research Article

The Midwifery Students Vocational Belonging Levels and Affecting Factors Determination

Elif Bayrakci Eroglu[1*], Meltem Akbas[2]

[1]*Gaziantep Islam Science and Tecnology University, Faculty of Health Sciences, Department of Midwifery, Gaziantep, Turkiye.*
[2]*Cukurova University, Faculty of Health Sciences, Department of Midwifery, Adana, Turkiye.*

Abstract

Objective: *This study was conducted to evaluate the professional affiliation of midwifery students.*

Methods: *This study is descriptive and cross-sectional. The research was conducted between 01.03.2020-01.04.2020 at a state university in southern Türkiye, Department of Midwifery. Sample Size Calculator -Australian Calculated by Bureau of Statistics. In the calculation, the number of samples was determined as 198. The population of the research consisted of a total of 200 students studying in the midwifery department of the relevant faculty in the 2019-2020 academic year. Data were collected with the "Personal Information Form" and "Midwifery Belonging Scale". The scale consists of 22 items and the Cronbach-α coefficient is 0.936. The data were evaluated using the Mann-Whitney U test (Z-table value) and Kruskal -Wallis H test method and Bonferroni correction from the SPSS 24 package program.*

Results: *The average age of the students is 20.64±1.56 years and 74.0% of them stated that their family was at the middle income level. It was determined that 69.5% of the students chose the profession willingly, 83.5% loved their profession, and 41.0% had positive thoughts about the midwifery department before starting school. It was determined that the average score of all students on the Midwifery Belonging Scale was 88.47. There is a statistically significant difference between the students' scores on the Midwifery Belonging Scale and their class, age, choosing the profession voluntarily, liking the profession, and their thoughts about the midwifery department before starting school ($p<0.05$).*

Conclusion: *In the study, it was determined that the students' midwifery affiliation levels were high. Students' class, age, choosing the profession willingly, liking the profession, and their thoughts about the midwifery department before starting school are factors that affect their level of professional belonging.*

Key words: *Belonging, Midwifery, Midwifery students, Professional belonging*

*** Corresponding Author:** Elif Bayrakci Eroglu, E-mail: bayrakcielif2@gmail.com ORCID ID: 0000-0001-6351-6002

Introduction

The sense of belonging that people need to be accepted in social life has existed since the birth of humanity (1, 2). People want to belong to a person, group, place, profession, culture or a community through belonging and identification (3). Belonging; It contributes to the development of the person by developing the sense of trust, care and compassion in people and playing an important role in establishing healthy interpersonal relationships (4, 5).

Professional belonging, which is within the scope of the concept of belonging, constitutes the building block of the attitudes and behaviors that people show in their professional lives (6). Professional affiliation; It can be defined as a person's interest in the profession, his internalization of his profession and his ability to continue his profession (7). The extent of professional affiliation may vary from person to person due to different reasons. The person's position in the profession, working conditions, working hours and salary can be cited as among these reasons (8). All reasons affecting professional belonging directly affect people's success and performance in the profession (9). A low level of sense of professional belonging negatively affects a person's professional success and performance (10). This negative effect is reflected not only in the person's professional life but also in his daily life (11). It is seen that in people with a high, as opposed to a low, sense of professional belonging, their professional success, performance and motivation are positively affected, and therefore their work efficiency increases (12). Midwifery is a professional profession that requires direct communication with the people it provides care for and continues its development within the framework of evidence-based practices, science, art and ethics (13). Due to the harsh working conditions in this profession, midwives who will work in the field must have a high level of professional affiliation in order to do the profession with dedication (14). A midwife's embrace of her profession, her ownership of her profession, and her ability to practice her profession devotedly and in accordance with the procedure show her midwifery affiliation. Therefore, more studies are needed in this field to fully define and interpret professional belonging (15). In this direction, a standard measurement tool was recently developed to determine the professional affiliation levels of midwives working in clinics (7). It is very important to know the professional affiliation levels of not only the midwives working in the clinic, but also the midwifery students receiving undergraduate education who will practice

the profession in the near future. When studies on midwifery students' sense of professional belonging were examined in the literature, it was determined that there were very few studies on the subject (16-18). Therefore, in this study we conducted, midwifery students' professional affiliation levels and affecting factors determination is intended.

Methods

Objective and type of research

This study examines the professional affiliation levels of midwifery students and their affecting factors It was conducted cross-sectionally between 2-30 March 2020 to determine the population.

Population and sample of the research

This study, 2-30 March 2020 between At the relevant university Midwifery in the Department has been made of research universe, related of the faculty midwifery 2019-2020 education in the department (1st Grade: 80, 2nd Grade: 89, 3rd Grade: 72 and 4th Grade: 86) seeing total 327 students has created. sample size by “Sample Size Calculator-Australian Bureau of Statistics” has been calculated. 5% error in calculation share and 95% confidence in the range designated sample The number is 180. data loss could be eyelash in front when it is found student The number of students increased by 10% to 18 students. more sampling including has been is sample number as 198 has been determined. The research was done of the faculty midwifery in every class of the department education seeing student numbers eyelash in front by keeping proportional sampling method from all classes with will be taken student number has been determined. The population of the research consisted of a total of 200 students studying in the midwifery department of the relevant faculty in the 2019-2020 academic year. Data were collected with the Personal Information Form and the "Midwifery Belonging Scale".

Criteria for inclusion in the study:

• Midwifery department students were included in the research.

Collection of data

This study of the data were collected face to face through a questionnaire that included the "Personal Information Form", in which the factors affecting professional belonging were questioned, and the "Midwifery Belonging Scale", which was used to determine the level of belonging.

Data collection tools

Two data collection tools were used to collect the data: "Survey Form" and "Midwifery Belonging Scale".

Personal Information Form: *It was prepared* by the researchers in line with the literature (19, 20). This form contains a total of 13 questions including demographic information of the students.

Midwifery Belonging Scale: Midwifery Belonging Scale (EAS) is a 5-point Likert type scale consisting of 22 items and was developed by Baskaya et al. in 2020. The scale does not have a cut-off point or inverse item. The lowest score from the scale is 22 points and the highest score is 110 points. The scale consists of four factors and these factors are; They are called "Emotional belonging", "Fulfilling professional roles and responsibilities", "Evaluating professional development and opportunities" and "Limit of duty and authority in the profession".

The highest score that can be obtained for the emotional belonging dimension and the fulfillment of professional roles and responsibilities dimension in the scale is "35" and the lowest score that can be obtained is "7". The highest score that can be obtained for the professional development and opportunities evaluation dimension is "25" and the lowest possible score is "5". The highest score that can be obtained for the dimension of duty and authority limits in the profession is "15" and the lowest score that can be obtained is "3". It is accepted that as the score obtained from the scale increases, people's professional affiliation levels increase (21). Baskaya et al. While the Cronbach Alpha Coefficient of the scale was found to be 0.900 in their study (22), the Cronbach Alpha Coefficient was found to be 0.936 in this study.

Evaluation of data

SPSS 24.0 (Statistical package for the Social Sciences) program was used. Descriptive, parametric and nonparametric statistical analysis methods were used to analyze the data. In descriptive statistical analyses, mean, standard deviation, median, frequency, percentage, minimum and maximum values were calculated. In comparing quantitative data, the Student t test will be used for two-group comparisons of normally distributed variables, and the Mann Whitney U test will be used for two-group comparisons of non-normally distributed parameters. In the comparisons of three or more normally distributed groups, One-way ANOVA was used for the variables where the assumption of homogeneity of variances was met. In the comparisons of three or more groups that were not normally distributed, the Kruskal Wallis test was used, and the Mann Whitney U test was used to determine the group that caused the difference. Significance value is $p<0.05$ the ayes have it.

