Chronicles of Precision Medical Researchers

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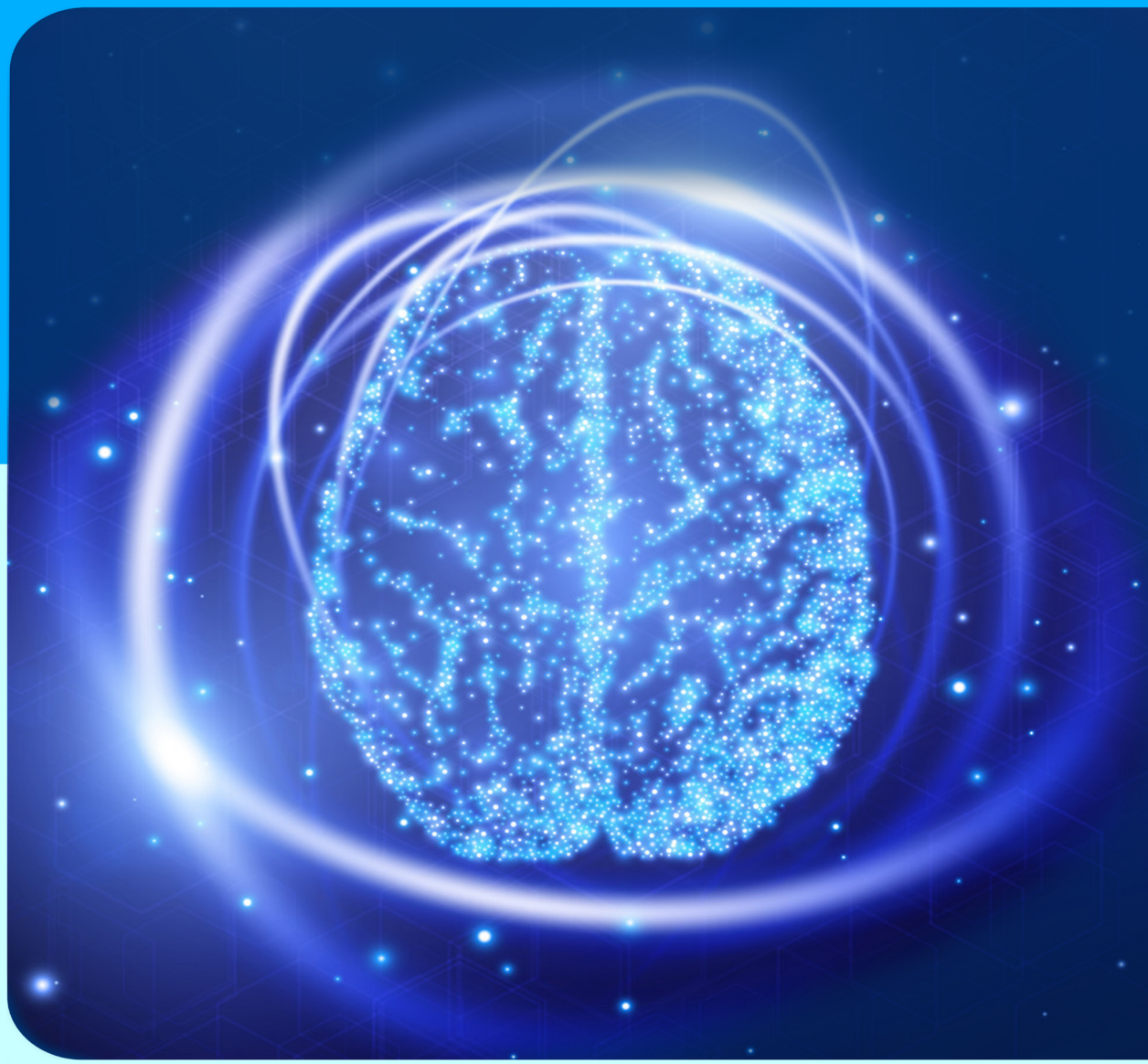

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Chronicles of Precision Medical Researchers

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Chronicles of Precision Medical Researcers.

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INSTRUCTIONS FOR AUTHORS

AIM AND SCOPE

The Journal will not consider manuscripts any that have been published elsewhere, or manuscripts that are being considered for another publication, or are in press. Studies previously announced in the congresses are accepted if this condition is stated. If any part of a manuscript by the same author(s) contains any information that was previously published, a reprint or a copy of the previous article should be submitted to the Editorial Office with an explanation by the authors

A technical review is performed to confirm that all of the required documentation has been submitted and to conduct a preliminary evaluation of the manuscript and supplementary files to assess suitability for the Journal. The manuscript will be returned to the Author in the event of any deficiency.

Chronicles of Precision Medical Researchers operates a blind review process. Contributions deemed suitable are then typically sent to a minimum of two independent expert reviewers in the field of study to assess the scientific quality of the paper.

The Editor/Editors are responsible for the final decision regarding acceptance or rejection of articles. The Editor's decision is final. If necessary, author(s) may be invited to submit a revised version of the manuscript. This invitation does not imply that the manuscript will be accepted for publication. Revised manuscripts must be sent to the Editorial Office within 4 (four) weeks, otherwise they will be considered as a new application. The corresponding author will be notified of the decision to accept or reject the manuscript for publication.

Statements and suggestions published in manuscripts are the authors' responsibility and do not reflect the opinions of the Editor, Associate Editors and the Editorial Board members.

The manuscript will not be returned to the authors whether the article is accepted or not. Copyright fee is not paid for the articles published in the journal. A copy of the journal will be sent to the corresponding author.

Language of the Journal

The official languages of the Journal are Turkish and English. The manuscripts that are written in Turkish have abstracts in English, which makes the abstracts available to a broader audience.

Authorship Criteria

After accepted for publication, all the authors will be asked to sign "Coyright Transfer Form" which states the following: " This work is not under active consideration for publication, has not been accepted for publication, nor has it been published, in full or in part (except in abstract form). I confirm that the study has been approved by the ethics committee. " All authors should agree to the conditions outlined in the form.

Chronicles of Precision Medical Researchers has agreed to use the standards of the International Committee of Medical Journal Editors. The author(s) should meet the criteria for authorship according to the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication. It is available at www.icmje.org.

Ethical Responsibility

The protocol of clinical research articles must be approved by the Ethics Committee.

In all studies conducted on humans, the "Material and Method" section was approved by the relevant committee or the Helsinki Declaration of Principles (https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/).

It should be stated in the text that all persons included in the study signed the am Informed Consent Form ".

The articles submitted to the Chronicles of Precision Medical Researchers will be deemed to have been conducted in accordance with the Helsinki Declaration of Principles, and have received ethical and legal permissions and will not be held responsible.

If the "Animal" item was used in the study, the authors stated that in the Material and Method section of the article, they protect the animal rights in their studies in accordance with the principles of Guide for the Care and Use of Laboratory Animals (www.nap.edu/catalog/5140.html) and that they have received approval from the ethics committees of their institutions. must specify.

In case reports, Informed Consent a should be obtained from patients regardless of the identity of the patient.

If the article includes the institution (directly or indirectly) providing financial support for the commercial connection or work, the authors; the commercial product used, the drug, the company has no commercial relationship with, or if there is any relationship (consultant, other agreements, etc.), the editor must inform the presentation page.

If Ethics Committee Approval is required in the article; the received document should be sent with the article.

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The manuscript should be submitted to the Academic Plagiarism Prevention Program by the authors.

It is the authors' responsibility to ensure that the article complies with the ethical rules.

Policy of Screening for Plagiarism

The manuscripts are scanned by the Journal using the iThenticate program for determination of plagiarism and non-ethical situations. Chronicles of Precision Medical Researchers will immediately reject manuscripts leading to plagiarism.

TYPES OF MANUSCRIPT

Manuscripts should be submitted online via www.chronpmr.com

Original Articles should not exceed 3000 words and should be arranged under the headings of Abstract (not more than 300 words), Introduction, Materials and Methods, Results, Discussion, Conclusion and References.

Case Reports should not exceed 1000 words and 10 references, and should be arranged as follows: Abstract, Introduction, Case Report, Discussion and References. It may be accompanied by only one figure or table.

Letter to the Editor should not exceed 500 words. Short relevant comments on medical and scientific issues, particularly controversies, having no more than five references and one table or figure are encouraged. Where letters refer to an earlier published paper, authors will be offered right of reply.

Reviews are not accepted unless written on the invitation of the Editorial Board.

PREPARATION OF MANUSCRIPTS

All articles submitted to the Journal must comply with the following instructions:

a) Submissions should be doubled-spaced and typed in Arial 10 points.

b) All pages should be numbered consecutively in the top right-hand corner, beginning with the title page.

c) The title page should not include the names and institutions of the authors.

d) The manuscript should be presented in the following order: Title page, Abstract (English, Turkish), Keywords (English, Turkish), Introduction, Materials and Methods, Results, Discussion, Conclusion, Acknowledgements (if present), References, Figure Legends, Tables (each table, complete with title and foot-notes, on a separate page) and Appendices (if present) presented each on a separate page.

Title

The title should be short, easy to understand and must define the contents of the article.

Abstract

Abstract should be in both English and Turkish and should consist "Aim, Materials and Methods, Results and Conclusion". The purpose of the study, the setting for the study, the subjects, the treatment or intervention, principal outcomes measured, the type of statistical analysis and the outcome of the study should be stated in this section (up to 300 words). Abstract should not include reference. No abstract is required for the letters to the Editor.

Keywords

Not more than five keywords in order of importance for indexing purposes should be supplied below the abstract and should be selected from Index Medicus Medical Subject Headings (MeSH), available at www.nlm.nih.gov/meshhome.html.

Text

Authors should use subheadings to divide sections regarding the type of the manuscript as described above. Statistical methods used should be specified in the Materials and Methods section.

References

In the text, references should be cited using Arabic numerals in parenthesis in the order in which they appear. If cited only in tables or figure legends, they should be numbered according to the first identification of the table or figure in the text. Names of the journals should be abbreviated in the style used in Index Medicus. The names of all authors should be cited when there are six or fewer; when seven or more, the first three should be followed by et al. The issue and volume numbers of the referenced journal should be added.

References should be listed in the following form:

Journal article

Teke Z, Kabay B, Aytekin FO et al. Pyrrolidine dithiocarbamate prevents 60 minutes of warm mesenteric ischemia/reperfusion injury in rats. Am J Surg 2007;194(6):255-62.

Supplement

Solca M. Acute pain management: Unmet needs and new advances in pain management. Eur J Anaesthesiol 2002; 19(Suppl 25): 3-10.

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Online article not yet published in an issue

Butterly SJ, Pillans P, Horn B, Miles R, Sturtevant J. Off-label use of rituximab in a tertiary Queensland hospital. Intern Med J doi: 10.1111/j.1445-5994.2009.01988.x

Book

Sample1: Murray PR, Rosenthal KS, Kobayashi GS, Pfaller MA. Medical microbiology. 4th ed. St. Louis: Mosby; 2002.

Sample 2: Sümbüloğlu K, Akdağ B. Regresyon Yöntemleri ve Korelasyon Analizi. Hatiboğlu Yayınevi: Ankara; 2007.