Ethical aspect of study

In order to conduct the study, the necessary permission was obtained from Cukurova University Faculty of Medicine Non-Interventional Research Ethics Committee (Ethics Committee Decision No:82). For the research, institutional permission and informed consent from the participants were obtained (informed consent was given to the students who will form the sample of the research to participate in the research within the scope of the principle of willingness and voluntariness by explaining the purpose, duration, benefits, and data collection tools of the research). Helsinki in the study the principles of the Declaration have been complied with.

Limitations of the study

One of the limitations of the study is only Studied at the relevant university, Department of Midwifery**.** Because it was done with students**.** The results have limited generalizability is that it is. In the research, the level of belonging in terms of demographic and descriptive characteristics Although evaluated, professional affiliation other parameters that may affect (The physical conditions of the university, laboratory and access to equipment, classroom quotas, internship opportunities, etc.) The fact that it was not evaluated is a there are other limitations.

Results

The study was completed with 200 midwifery students who participated in the study. It was determined that the average age of the students participating in the study was 20.64±1.56 (years) and 50.0% of them were in the 20-21 age group. It was determined that 97.5% of them were single, 54.5% of them lived with their families in the province, 49.5% of them lived with their families and 79.0% of them were in the nuclear family type. It was determined that 69.0% of the students had 2 or more siblings, 74.0% of their families were in the middle income level, and 74.5% were Anatolian high school graduates. 69.5% of the students chose the profession willingly, 83.5% loved their profession, 64.0% wanted to work as a midwife, 41.0% had a positive opinion about the midwifery department before starting school, and 57% said that It was determined that 5 of them had a sense of belonging to the midwifery profession between 5-7 (Table 1, Table 2).

Table 1. Distribution of student findings.

Variable (N=200)	%
Class	
1.	25.0
2.	25.0
3.	25.0
4.	25.0
Age classes [$\overline{X} \pm$ S.S.→20,64±1,56 (yıl)]	
<20	22.5
20-21	50.0
≥22	27.5
Marital status	
Married	2.5
Single	97.5
Where the family lives	
Province	54.5
District	32.5
Bay	13.0
Current place of residence	
with family	49.5
At home	10.5
in dormitory	40.0
Family type	
Sunflower seed	79.0
Wide	12.0
Broken	9.0
Sibling presence	
None	4.5
one	26.5
2 and above	69.0
Family income level	
Good	11.0
Middle	74.0
Bad	15.0
Graduated high school	
Straight	11.0
Job	6.0
health profession	8.5
Anatolia	74.5
Choosing a profession willingly	
Yes	69.5
No	30.5
Don't like the profession	
Yes	83.5
No	16.5
Position desired to work in midwifery*	
As a midwife	64.0
As a nurse	10.5
Academically	24.0
Doesn't want to work in the healthcare field	10.5
Consideration of midwifery department before starting school	
Positive	41.0
Negative	21.0
he had no idea	38.0
Sense of belonging to the midwifery profession*	
<5	10.5
5-7	57.5
8-10	32

Table 2. Distribution of findings regarding the scale.

Scale (N=200)	Average	Standard deviation	Median	Min.	Max .
Midwifery Belonging Scale	88.47	14.78	90.5	22.0	110.0

The findings regarding the students' answers to the scale are given in the table.

A statistically significant difference was detected in terms of MBS scores according to classes (χ^2=26.099; p=0.000). As a result of Bonferroni corrected pairwise comparisons made to determine which group caused the significant difference; A significant difference was detected between those studying in the 1st grade and those studying in the 2nd and 4th grades. MBS scores of students studying in the 1st grade are significantly higher than those studying in the 2nd and 4th grades. Likewise, a significant difference was detected between those studying in the 3rd grade and those studying in the 2nd and 4th grades. MBS scores of students studying in the 3rd grade are significantly higher than those studying in the 2nd and 4th grades (Table 3).

Table 3. Comparison of midwifery affiliation scale scores according to student findings.

Variable (N=200)	n	Midwifery Belonging Scale		Statistical analysis* Possibility
		$\overline{X} \pm S.S.$	Median [IQR]	
Class				
1.	50	91.58±14.58	95.5 [16.3]	χ^2=26.099 p=0.000 [1-2,4] [3-2,4]
2.	50	85.52±13.71	86.0 [17.8]	
3.	50	94.48±14.50	98.5 [18.3]	
4.	50	83.12±13.93	83.0 [21.0]	
Age classes				
<20	45	89.69±15.31	92.0 [18.0]	χ^2=12.464 p=0.002 [1,2-3]
20-21	100	91.11±13.55	93.0 [19.0]	
≥22	55	82.67±15.13	83.0 [24.0]	
Where the family lives				
Province	109	90.28±14.60	92.0 [19.0]	χ^2=5.355 p=0.069
District	65	85.09±15.49	85.0 [26.0]	
Bay	26	89.35±12.57	91.0 [20.3]	
Place of residence				
with family	99	89.12±15.06	91.0 [22.0]	χ^2=0.520 p=0.771
At home	21	88.47±13.65	89.0 [19.5]	
in dormitory	80	87.66±14.85	90.5 [24.5]	
Family type				
Sunflower seed	158	88.15±15.34	90.0 [24.0]	χ^2=1.326 p=0.515
Wide	24	91.30±11.91	92.0 [18.0]	
Broken	18	86.50±12.36	88.0 [16.5]	
Sibling presence				
None	9	84.56±11.08	83.0 [19.5]	χ^2=1.992 p=0.369
one	53	88.06±14.24	90.0 [23.5]	
2 and above	138	88.88±15.22	91.0 [20.0]	

Table 3. Comparison of midwifery affiliation scale scores according to student findings (continued).

Family income level				
Good	22	89.90±13.21	93.0 [21.5]	χ^2=0.729
Middle	148	88.99±13.87	91.0 [19.0]	p=0.694
Bad	30	84.71±20.14	88.0 [24.0]	
Graduated high school				
Straight	22	90.59±14.42	92.0 [18.8]	
Job	12	78.83±16.03	76.0 [32.0]	χ^2=5.581
Health profession	17	87.29±16.30	86.0 [25.0]	p=0.134
Anatolia	149	89.07±14.40	91.0 [19.0]	
Don't want the profession				
Yes	139	91.94±13.82	94.0 [17.0]	Z=-5.418
No	61	80.58±13.92	81.0 [17.5]	p=0.000
Don't like the profession				
Yes	167	91.08±13.74	93.0 [19.0]	Z=-5.716
No	33	75.24±12.76	77.0 [17.0]	p=0.000
Midwifery idea				
Positive	82	90.72±16.21	94.5 [19.5]	χ^2=10.908
Negative	42	82.24±16.09	81.0 [23.5]	p=0.004
He had no idea	76	89.34±11.13	89.0 [14.5]	[2-1,3]

*"Mann-Whitney U" test (Z-table value) when comparing the measurement values of two independent groups in data that does not have a normal distribution; "Kruskall -Wallis H" test (χ^2-table value) statistics were used to compare three or more independent groups**.**

A statistically significant difference was detected in terms of EAS scores according to age classes (χ^2=12.464; p=0.002). As a result of Bonferroni corrected pairwise comparisons made to determine which group caused the significant difference; A significant difference was detected between those in the <20 and 20-21 age groups and those in the ≥22 age group. EAS scores of those in the <20 and 20-21 age groups are significantly higher than those in the ≥22 age group.