Chapter in a book

Meltzer PS, Kallioniemi A, Trent JM. Chromosome alterations in human solid tumors. I n: Vogelstein B, Kinzler KW, editors. The genetic basis of human cancer. New York: McGraw-Hill; 2002. p. 93113.

Journal article on the Internet

Abood S. Quality improvement initiative in nursing homes: The ANA acts in an advisory role. Am J Nurs [serial on the Internet] 2002 [cited 12 Aug 2002]; 102. Available from: www.nursingworld.org/AJN/2002/june/wawatch.htm

Website

Cancer-pain.org [homepage on the Internet]. New York: Association of Cancer Online Resources [updated 16 May 2002; cited 9 Jul 2002]. Available from: www.cancer-pain.org

An organization as an author

The Intensive Care Society of Australia and New Zealand. Mechanical ventilation strategy in ARDS: Guidelines. Int Care J Aust 1996;164:282-4.

Acknowledgements

The source of financial grants and the contribution of colleagues or institutions should be acknowledged.

Tables

Tables should be complementary, but not duplicate information contained in the text. Tables should be numbered consecutively in Arabic numbers, with a descriptive, self-explanatory title above the table. All abbreviations should be explained in a footnote. Footnotes should be designated by symbols in the following order: *,†, ‡, §, ¶.

Figures

All illustrations (including line drawings and photographs) are classified as figures. Figures must be added to the system as separate .jpg or .gif files (approximately 500x400 pixels, 8 cm in width and at least 300 dpi resolution). Figures should be numbered consecutively in Arabic numbers and should be cited in parenthesis in consecutive order in the text.

Figure Legends

Legends should be self-explanatory and positioned on a separate page. The legend should incorporate definitions of any symbols used and all abbreviations and units of measurements should be explained. A letter should be provided stating copyright authorization if figures have been reproduced from another source.

Measurements and Abbreviations

All measurements must be given in metric system (Système International d'Unités, SI). Example: mg/kg, µg/kg, mL, mL/kg, mL/kg/h, mL/kg/min, L/min, mmHg, etc. Statistics and measurements should always be given in numerals, except where the number begins a sentence. When a number does not refer to a unit of measurement, it is spelt out, except where the number is greater than nine.

Abbreviations that are used should be defined in parenthesis where the full word is first mentioned. Some common abbreviations can be used, such as iv, im, po, and sc.

Drugs should be referred to by their generic names, rather than brand names.

Editorial Correspondence

Prof. Dr. Resul YILMAZ
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Checklist for Manuscripts

Review guide for authors and instructions for submitting manuscripts through the electronic submission, website at

http://www.chronpmr.com

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Chronicles of Precision Medical Researchers

YAZARLARA BİLGİ

AMAÇ ve KAPSAM

Chronicles of Precision Medical Researchers Dergisi, dört ayda bir yayımlanır ve üç sayı ile bir cilt tamamlanır. Dergi; pediatri ile ilgili tüm nitelikli klinik ve deneysel araştırmaları, olgu sunumlarını ve editöre mektupları yayımlar.

Chronicles of Precision Medical Researchers Dergisi, bilimsel yayınlara açık erişim sağlar. Dergi basımından hemen sonra, makalelerin tam metinlerine ücretsiz ulaşılabilir.

Dergide yayımlanmak üzere gönderilen yazıların daha önce başka bir yerde yayımlanmamış veya yayımlanmak üzere gönderilmemiş olması gerekir. Daha önce kongrelerde sunulmuş çalışmalar, bu durum belirtilmek koşuluyla kabul edilir. Makale, yazar(lar) ın daha önce yayımlanmış bir yazısındaki konuların bir kısmını içeriyorsa bu durum belirtilmeli ve yeni yazı ile birlikte önceki makalenin bir kopyası da Yayın Bürosu'na gönderilmelidir.

Gerekli tüm belgelerin sunulduğunu teyit etmek ve dergiye uygunluğunu değerlendirmek için makale ve ek dosyaların ön değerlendirmesini yapmak üzere teknik bir inceleme yapılır. Herhangi bir eksiklik olması halinde makale yazara iade edilecektir. Chronicles of Precision Medical Researchers Dergisi kör bir inceleme süreci yürütmektedir. Uygun görülen yazılar daha sonra makalenin bilimsel kalitesini değerlendirmek için çalışma alanında en az iki bağımsız uzmana gönderilir. Editör / Editörler makalelerin kabulü veya reddi ile ilgili nihai karardan sorumludur.

Editörün kararı kesindir. Gerekli olduğu durumlarda, yazar(lar) dan düzeltme istenebilir. Yazardan düzeltme istenmesi, yazının yayımlanacağı anlamına gelmez. Bu düzeltmelerin en geç 21 gün içinde tamamlanıp dergiye gönderilmesi gereklidir. Aksi halde yeni başvuru olarak değerlendirilir. Sorumlu yazara yazının kabul veya reddedildiğine dair bilgi verilir.

Dergide yayımlanan yazıların etik, bilimsel ve hukuki sorumluluğu yazar(lar)a ait olup Editör, Editör Yardımcısı ve Yayın Kurulu'nun görüşlerini yansıtmaz.

Dergide yayımlanması kabul edilse de edilmese de, yazı materyali yazarlara geri verilmez. Dergide yayımlanan yazılar için telif hakkı ödenmez. Bir adet dergi, sorumlu yazara gönderilir.

Derginin Yazı Dili

Derginin yazı dili Türkçe ve İngilizcedir. Dili Türkçe olan yazılar, İngilizce özetleri ile yer alır. Yazının hazırlanması sırasında, Türkçe kelimeler için Türk Dil Kurumundan (www.tdk.gov.tr), teknik terimler için Türk Tıp Terminolojisinden (www.tipterimleri.com) yararlanılabilir.

Yazarlık Kriterleri

Dergide yayınlanması uygun bulunan tüm yazıların araştırma ve yayın etiğine uygun hazırlandığı, varsa sağlanan fonun kaynağının tanımlandığı, başka yerde yayımlanmadığı veya yayımlanmak üzere gönderilmediği, çalışmaya katılan tüm yazarlar tarafından yazının son halinin onaylandığı, yayımlanacak yazı ile ilgili telif haklarının dergiye devredildiği, tüm yazarların imzaları ile "Yayın Hakkı Devir Formu"nda belirtilmesi gerekir.

Chronicles of Precision Medical Researchers Dergisi, Uluslararası Tıp Dergileri Editörleri Kurulu'nun (International Committee of Medical Journal Editors) "Biyomedikal Dergilere Gönderilen Makalelerin Uyması Gereken Standartlar: Biyomedikal Yayınların Yazımı ve Baskıya Hazırlanması (Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication)" standartlarını kullanmayı kabul etmektedir. Bu konudaki bilgiye www.icmje.org adresinden ulaşılabilir.

Etik Sorumluluk

Etik Sorumluluk / Kurallar: Klinik araştırma makalelerinin protokolü Etik Komitesi tarafından onaylanmış olmalıdır.

İnsanlar üzerinde yapılan tüm çalışmalarda "Gereç ve Yöntem" bölümünde çalışmanın ilgili komite tarafından onaylandığı veya çalışmanın Helsinki İlkeler Deklarasyonu'na (https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/) uyularak gerçekleştirildiğine dair bir cümle yer almalıdır.

Çalışmaya dahil edilen tüm kişilerin Bilgilendirilmiş Onam Formu'nu imzaladığı metin içinde belirtilmelidir.

Chronicles of Precision Medical Researchers Dergisi'ne gönderilen makalelerdeki çalışmaların Helsinki İlkeler Deklarasyonu'na uygun olarak yapıldığı, kurumsal etik ve yasal izinlerin alındığı varsayılacak ve bu konuda sorumluluk kabul edilmeyecektir.

Çalışmada "Hayvan" öğesi kullanılmış ise yazarlar, makalenin Gereç ve Yöntem bölümünde hayvan haklarını Guide for the Care and Use of Laboratory Animals (www.nap.edu/catalog/5140.html) prensipleri doğrultusunda koruduklarını, çalışmalarında ve kurumlarının etik kurullarından onay aldıklarını belirtmek zorundadır.

Olgu sunumlarında hastanın kimliğinin ortaya çıkmasına bakılmaksızın hastalardan "Bilgilendirilmiş rıza" alınmalıdır.

Makalede ticari bağlantı veya çalışma için maddi destek veren kurum (doğrudan veya dolaylı) mevcut ise yazarlar; kullanılan ticari ürün, ilaç, firma ile ticari hiçbir ilişkisinin olmadığını veya varsa nasıl bir ilişkisinin olduğunu (konsültan, diğer anlaşmalar vs.), editöre sunum sayfasında bildirmek zorundadır.

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Makalede Etik Kurul Onayı alınması gerekli ise; alınan belge makale ile birlikte gönderilmelidir.

Makale yazarlar tarafından akademik intihal önleme programından geçirilmelidir.

Makalenin etik kurallara uygunluğu yazarların sorumluluğundadır.

İntihal Taraması Politikası

Makaleler, intihal ve etik olmayan durumların belirlenmesi için iThenticate programı kullanılarak Journal tarafından taranır. Chronicles of Precision Medical Researchers Dergisi intihallere yol açan makaleleri derhal reddedecektir.

YAZI TÜRLERİ

Yazılar, elektronik ortamda www.chronpmr.com adresine gönderilir.

Orijinal makaleler, 3000 sözcük sayısını aşmamalı, "Öz (en fazla 300 kelime), Giriş, Gereç ve Yöntem, Bulgular, Tartışma, Sonuç, Kaynaklar" bölümlerinden oluşmalıdır.

Olgu Sunumu, "Öz, Giriş, Olgu Sunumu, Tartışma, Kaynaklar" şeklinde düzenlenmelidir. En fazla 1000 sözcük ile sınırlıdır. Sadece bir tablo veya şekil ile desteklenebilir.

Editöre Mektup, yayımlanan metinlerle veya mesleki konularla ilgili olarak 500 sözcüğü aşmayan ve beş kaynak ile bir tablo veya şekil içerecek şekilde yazılabilir. Ayrıca daha önce dergide yayınlanmış metinlerle ilişkili mektuplara cevap hakkı verilir.

Yayın Kurulu'nun daveti üzerine yazılanlar dışında derleme kabul edilmez.

MAKALENİN HAZIRLANMASI

Dergide yayınlanması istenilen yazı için aşağıdaki kurallara uyulmalıdır.

a) Yazı; iki satır aralıklı olarak, Arial 10 punto ile yazılmalıdır.
b) Sayfalar başlık sayfasından başlamak üzere, sağ üst köşesinde numaralandırılmalıdır.
c) Online makale sistemine yüklenen word dosyasının başlık sayfasında (makalenin adını içeren başlık sayfası), yazarlara ait isim ve kurum bilgileri yer almamalıdır.
d) Makale, şu bölümleri içermelidir: Her biri ayrı sayfada yazılmak üzere; Türkçe ve İngilizce Başlık Sayfası, Öz, Abstract, Anahtar Sözcükler, Keywords, Giriş, Gereç ve Yöntem, Bulgular, Tartışma, Sonuç, Açıklamalar (varsa), Kaynaklar, Şekil Alt Yazıları, Tablolar (başlıkları ve açıklamalarıyla beraber), Ekler (varsa).