A statistically significant difference was found in terms of EAS scores according to the opinion about the midwifery department before starting school (χ^2=10.908; p=0.004). As a result of Bonferroni corrected pairwise comparisons made to determine which group caused the significant difference; A significant difference was detected between those who previously thought negatively and those who thought positively and had no opinion. The EAS scores of those who think positively and have no opinion are significantly higher than those who think negatively.

A statistically significant difference was detected in terms of EAS scores depending on whether the profession was chosen voluntarily (Z=-5.418; p=0.000). EAS scores of those who chose the profession voluntarily are significantly higher than those who did not choose it voluntarily.

A statistically significant difference was detected in terms of EAS scores according

to the level of liking the profession (Z=-5.716; p=0.000). EAS scores of those who like the profession are significantly higher than those who do not like it.

There is no statistically significant difference in EAS scores according to current place of residence, family type, number of siblings and high school graduated (p>0.05).

Discussion

There is no cut-off point for the EAS used in this study to measure the belonging levels of the students participating in the study. According to the scale, an increase in the score indicates that belongingness increases, and a decrease indicates that belongingness decreases. The average midwifery affiliation score of the students included in our study was determined to be 88.47. Based on this, as a result of the research, it was determined that the average score of the students' belonging level was close to the upper limit of points that can be obtained from the scale. However, the students total scale scores were found to be the same in the study conducted by Baskaya and colleagues with working midwives. It was observed that the total score obtained with the scale was higher than the total score (21). This can be considered an indicator that the students who participated in the study felt like they belonged to the profession. In this study, midwifery department Students' belonging levels and affecting factors were examined. In the literature, positive emotions are found to be an important determinant of belonging. It is reported that it is a feature (23). In this study, it was determined that almost all of the students had positive thoughts about the midwifery department and the students who had positive thoughts about the midwifery department had a high level of belonging to midwifery. It has been determined that the surface is higher. The results of this study support the literature. Satisfaction with career choice can be considered as a factor affecting the level of belonging. In a study conducted with midwifery students, approximately eight out of ten students stated that they did not like the midwifery profession but that they had to do it (20). In another study conducted with students, it was determined that half of the students believed that they would enjoy doing the profession (19). In a study conducted with working midwives, it was determined that seven out of ten midwives enjoy their job (24). In this study, it was found that most of the students had positive thoughts about the midwifery profession. Regarding wanting the profession, it was determined that 139 of the participants were willing to do the profession and their EAS score was 91.94±13.82. Regarding liking the profession, it was determined that 167 of the participants liked the midwifery profession

and their EAS score was 91.08±13.74. It was determined that 82 of the participants had positive opinions about midwifery and their EAS score was 90.72±16.21. In this context, there is a difference between the results of the study of Ay and his friends and Yücel and his friends and this study, and Yılmaz and his friends what he did It is seen that there is a similarity between the results of the study and this study (19, 20, 24). This difference and similarity can be interpreted as the fact that the midwifery profession has become popular over time because this study was conducted only with senior students. In addition, in this study, it was determined that the midwifery affiliation levels of students who believed that they would enjoy their profession were higher. Being fond of the midwifery profession is accepted as an indicator of belonging (19). The results of this study support the literature. Enjoying the midwifery profession can be an indicator of the level of belonging. The feeling of commitment is one of the factors that can be associated with belonging (23).

The reason for choosing the midwifery profession can be described as an important parameter of belonging, as it can affect the perception and success of the profession (20, 25, 26). In the literature, the reasons why students choose the midwifery department vary (19, 20, 27). As a result of the qualitative research in which Cullen and her colleagues examined the students motivations for choosing the midwifery department, it was determined that one of the leading reasons was "witnessing midwifery". It has been revealed that "being born and hearing birth stories" (27). In this study, it was determined that more than half of the students chose the midwifery department willingly and after researching it. As a result of the study of Ay and her friends, it was seen that more than half of the midwifery students chose the profession voluntarily, which is parallel to the results of this study. It is reported (20). In this study, it was found that the midwifery affiliation levels of students who chose the profession voluntarily were higher than those who chose the profession for other reasons. Similarly, in the research conducted by Baskaya, it was determined that midwifery affiliation levels were higher in midwives who chose the profession because they loved it, compared to those who chose the profession for other reasons (21). According to these results, the reason for choosing a profession is a parameter that may be related to belonging.

It is thought that one of the factors that can be associated with the level of belonging of midwifery students is whether the students want to work in a job related to the field of midwifery. This research shows that there

are very few people who do not want to work in a field related to midwifery after graduation. While most of them want to work in a public hospital, there are also some who plan to work as academics or freelance midwives. The fact that there are students planning to work in various fields related to the midwifery profession suggests that their professional awareness is high. In the literature, a similar result to this result was reported by Evans and his friends in the senior midwifery department. In the research where they examined the career plans of students, it was found that almost all of the students planned to work as midwives, and most of these students applied to work in hospitals. It was determined that a small number of students planned to work as freelance midwives. Again, as a result of this research, it is seen that the belonging scores of those who want to work in a field other than midwifery are low (28). In parallel with this result, as a result of Baskaya's research, midwives working in out - of -field units had higher midwifery affiliation scores compared to midwives working in the maternity ward or public health field. It was found to be lower (21). In the light of the literature, the desire to work in fields specific to midwifery can be associated with belonging; It can be argued that working in different fields may negatively affect professional belonging. Belonging is a concept that can be important not only in the learning process but also in the transition to working life in midwifery and the professional adaptation process. What St - Amand and his friends did in their study, they stated that students' sense of belonging can be increased by encouraging them to have this feeling (23). Therefore, midwifery students should be evaluated in this respect during the undergraduate education process and initiatives should be taken to increase their level of belonging. In this research, midwifery department Students' belonging levels and affecting factors were examined. A statistically significant difference was found in terms of the participants' current class level in which they are studying, their age, their thoughts about the midwifery department before starting the midwifery department, their willingness to choose the profession and their liking for the profession, in terms of Midwifery Belonging Scale scores, and the Midwifery Belonging Scale scores of these people were significantly higher. It is seen that it is high and there are factors affecting the levels of belonging. Since the quantitative method was adopted in the research, there is a limitation in determining the factors affecting the students ' belonging level. For this reason, prospective qualitative research will be supportive in explaining the relevant factors.

Conclusion

In our study, midwifery students have a high sense of belonging and the level of belonging is affected by factors such as the current class level in which they are studying, age, thoughts about the midwifery department before starting the midwifery department, the state of choosing the profession willingly and the state of liking the profession, and the EAS scores of these people are significantly higher. It was found to be. The concept of belonging in the midwifery profession can be described as a very important quality for both the clinic and the field. Developing professional belonging in students during their undergraduate education may be important in terms of maintaining midwifery belonging and ensuring satisfaction in business life in the future. It may be recommended to conduct more comprehensive future research on the factors affecting the belonging levels of midwifery students. In addition, qualitatively examining students' midwifery affiliation will contribute to a better understanding of this issue.