Yazının Başlığı

Kısa, kolay anlaşılır ve yazının içeriğini tanımlar özellikte olmalıdır.

Özetler

Türkçe (Öz) ve İngilizce (Abstract) olarak yazılmalı, Amaç, Gereç ve Yöntem, Bulgular ve Sonuç (Aim, Materials and Methods, Results, Conclusion) olmak üzere dört bölümden oluşmalı, en fazla 300 sözcük içermelidir. Araştırmanın amacı, yapılan işlemler, gözlemsel ve analitik yöntemler, temel bulgular ve ana sonuçlar belirtilmelidir. Özette kaynak kullanılmamalıdır. Editöre mektup için özet gerekmemektedir.

Anahtar Sözcükler

Türkçe Öz ve İngilizce Abstract bölümünün sonunda, Anahtar Sözcükler ve Keywords başlığı altında, bilimsel yazının ana başlıklarını yakalayan, Index Medicus Medical Subject Headings (MeSH)'e uygun olarak yazılmış en fazla beş anahtar sözcük olmalıdır. Anahtar sözcüklerin, Türkiye Bilim Terimleri'nden (www.bilimterimleri.com) seçilmesine özen gösterilmelidir.

Metin

Yazı metni, yazının türüne göre yukarıda tanımlanan bölümlerden oluşmalıdır. Uygulanan istatistiksel yöntem, Gereç ve Yöntem bölümünde belirtilmelidir.

Kaynaklar

Chronicles of Precision Medical Researchers Dergisi, Türkçe kaynaklardan yararlanmaya özel önem verdiğini belirtir ve yazarların bu konuda duyarlı olmasını bekler.

Kaynaklar metinde yer aldıkları sırayla, cümle içinde atıfta bulunulan ad veya özelliği belirten kelimenin hemen bittiği yerde ya da cümle bitiminde noktadan önce parantez içinde Arabik rakamlarla numaralandırılmalıdır. Metinde, tablolarda ve şekil alt yazılarında kaynaklar, parantez içinde Arabik numaralarla nitelendirilir. Sadece tablo veya şekil alt yazılarında kullanılan kaynaklar, tablo ya da şeklin metindeki ilk yer aldığı sıraya uygun olarak numaralandırılmalıdır. Dergi başlıkları, Index Medicus'ta kullanılan tarza uygun olarak kısaltılmalıdır. Kısaltılmış yazar ve dergi adlarından sonra nokta olmamalıdır. Yazar sayısı altı veya daha az olan kaynaklarda tüm yazarların adı yazılmalı, yedi veya daha fazla olan kaynaklarda ise üç yazar adından sonra et al. veya ve ark. yazılmalıdır. Kaynak gösterilen derginin sayı ve cilt numarası mutlaka yazılmalıdır.

Kaynaklar, yazının alındığı dilde ve aşağıdaki örneklerde görüldüğü şekilde düzenlenmelidir.

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Dergilerdeki yazılar

Teke Z, Kabay B, Aytekin FO et al. Pyrrolidine dithiocarbamate prevents 60 minutes of warm mesenteric ischemia/reperfusion injury in rats. Am J Surg 2007;194(6):255-62.

Ek sayı (Supplement)

Solca M. Acute pain management: Unmet needs and new advances in pain management. Eur J Anaesthesiol 2002;19(Suppl 25):3-10.

Henüz yayınlanmamış online makale

Butterly SJ, Pillans P, Horn B, Miles R, Sturtevant J. Off-label use of rituximab in a tertiary Queensland hospital. Intern Med J doi: 10.1111/j.1445-5994.2009.01988.x

Kitap

Örnek 1: Murray PR, Rosenthal KS, Kobayashi GS, Pfaller MA. Medical microbiology. 4th ed. St. Louis: Mosby; 2002.
Örnek 2: Sümbüloğlu K, Akdağ B. Regresyon Yöntemleri ve Korelasyon Analizi. Hatiboğlu Yayınevi: Ankara; 2007.

Kitap bölümü

Meltzer PS, Kallioniemi A, Trent JM. Chromosome alterations in human solid tumors. I n: Vogelstein B, Kinzler KW, editors. The genetic basis of human cancer. New York: McGraw-Hill; 2002. p. 93113.

İnternet makalesi

Abood S. Quality improvement initiative in nursing homes: The ANA acts in an advisory role. Am J Nurs [serial on the Internet] 2002 [cited 12 Aug 2002]; 102. Available from: www.nursingworld.org/AJN/2002/june/wawatch.htm

Web Sitesi

Cancer-pain.org [homepage on the Internet]. New York: Association of Cancer Online Resources [updated 16 May 2002; cited 9 July 2002]. Available from: www.cancer-pain.org

Yazar olarak bir kuruluş

The Intensive Care Society of Australia and New Zealand. Mechanical ventilation strategy in ARDS: Guidelines. Int Care J Aust 1996;164:282-4.

Açıklamalar

Varsa finansal kaynaklar, katkı sağlayan kurum, kuruluş ve kişiler bu bölümde belirtilmelidir.

Tablolar

Tablolar metni tamamlayıcı olmalı, metin içerisinde tekrarlanan bilgiler içermemelidir. Metinde yer alma sıralarına göre Arabik sayılarla numaralandırılıp tablonun üstüne kısa ve açıklayıcı bir başlık yazılmalıdır. Tabloda yer alan kısaltmalar, tablonun hemen altında açıklanmalıdır. Dipnotlarda sırasıyla şu semboller kullanılabilir: *, †, ‡, §, ¶.

Şekiller

Şekil, resim, grafik ve fotoğrafların tümü "Şekil" olarak adlandırılmalı ve ayrı birer .jpg veya .gif dosyası olarak (yaklaşık 500x400 piksel, 8 cm eninde ve en az 300 dpi çözünürlükte) sisteme eklenmelidir. Şekiller metin içinde kullanım sıralarına göre Arabik rakamla numaralandırılmalı ve metinde parantez içinde gösterilmelidir.

Şekil Alt Yazıları

Şekil alt yazıları, her biri ayrı bir sayfadan başlayarak, şekillere karşılık gelen Arabik rakamlarla çift aralıklı olarak yazılmalıdır. Şeklin belirli bölümlerini işaret eden sembol, ok veya harfler kullanıldığında bunlar alt yazıda açıklanmalıdır. Başka yerde yayınlanmış olan şekiller kullanıldığında, yazarın bu konuda izin almış olması ve bunu belgelemesi gerekir.

Ölçümler ve Kısaltmalar

Tüm ölçümler metrik sisteme (Uluslararası Birimler Sistemi, SI) göre yazılmalıdır. Örnek: mg/kg, µg/kg, mL, mL/kg, mL/kg/h, mL/kg/min, L/min, mmHg, vb. Ölçümler ve istatistiksel veriler, cümle başında olmadıkları sürece rakamla belirtilmelidir. Herhangi bir birimi ifade etmeyen ve dokuzdan küçük sayılar yazı ile yazılmalıdır.

Metin içindeki kısaltmalar, ilk kullanıldıkları yerde parantez içinde açıklanmalıdır. Bazı sık kullanılan kısaltmalar; iv, im, po ve sc şeklinde yazılabilir.

İlaçların yazımında jenerik isimleri kullanılmalıdır.

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· Türkçe ve İngilizce anahtar sözcükler (En fazla 5 sözcük)
· İki satır aralıklı yazılmış metin (Arial, 10 punto)
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· Kurallara uygun yazılmış kaynaklar
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ORIGINAL ARTICLES

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Radiological Correlation Between Ethmoid Roof Asymmetry and Variations of Nasal Turbinates

Etmoid Çatı Asimetrisi ile Burun Türbinatlarının Varyasyonları Arasındaki Radyolojik İlişki

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ABSTRACT

Introduction: Etmoid roof and nasal turbinates have many anatomic variations that are important during endoscopic sinus surgery (ESS). During ESS, nasal turbinates that act as anatomical markers can be intervened at the beginning of the surgery. Anatomical knowledge of variations and their relationships increases the success of surgery by reducing complications. In this study, we assess the relation of skull base asymmetry with variations of nasal turbinates.

Material and Method: Paranasal sinus tomography images of 124 patients [(64 (62%) females and 60 (48%) males] were retrospectively analyzed. Statistical analysis of variations of nasal turbinates (middle, superior, supreme turbinate and accessory, secondary turbinate) has been made in conjunction with measurements of the bilateral lateral lamella of the cribriform plate (LLCP).

Results: In the existence of bilateral bullous middle turbinate (BMT), unilateral accessory middle turbinate (AMT), bilateral secondary middle turbinate (SeMT), bilateral superior concha bullosa (SCB), unilateral and bilateral supreme turbinate (SuprT), mean of difference of right LLCP (RLLCP) and left LLCP (LLLCP) is statistically significant ($p<0.05$). It is determined that the vertical diameter of the superior turbinate was correlated with the vertical diameter of contralateral superior turbinate, as well as the LLCP of the ipsilateral and contralateral side ($p<0.05$).

Conclusion: This study suggests bilateral BMT, unilateral AMT, bilateral SeMT, bilateral SCB, unilateral and bilateral SuprT should be carefully evaluated in the presence of anterior skull base asymmetry in order not to experience complications during ESC.

Keywords: Computed tomography, skull base, accessory turbinate, anatomic variation

ÖZ

Giriş: Etmoid çatı ve burun konkaları endoskopik sinüs cerrahisi (ESC) sırasında öneme sahip birçok varyasyona sahiptir. ESC sırasında, anatomik belirteç görevi gören burun konkalarına ameliyatın başlangıcında müdahale edilebilir. Anatomik varyasyonların ve birbirleri ile olan ilişkilerinin bilinmesi komplikasyonları azaltarak cerrahinin başarısını arttırır. Bu çalışmada, konka varyasyonları ile kafa tabanı asimetrisinin ilişkisini değerlendirdik.

Gereç ve Yöntem: 124 hastanın [(64 (%62) kadın ve 60 (%48) erkek] paranazal sinüs tomografi görüntüleri retrospektif olarak incelendi. Lateral nazal duvar (orta, üst, yüksek (supreme) konka ve aksesuar ve sekonder konka) varyasyonlarının istatistiksel analizi yapıldı. İki taraflı kribriform plakanın lateral lamellerinin (LLCP) ölçümleri yapılmıştır ve birbirleri ve konka varyasyonları ile ilişkileri analiz edilmiştir.

Bulgular: Bilateral büllöz orta konka (BMT), unilateral aksesuar orta konka (AMT), bilateral sekonder orta konka (SeMT), bilateral superior konka bülloza (SCB), unilateral ve bilateral yüksek konka (SuprT) varlığında, sağ LLCP (RLLCP) ve sol LLCP (LLLCP) fark ortalamaları istatistiksel olarak anlamlıdır ($p<0.05$). Üst konkanın dikey çapının karşı taraf üst konkanın dikey çapı ve ayrıca aynı taraf ve karşı tarafın LLCP'si ile korrele olduğu saptandı ($p<0.05$).