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Review

Use of Music Therapy in Prenatal and Postnatal Period

Songul Kekil[1*], Ayse Elkoca[1]

[1]*Gaziantep Islam Science and Technology University, Faculty of Health Sciences, Department of Midwifery, Gaziantep, Turkiye.*

Abstract

Pregnancy is a period characterized by physical, hormonal and emotional changes. With conception, profound physiological changes occur in many organs and systems of the mother during pregnancy. These changes are not only physiological but also psychological. Pregnant women are particularly affected by stress during pregnancy, labor and postpartum. At the same time, expectant mothers may experience indecision, frequent mood swings from exhaustion to euphoria, and many psychological disorders such as emotional disturbances or mixed anxiety-depressive disorder. Music therapy, which is a form of treatment aiming at the physical, mental and psychological integration of the patient, is one of the methods used as support during pregnancy. Music therapy is known to have positive effects on the mood and well-being of the mother, with positive effects such as reducing anxiety in pregnant women, improving birth quality and supporting maternal-fetal bonding. It has also been shown to have specific positive effects in the postnatal period, such as reducing pain and anxiety and increasing satisfaction, as well as being beneficial in emotional, intellectual, psychological, physiological and social domains. The aim of this review is to examine the use of music therapy in the prenatal and postnatal period in line with the literature.

Key Words: *Birth, Music therapy, Postpartum period, Pregnancy*

* **Corresponding author:** Songul Kekil, e-mail: kekilsongul@gmail.com ORCID ID: 0000-0003-1713-7540

Introduction

Music Therapy

Music has been a constant part of human life since prehistoric times. Music, which is a powerful tool for expressing emotions, is used for relaxation and healing as well as expressing love, compassion, fear and belief in people's daily lives (1). In addition, music therapy is defined as a specialty that uses music and musical activities to meet the physical, psychological, social and mental needs of individuals. Music therapy is an easy-to-implement, low-cost, beneficial and non-pharmacologic intervention (2).

Music therapy aims to improve patients' potential or abilities in a culturally acceptable manner in an effort to provide better interpersonal relationships and consequently improved quality of life through prevention, rehabilitation and treatment (3). The World Federation of Music Therapy defines music therapy as the use of music and/or musical elements (sound, rhythm, melodies or harmonies) to facilitate and improve communication, relationships, learning, movement, expression, organization, physical, emotional, mental, social and cognitive needs, and therapeutic goals (4). Music blocks nerve conduction pathways by causing the pituitary gland to release endorphins, decreases pain perception and reduces muscle tension, enhancing the effect of body relaxation and self-healing. As a low-cost, non-invasive and drug-free treatment method, music balances emotions, regulates breathing, heart rate and blood oxygen levels, and lowers blood pressure (5). Music therapy is currently used in many areas of medicine, including dental treatments, cardiac surgeries, medical and surgical procedures, obstetrics and oncology treatments, stress reduction, pain management and reduction of hypertension (6).

In Turkey, Music Therapy Certified Training Program is designated as a certified training area within the scope of the Ministry of Health Certified Training Regulation, which entered into force after being published in the Official Gazette dated 04 February 2014. The Music Therapy Certified Training Program Standard of the Ministry's Authority was revised with the Approval of the Authority dated 19.04.2024 and numbered E-99910406-799-241711826. Health professionals and music professionals can participate in the training (7). Since no drugs or substances are used, music therapy does not pose a significant risk to health. However, caution should be exercised if it is to be used in individuals with hearing difficulties, significant mental-mental disorders or substance addiction. If the

therapist fails to establish a trusting relationship, there may be problems such as discontent, discomfort or fear. In this case, the music therapist should be more careful and cooperate with the attending physician. A competent and experienced therapist should organize the therapy in a personalized manner by taking the necessary precautions to prevent undesirable situations (8). In a study conducted by Yang and colleagues in China, thirty minutes of music therapy was applied to women in the experimental group for three days. At the end of the application, it was determined that anxiety levels in the women decreased (9).

Effects of Music Therapy in Pregnancy

Pregnancy is an event that has an important and long-term effect on the life of the expectant mother. Many women experience various stress periods due to physiological and psychological changes during pregnancy (10). Music therapy is the systematic use of music to promote relaxation and reduce psychophysiologic stress (11). Music therapy, which is an effective and natural method to reduce the stress of pregnancy, offers a possible approach in this sense (12).

Studies showing that music therapy is an effective intervention to reduce stress during pregnancy are included in the literature (12-14). In the study by Corbijn et al. it was observed that music therapy reduced anxiety in women with low- or high-risk pregnancies. Thus, it is recommended to use music therapy as an alternative treatment for pregnant women with anxiety (13). Chang et al. reported that listening to relaxing music during pregnancy decreased anxiety and depression symptoms and decreased cortisol levels (12). In a study conducted by Dayyana et al. to investigate the effectiveness of music therapy on anxiety levels and β-endorphin levels in primigravidas in the third stage of pregnancy, it was found that music therapy was effective in reducing anxiety levels and increasing β-endorphin levels. Music therapy can be used as an alternative treatment in this group (14).

The ears are the most developed organs of the fetus at approximately the fifth month of gestation. The brain can process sounds and the fetus can physically react to sound in utero, as high frequencies pass more easily through the amniotic fluid (15). When pregnant women are stressed and anxious, the adrenal glands in their body release adrenaline and catecholamines in response. These hormones pass through the placental barrier and pass to the fetus, creating a physiologic state related to maternal stress or anxiety (16). In a study by Liu et al. İn which 121 Taiwanese pregnant women with

poor sleep quality were selected as the intervention group and the control group, they reported that two weeks of active music listening in pregnant women reduced stress and anxiety and improved sleep quality (17). Arya et al. examined the effect of listening to music during pregnancy on the behavior of the newborn. In the study, it was observed that maternal exposure to music positively affected the nervous system and behavior of the newborn through the endocrine system of women in the intervention group compared to those in the control group (18).

The Effects of Music Therapy on ChildBirth

Childbirth is an important experience in a woman's life and this experience has short and long-term effects. Negative birth experiences have been shown to negatively affect postpartum psychiatric symptoms, sexual functioning, expectations for future births and the connection between mother and baby (19). When a woman encounters the unknown process of labor for the first time, she often feels anxiety because coping with labor pain is commonly seen as a feared moment (20). Pain and discomfort associated with birth can be both physically debilitating and increase anxiety; therefore, it is of clinical importance to reduce both pain and anxiety in women in the period leading up to and during labor (21). Music-based interventions are non-pharmacologic pain relief methods that have received increasing attention in recent years. Music is omnipresent, emotional and seen in every culture. The history of music and its therapeutic role in the medical field dates back to 4000 BC. Various music-based therapies, strategies and methods can be useful for promoting health and well-being. Music can positively affect the physiology of mothers during labor by activating the primary auditory cortex (22). In a study conducted by Sürücü et al. (2018) to determine the effect of music on pain and anxiety during labor in primiparous women, women were made to listen to music in Acemasiran mode, one of the modes used in Classical Turkish music, and it was determined that women in the intervention group felt less pain and their anxiety levels decreased compared to the control group after listening to music (11). Estrella et al. (2023) conducted a randomized controlled study with 343 pregnant women to evaluate the effects of music therapy on anxiety levels, maternal and fetal physiological parameters, labor and birth outcomes; they determined that listening to music for 20 minutes each time during NST in the third trimester and during the first stage of labor reduced anxiety and improved the labor process in primiparous women (23). Therefore, music therapy has been accepted as a safe, inexpensive and effective non-

pharmacological anxiolytic agent due to its effect on anxiety and pain perception and reducing regular pharmacological sedative doses (24).

Effects of Music Therapy in the Postpartum Period

Music therapy is a new and promising innovation in the field of neonatal care, where continuous efforts are being made to reduce both infant stress and parental anxiety levels (25). In addition to well-known early interventions such as kangaroo care, family-centered care, cognitive behavioral therapy, and peer support programs, music therapy is increasingly being implemented. Music therapy can be defined as "the clinical and evidence-based use of music interventions to achieve individual goals within a therapeutic relationship by a qualified professional who has completed an approved music therapy program" (26). Music helps to reduce pain response behaviors of newborns, stabilize vital signs, improve attachment and shorten the duration of hospital stay (27). Since postpartum anxiety in mothers is associated with long-term negative outcomes for both mother and baby, music therapy needs to be integrated as part of standard care for very preterm infants and their mothers (28). In a randomized controlled study conducted in the Netherlands to investigate whether music therapy applied to the baby to identify anxiety in mothers of babies born before 30 weeks of gestation alleviated maternal anxiety, it was found that music therapy was effective in reducing maternal anxiety (28). In a study by Küçükkaya et al. (2022), in which they examined the effect of music played to new mothers on postpartum sadness, Turkish music pieces played with Ney in Uşşak makam for 30 minutes every day for two days after delivery were played to the mothers. Accordingly, it was found that music played to mothers effectively reduced postpartum sadness (29). Bieleninik et al. (2016) found that although music therapy did not have significant effects on infant heart rate, oxygen saturation and behavioral status, it had positive effects on infant respiratory rate and maternal anxiety (30). Standley et al. (2012) suggested that music therapy had significant benefits on heart rate, behavioral status, sucking or feeding ability and oxygen saturation (31). Farhat et al. used headphones to play lullaby music (65-75 dB) for 20 minutes to premature infants for eight days. The control group wore headphones without music. While no change was observed in the heart rate of the babies in the experimental group, they reported significant increases in respiratory rates during the intervention compared to baseline (32). In a study conducted by Almeida et al. to evaluate the effect of music intervention on brain structure

maturation of premature infants, they stated that music therapy had a structural maturation effect on the auditory and emotional functions of preterm infants during an important period of brain development (33). Hâkimi et al. (2021) found that music therapy can significantly reduce both postpartum anxiety and pain scores (34).

Use of Music Therapy and Midwifery Care

Birth is one of the most important events in a woman's life. The course of labor depends not only on the woman giving birth but also on the midwife who assists in labor. The duties of the midwife include primarily medical duties, but also establishing an appropriate relationship with the woman in labor and supporting her (35). The midwife should inform the patient about the course of labor, suggest ways of coping with pain and support the patient in active participation in labor. It is very important for midwives to continuously update their professional knowledge and to use the new skills they have acquired in practice. Therefore, it is recommended that midwives should continuously educate themselves and update their knowledge about the latest developments (36). Vertical positions are increasingly used to alleviate labor pain, and aromatherapy, music therapy, massage and hot compresses are also used. These methods not only reduce the sensation of pain, but also affect the duration of the first and second stages of labor, help the mother to focus, and may reduce injuries to the perineum during natural labor (37). The midwife should have knowledge about the physiology of labor pain, its difference from other types of pain, methods of coping with pain and the mechanisms of action of these methods. Midwives who have adequate knowledge and skills and are aware of their responsibilities can be effective and successful in reducing perceived pain by using non-pharmacologic pain management methods (38).

Conclusion

Results based on the literature suggest that music therapy reduces stress, depression and anxiety during pregnancy, has an impact on pain perception during labor and can function as a safe, inexpensive and effective non-pharmacological intervention by reducing regular doses of pharmacological sedatives. It has been reported that music reduces stress levels in infants, helps strengthen the bond between mother and baby, and produces positive physiological and behavioral changes. Music reduces stress and anxiety in pregnant women and has positive effects on the physiological status of infants. It is strongly recommended that healthcare professionals participate in music therapy

certification programs and incorporate music therapy into their practice.

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Clinical Research

Bibliographic Analysis of Completed Theses in the Field of Anatomy in Turkey between 2021-2023

Rukiye Ciftci[1], Yusuf Secgin[2], Seyma Toy[2*]

[1]*Gaziantep Islam Science and Technology University, Faculty of Medicine, Department of Anatomy, Gaziantep, Turkiye.*
[2]*Karabuk University, Faculty of Medicine, Department of Anatomy, Karabuk, Turkiye.*

Abstract

Purpose: *In this study, we aimed to systematically examine the theses in the field of anatomy published between 2021 and 2023.*
Method: *The study was conducted by screening 298 anatomy (medicine) theses published between 2021 and 2023 in the National Thesis Search Center. Theses were categorized as master's, doctoral and medical specialty. These categorized theses were also grouped according to their relevance to the locomotor system, circulatory system, respiratory system, digestive system, urogenital and endocrine system, and nervous system for systematic analysis. Experimental, anthropometric, radiologic, cadaveric and clinical subheadings were also used according to the method used.*
Results: *The findings of our study showed that the majority of anatomy theses were related to the locomotor system with a rate of up to 49%, while the least common theses were urogenital, endocrine and respiratory system theses with a rate of 3% each. It was observed that the theses related to the locomotor system were mostly performed using radiologic methods and the second most common theses related to the nervous system were performed using clinical and radiologic methods.*
Conclusion: *In conclusion, we believe that this bibliographic analysis will give an idea to anatomy graduate students, doctoral students and faculty members in anatomy education about the trends, frequently preferred methods and systems in anatomy theses.*

Key words: *Anatomy, Bibliometric analysis, Theses, Systematic review*

*** Corresponding author:** Seyma Toy, E-mail: seymatoy@karabuk.edu.tr, ORCID ID: 0000-0002-6067-0087

Introduction

Universities are institutions of higher learning that fulfill needs in the areas of education, research, and human resources for states. Due to the development of higher education in recent years, both the number of public and private universities as well as the breadth of higher education have increased (1). The demand for academic staff is fueled by the expanding and diverse student body at colleges. Graduate education is essential for producing academic staff who are qualified in a variety of subjects. University institute units perform scientific research and activities as part of graduate education. These institutions award researchers master's and doctorate degrees. Additionally, these institutes provide a considerable contribution to the research outputs of universities through the publication of graduate theses. A thesis is a piece of writing that is the outcome of independent investigation. As a result, depending on the academic degree one wishes to obtain, its length, depth, and research quality may change (2). The process of writing a thesis has many advantages for the researcher in terms of developing their research abilities and capacity for lifetime learning (3).

The theses archived at the National Thesis Center of the Council of Higher Education (YK) have been the subject of numerous bibliometric research in various domains (4). In bibliometric analysis, statistical techniques are used to profile publications in pertinent fields, identify trends within a discipline, and assess qualitative and quantitative changes connected to a particular scientific research topic (5). Bibliometric studies can be used to evaluate the growth and impact of a scientific topic or journal in the literature (6). Analyses that assess scientific trends and the influence of literature in respective research fields might be useful to researchers looking for information on a certain issue. It is possible to assess the state of graduate education programs in particular subjects by looking at the bibliometric characteristics of theses (4). The increasing use of bibliometric methods can also be effective in evaluating the quantity and quality of scientific research outputs in the field of anatomy (6).