Sonuç: Bu çalışma, ESC sırasında komplikasyon yaşamamak için bilateral BMT, unilateral AMT, bilateral SeMT, bilateral SCB, unilateral ve bilateral SuprT'nin ön kafa tabanı asimetrisi varlığında dikkatle değerlendirilmesi gerektiğini düşündürmektedir.

Anahtar kelimeler: Bilgisayarlı tomografi, kafa tabanı, aksesuar konka, anatomik varyasyon

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INTRODUCTION

Endoscopic sinus surgery (ESS), has been widely used in operations in sinonasal pathologies (chronic rhinosinusitis, nasal polyposis, antrochoanal polyps, malign sinonasal tumors, sinus mucoceles, orbital decompression, cerebrospinal leak closure, choanal atresia repair, dacryocystorhinostomy, and in control of epistaxis) since 1985. Anterior skull base variations like anomalies of the asymmetrical skull base, dehiscences predisposing to potential terrible complications such as brain injury, CSF rhinorrhea, recurrent meningitis, and vision loss (2).Preoperative tomographic evaluation gains importance in detecting these variations(3).

Cribriform plate and ethmoid roof form ethmoid skull base which is in the middle of the anterior skull base (4). The ethmoid roof is formed by the fovea ethmoidalis (FE) which is the medial part of the orbital frontal bone. Cribriform plate and ethmoid roof meet at the lateral lamella of cribriform plate (LLCP), a very weak area predisposing to iatrogenic skull base injuries during ESS. LLCP is also the lateral boundary of the olfactory fossa (OF) and its medial site is formed by crista galli, the bottom is formed by medial lamella of cribriform plate (5,6). Keros in 1962 classified OF into three groups based on the length of the LLCP and determined the iatrogenic risk during surgical manipulations in the ethmoidal region (6-8)

FE, OF, LLCP, and course of the ethmoid artery are necessary in the evaluation of anterior skull base variations before ESS to avoid complications (9). In the analysis of anteriorskull base asymmetry by Adeel, he stated that Adeel,Lebowitz, and Alazzawi found ethmoid asymmetry according to FE measurements in 10%, 9,5%, and 93% respectively (10).Keros investigated the skull base according to lateral lamella height (10). In his study of 450 skulls, he found Keros 1 in 11,59%, type 2 53%, type 3 18,25% of cases (8,10). We see many articles about skull base asymmetries and the coexistence of paranasal sinus variations and clinical situations in the literature. Damar et al. studied LLCP height for studying the asymmetry of the skull base and found no relation to the severity of nasal septal deviation (11). Kayabaşı et al. in their study observed that the mean heights of LLCP of hypoplastic and aplastic frontal sinuses were significantly greater than those of the normal control group (12). Kızılkaya et al. investigated handedness discrepancies in the height of right and left ethmoid roofs and he observed lower ethmoid roofs on the right side among right-handers, also found the lower ethmoid roof was on the left side among left-handers, predominantly (13).

Furthermore, in the literature,relationship of ethmoid roof asymmetry with frontal sinus pneumatization (14), concha bullosa (15), length of the middle turbinate (16), and septal deviation (17) have been investigated. However, to the best of our knowledge, relationship between cribriform plate asymmetry and SeMT, AMT, superior and SuprT has not been examined. The purpose of this study is to investigate whether the presence of SeMT, AMT, superior, and SuprT point out a skull base asymmetry.

In the literature, the relationship of ethmoid roof asymmetry with frontal sinus pneumatization (14), concha bullosa (15), length of the middle turbinate (16), and septal deviation (17) have been investigated. However, to the best of our knowledge, the relationship between cribriform plate asymmetry and SeMT, AMT, superior, and SuprT has not been examined. This study investigates whether SeMT, AMT, superior turbinate, and SuprT besides middle turbinate point out a skull base asymmetry.

MATERIAL AND METHOD

This retrospective study was performed in a digital radiology database of the paranasal sinus CT scans obtained from January 01, 2021, to December 31, 2021. This study was carried out under the

ethical principles stated in the Declaration of Helsinki. And, it was approved by the Ethical Committee of noninvasive Clinical Research of the Mardin Artuklu University (Date: Oct 11,2021 and numbered:2021/2). All patients were referred for CT scans owing to clinical symptoms probably related to sinonasal disorders, such as nasal obstruction, anosmia, facial pain, etc. Previous trauma and surgery, sinonasal tumor, sinonasal polyposis, notable rhinosinusitis (defined as inflammatory changes that prevented visualization of nasal structures, and anterior ethmoid roof), cerebrospinal fluid leak marked facial deformity, rotated or tilted scans, and age less than 18 years old were the exclusion criteria.

FE, OF, LLCP, and course of the ethmoid artery are necessary for the evaluation of anterior skull base variations before FESS to avoid complications (9). In the analysis of anterior skull base asymmetry by Adeel, it is stated that Adeel, Lebowitz, Alazzawi had used FE and found ethmoid asymmetry in 10%, 9,5% and 93% respectively (10). All patients underwent axial CT scan (tube voltage, kV 120-130; 80–150 mA; field of view, 140 mm; high resolution, 0.625-mm contiguous axial slice) obtained using a General Electric IQ™ 32-Detector Spiral MSCT device. The evaluation was performed using RadiAnt DICOM Viewer 2020.2 (64-bit) version on axial, coronal, and sagittal reconstructed images.

The bone window was used in interpreting the scans. The coronal CT scan with the visualization of the infraorbital nerve was chosen to measure the parameters. The following anatomical parameters were identified and used for measurements (**Figure 1**) (15). The Software's ruler tool was used for linear measurements (in

millimeters). RLFE: Right fovea ethmoidal length, LLFE: Left fovea ethmoidal length, RLMCP: Right medial cribriform plate length (the horizontal length of the base of olfactory fossa), LLMCP: Left medial cribriform plate length, RLLCP: Right LLCP (vertical length of olfactory fossa), LLLCP: Left length of LLCP is measured (**Figure 1**).