In recent years, postgraduate education has become more widespread, and this has made a significant contribution to science. The first step in postgraduate education is usually the master's thesis, where students begin their thesis writing journey. Subsequently, there is the doctoral thesis. The most important indicator of the expected achievements from doctoral candidates is the doctoral thesis. The doctoral thesis is a report where candidates

combine their knowledge with their research and interpret the data, reflecting the culmination of their achievements (7, 8).

In Turkey, important steps have been taken in recent years regarding the bibliographic control, digitalization, and accessibility of academic theses. Consequently, studies related to the bibliometric characteristics of theses have started to appear in the literature (9). The use of bibliometric studies in the field of anatomy provides important information about existing publications (10). In the field of anatomy at the postgraduate level, theses have been conducted on various topics. These theses may be related to radiological, anthropometric, experimental, cadaveric, or clinical areas. In this study, our aim was to systematically examine the theses in the field of anatomy published between 2021 and 2023.

Materials and Methods

The study was conducted by screening 298 medical anatomy theses published in the Council of Higher Education (YÖK) National Thesis Search Center between 2021 and 2023. Theses were categorized into master's, doctoral, and medical specialization theses. For a systematic analysis of these categorized theses, they were further divided into the following categories: locomotor system, circulatory system, respiratory system, digestive system, urogenital and endocrine system, nervous system, and others. The "others" category included multi-system theses, theses at the cellular level, surveys, and terminology studies. For a more detailed examination, the theses were further divided into five subheadings based on the study area for each system: experimental, anthropometric, radiological, cadaveric, and clinical.

It should be noted that the theses in the YÖK National Thesis Search Center are made available online with the individual's permission. In other words, the theses that do not have the individual's permission cannot be viewed in this center.

Results

Out of the completed 298 anatomy theses, it was found that 146 of them were related to the locomotor system, 33 were related to the circulatory system, 10 were related to the respiratory system, 13 were related to the digestive system, 10 were related to the urogenital and endocrine system, 63 were related to the nervous system, and 23 were categorized as "other" (Figure 1).

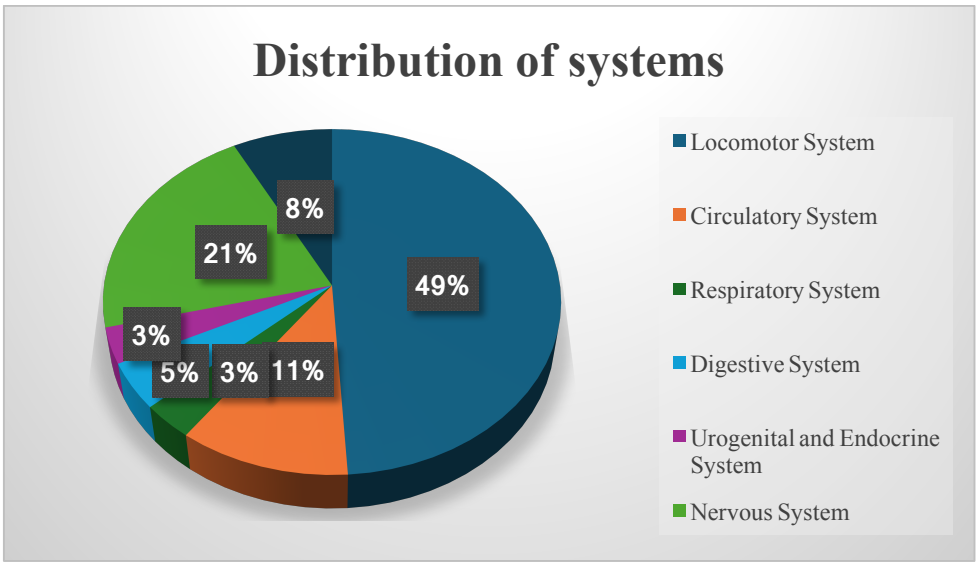

Figure 1. Distribution of theses in the field of anatomy by systems.

Of the 146 theses of the locomotor system, 34 belonged to 2023, 49 belonged to 2022, and 63 belonged to 2021. Of the 33 theses on the circulatory system, 5 belonged to 2023, 13 to 2022, and 15 to 2021. Of the 10 theses on the respiratory system, 1 belonged to 2023, 5 to 2022, and 4 to 2021. Of the 13 theses on the digestive system, 2 were for 2023, 10 for 2022, and 1 for 2021.

Of the 10 theses on the urogenital and endocrine system, 4 belonged to 2023, 3 to 2021, and 3 to 2021. Of the 63 theses on the nervous system, 19 were from 2023, 23 were from 2022, and 21 were from 2021. Of the 23 theses in the other department, 3 were from 2023, 14 were from 2022, and 6 were from 2021 (Figure 2).

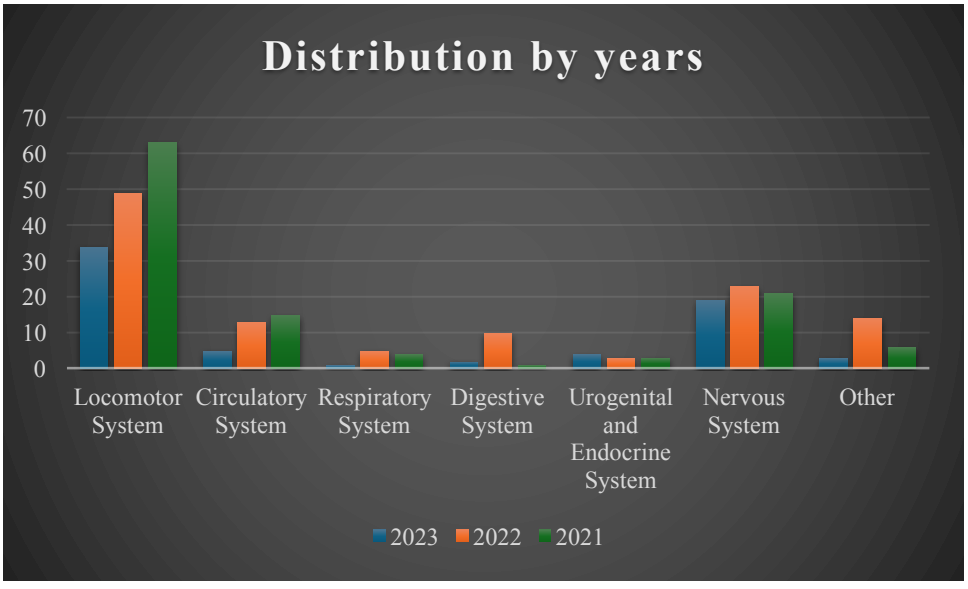

Figure 2. Distribution of theses written in the field of anatomy by years.

Of the 34 theses in the locomotor system for 2023, 19 of them are master's theses, 12 of them are doctoral theses, 3 of them are medical specialty theses, of the 49 theses of 2022, 35 are master's theses, 11 of them are doctoral theses, 3 of them are medical specialty theses, 63 of them are of 2021. 43 of the theses were master's theses, 15 were doctoral theses, and 5 were medical specialty theses. 5 of the 5 theses in 2023 in the circulation system are master's theses, 2 of the 13 theses in 2022 are master's theses, 8 of them are doctoral theses, 3 of them are medical specialty theses, 8 of the 15 theses in 2021 are master's theses, 4 of them are doctoral theses, and 3 of them are master's theses. One of them was a medical specialization thesis. In the respiratory system, 1 thesis of 2023 was a medical specialization thesis, 4 of the 5 theses of 2022 were master's thesis, 1 was a doctoral thesis, 2 of the 4 theses in 2021 were master's thesis, 1 was a doctoral thesis, and 1 was a medical specialization thesis. In the digestive system, 2 of the 10 theses from 2023 were master's theses, 6 of the 10 theses from 2022 were master's theses, 4 were doctoral theses, and 1 thesis from 2021 was a doctoral thesis. Of the 4 theses in 2023 on the urogenital and endocrine systems, 1 was a master's degree, 2 of them were doctoral, 1 was a medical specialty thesis, 2 of the 3 theses in 2022 were master's thesis, 1 was a doctoral thesis, and all 3 theses in 2021 were medical specialty thesis. Of the 19 theses in the nervous system in 2023, 9 are master's theses, 10 are doctoral theses, of the 23 theses in 2022, 16 are master's thesis, 6 are doctoral, 1 is a medical specialty thesis, 11 of the 21 theses in 2021 are master's theses, 9 are doctoral theses, 1 of which was a medical specialization thesis (Figure 3).

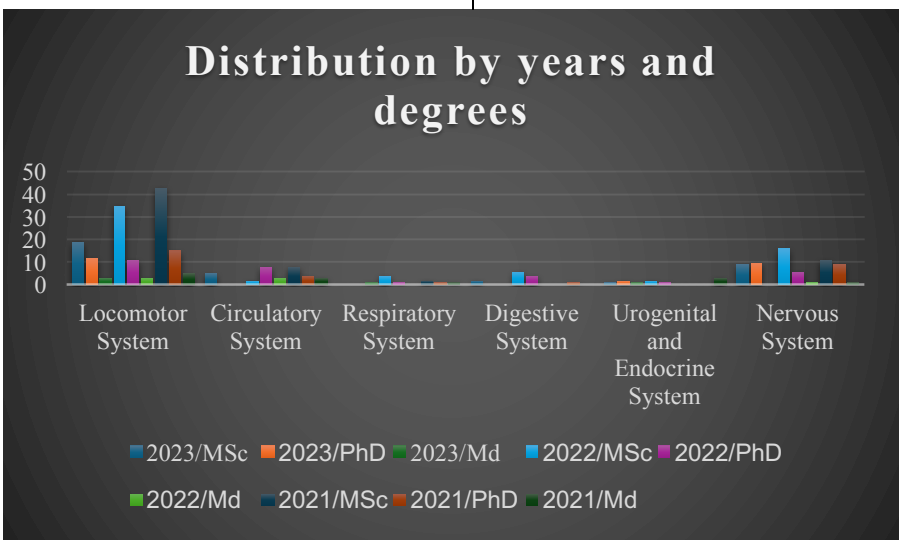

Figure 3. Distribution of theses separated by systems by years and graduate degrees (Distribution by years and degrees).

Of the 34 studies in the locomotor system of 2023, 2 are experimental, 5 are anthropometric, 14 are radiological, 5 are cadaver, 8 are clinical, 4 of 49 studies of 2022 are experimental, 5 are anthropometric, 28 are radiological, 8 are cadaver, 4 are Of the 63 studies in 2021, 2 were experimental, 8 were anthropometric, 32 were radiological, 12 were cadaveric, and 9 were clinical studies. Of the 5 studies in the circulatory system in 2023, 2 are radiological, 2 are cadaveric, 1 is clinical, 1 of the 13 studies in 2022 is anthropometric, 8 of them are radiological, 2 are cadaver, 2 are clinical, 15 studies in 2021 are 11 radiological, 3 are cadaveric. , 1 of which was a clinical study. In the respiratory system, 1 study in 2023 was radiological, 4 of 5 studies in 2022 were radiological, 1 was clinical, 1 of 4 studies in 2021 was experimental, 2 of which were anthropometric, and 1 was radiological. In the digestive system, 2 studies of 2023 were 1 cadaveric, 1 was clinical, 7 of 10 studies of 2022 were experimental, 2 were radiological, 1 was clinical, and 1 study of 2021 was experimental. Of the 4 studies on the urogenital and endocrine systems in 2023, 2 were experimental, 1 was radiological, 1 was clinical, 2 of 3 studies of 2022 was radiological, 1 was clinical, 3 of 2021 was 2 experimental, 1 was radiological. Of the 19 studies on the nervous system in 2023, 9 are experimental, 7 are radiological, 2 are cadaveric, 1 is clinical, 2 of the 23 studies of 2022 are experimental, 4 are anthropometric, 10 are radiological, 6 are cadaver, 1 is clinical, and in 2021 Of the 21 studies, 5 were experimental, 8 were radiological, 6 were cadaveric, and 2 were clinical studies (Figures 4, 5, 6).

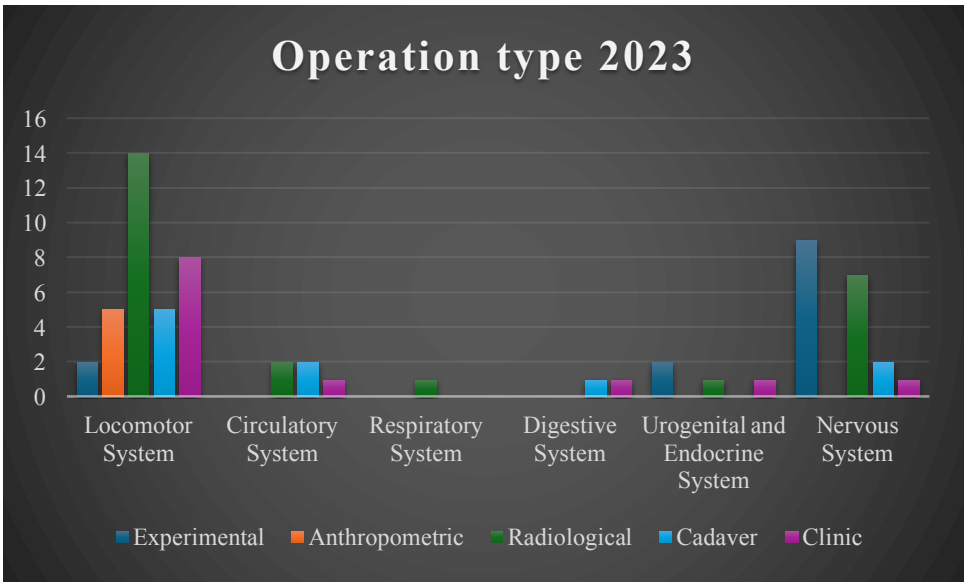

Figure 4. Distribution of theses written in 2023 according to method types in each system.

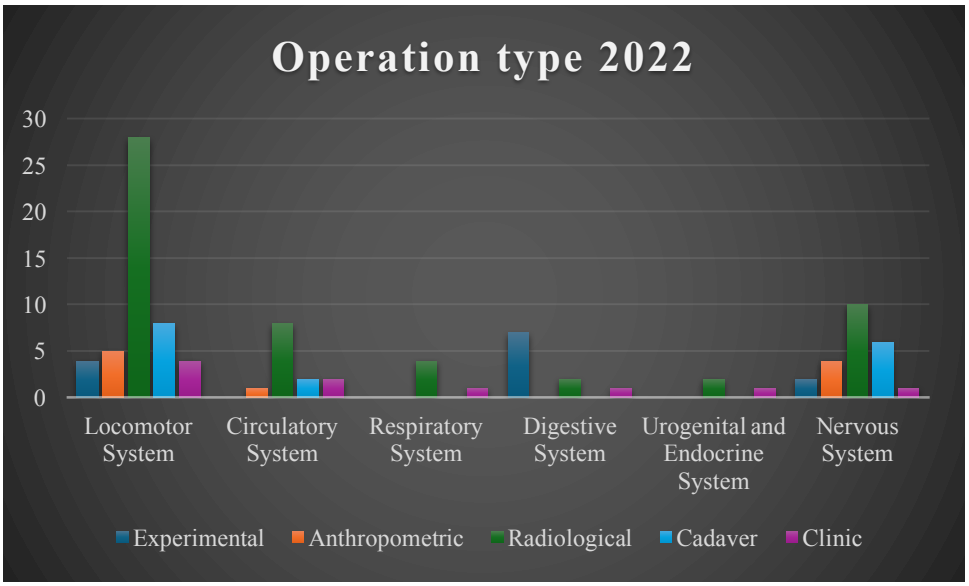

Figure 5. Distribution of theses in 2022 according to method types in each system (Operation type 2022).

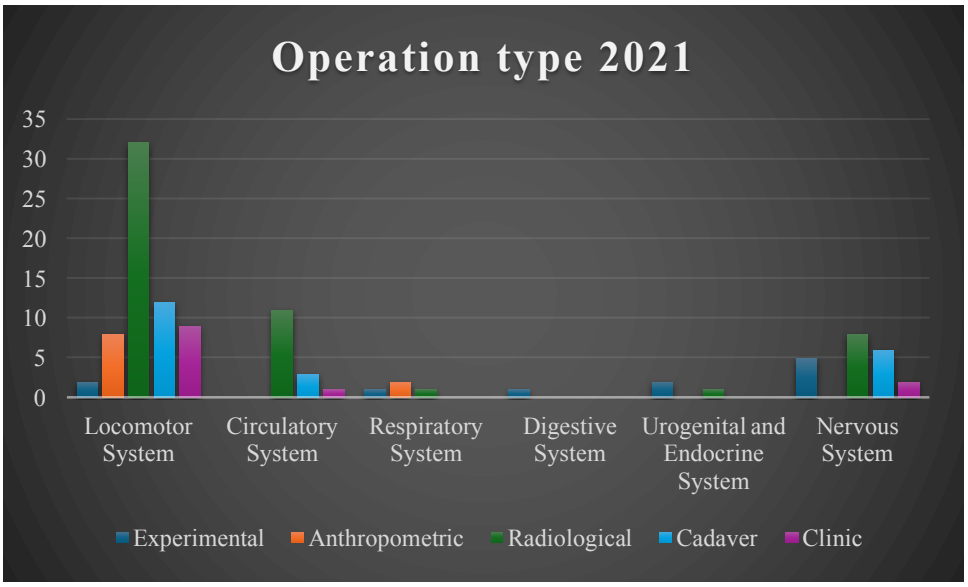

Figure 6. Distribution of theses made in 2021 by method types in each system (Operation type 2021).

Discussion

This study aimed to systematically examine the theses in the field of anatomy published between 2020 and 2023. As a result of this study, it was found that out of the 298 theses, 146 were related to the locomotor system, followed by 63 theses related to the nervous system. When examined by years, it was observed that anatomy theses related to the locomotor system were most frequently published in 2021, and it was also noted that a significant majority of the theses on the locomotor system in all three years were radiological in nature.

The areas of anatomy that see the most publications in Turkey include surgical

anatomy, morphology, neuroscience, clinical neurology, radiology, and nuclear medicine (1, 11). Additionally, it was noted that animal experiments (29.9%), radiological investigations (22.7%), and clinical research (13.4%) made up the majority of the original articles published in the Turkish Journal of Anatomy and Clinical Anatomy between 2007 and 2018 (6).

In a bibliographic study, it was reported that radiological studies were the most common type of research conducted in anatomy theses, followed by experimental animal research, anthropometric studies, and clinical studies (1). The bibliographic analysis conducted in this study aligns with the literature, revealing that especially radiological studies were conducted in the three-year period, with a strong focus on the locomotor system. This may be attributed to the frequent use of computerized tomography and magnetic resonance imaging techniques in clinical practice, which play a crucial role in the diagnosis, monitoring, and treatment planning of diseases. The recent advancements in radiological technology may have made it easier to conduct such research.

Advancements in the medical field are indeed fueling a race in scientific research. Experimental studies have benefited positively from these developments, and their numbers have gradually increased over time. Creating disease models in animals and conducting assessments aim to achieve rapid and effective diagnosis and treatment. As a result of technological advancements, as the level of equipment in animal research centers has increased, more advanced studies are being conducted. Experimental studies are frequently used as guiding tools in the field of anatomy (12). In this study, it was observed that the theses related to experimental studies on animals in the last three years lagged behind radiological and cadaver studies in all systems. This could be attributed to challenges in procuring cadavers and the financial resources required for experimental studies, which may lead researchers to prefer other types of research.

In a study examining publications in the field of anatomy, it was reported that experimental animal studies were the most common, followed by radiological studies (6). In this study, when examining the theses in the field of anatomy, it was found that radiological studies were the most common. The discrepancy between this study and the literature could be attributed to the examination of different time intervals.

Anatomy education holds a significant place in basic medicine, and it is also essential for the diagnosis and proper treatment of diseases in clinical practice

(13). The importance of anatomy is particularly emphasized in surgical specialties (14). Enhancing classical anatomical knowledge with clinical information and radiological images in anatomy education improves the understanding of anatomy and equips students with the ability to interpret clinical problems (15). The results obtained in this study, showing an increase in theses related to clinical anatomy over the years, support the literature in this regard.

Anatomy theses based on anthropometric measurements have been on the rise (16, 17). In this study, when examining the anatomy theses conducted in the last three years, it was found that anthropometric measurements were most frequently conducted in the locomotor system, followed by the nervous system. In this study, it was found that cadaver studies were most frequently conducted in the locomotor system in the last three years, followed by the nervous system.

Limitations:

This study can provide dynamic, objective, and valuable information about the trends in the increasing number of theses in the Department of Basic Medical Sciences, Anatomy, for researchers interested in the subject. However, it still has some limitations. Although the information from the theses accessible online is easily accessible during the research process, there may still be theses that are not publicly available and do not fully specify their subject matter in the thesis introduction. This bibliographic study involves systematic categorization but lacks topographic examination. For example, upper extremity studies could not be analyzed separately for the arm, forearm, and hand.

Conclusions

As a result of the study, it was determined that in the anatomy theses conducted in the last three years, the locomotor system was the most frequently examined, and radiological studies were the most commonly employed method. The current findings of the theses evaluated in this study related to the field of anatomy can provide insights into the categories of future research and publications when added to the data of bibliometric studies in the literature. It is expected that the research results will shed light on anatomy graduate students, doctoral students, clinicians, and researchers involved in various academic studies.

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