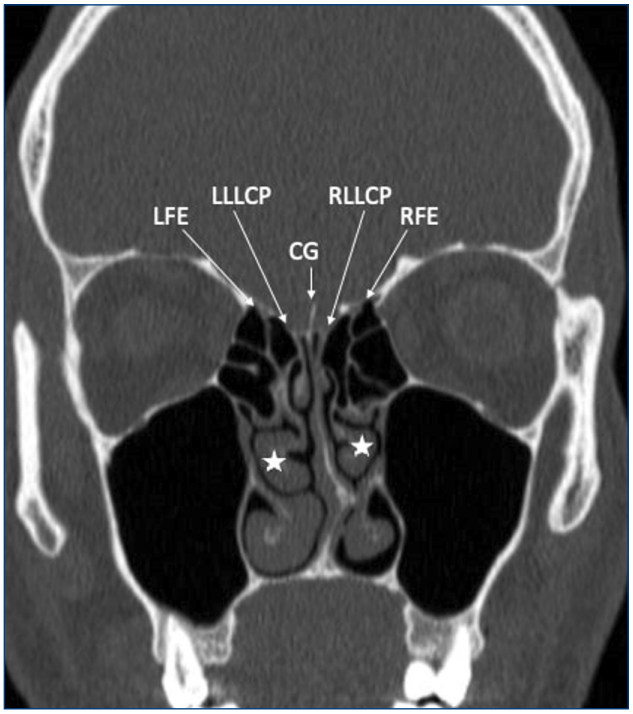

Figure 1. Coronal reformatted image. Bilateral paradoxical middle turbinate (white asterisces), crista Galli (CG), left lateral lamella of cribriform plate (LLLCP), right lateral lamella of cribriform plate (RLLCP), left fovea ethmoidalis (LFE), right fovea ethmoidalis (RFE).

Roof asymmetry: Roof asymmetry was assessed by comparing the difference in height of LLCP on two sides. The difference in the height of right and left sides >2mm was accepted roof asymmetry .<2mm was accepted as the symmetric roof (9).

Pneumatized (bullous) middle turbinate (BMT), paradoxical middle turbinate (PMT) were assessed on coronal, axial, and sagittal planes (16). Accessory middle turbinate (AMT) secondary middle turbinate (SeMT) and bullous secondary middle turbinate (BSeMT) was also evaluated on coronal, axial, and sagittal planes.

Due to the irregular margins and small size of the bullous superior turbinate, measurement in exact dimensions was difficult. Therefore, the vertical and horizontal dimensions of the pneumatised part were measured to evaluate the size. Because of the the horizontal and vertical diameters of the superior pneumatized turbinate are nearly alike, only vertical diameter was taken. The diameter of the superior turbinate is recorded as RSTvertical on the right side and LSTvertical on the left side. The presence of superior bullous concha was recorded as SCB.

Supreme turbinate (SuprT): If SuprT were present, it was registered as present or absent on coronal, sagittal, and axial planes. Both Zuckerkandl and Santorini conchas were registered as SuprT without making a distinction. Bullous SuprT (BSuprT) was also recorded.

In order To see the relation between the presence of lateral nasal wall variations and skull base asymmetry, change of right and left LLCP measurements were analyzed.

Statistical Analysis

For statistical analysis, SPSS 22.0 trial program for Windows was used. In descriptive statistics, the number, percentage for categorical variables, and mean, standard deviation, minimum, and maximum for numerical variables were given. Kolmogorov-Smirnov test was used to examine the normality of quantitative data. Paired sample t-test was used between groups. Paired sample test was used for the comparison of numerical variables in two independent groups since a normal distribution condition was obtained. Correlation analysis was made among measurements of the ethmoid roof and superior turbinate diameter. Chi-square analysis was used for gender and side comparisons. The statistical significance level was accepted as $p < 0.05$.

RESULTS

CT scans of 124 patients were included in this study. The ages of the patients ranged from 18 to 83 with a mean±SD; of 34.09±15.9. There were 64 (62%) females and 60 (48%) males. Distribution of measurements, ethmoid roof and right and left superior turbinate was given in **Table 1**.

Table 1. Measurements of ethmoid roof and superior turbinate (right and left)

	n	Mean (mm)	Std. Dev. (mm)	Min (mm)	Max (mm)
RLFE	124	8.9484	1.52275	6.00	13.60
LLFE	124	8.7653	1.59165	4.90	14.30
RLMCP	124	4.4669	.86727	2.60	8.70
LLMCP	124	4.4107	.91550	2.30	8.70
RSTvertikal	124	15.9573	3.46912	7.50	24.00
LSTvertikal	124	15.6242	3.24597	8.00	24.00
RLLCP	124	5.2016	1.49127	2.00	10.00
LLLCP	124	4.8613	1.39719	1.40	9.40

RLFE: Right fovea ethmoidalis, LLFE: Left fovea ethmoidalis, RLMCP: Right medial cribriform plate length, LLMCP: Left medial cribriform plate length, RSTvertical: Right superior turbinate vertical diameter, LSTvertical: Left superior turbinate vertical diameter, RLLCP: Right lateral lamella of cribriform plate length, LLLCP: Left lateral lamella of cribriform plate length.

RLFE, LLFE, RLMCP, LLMCP, RSTvertical, LSTvertical, RLLCP and LLLCP measurements were normally distributed ($p>0.05$). Although, RLLCP (mean±SD; 5,20±1,49) is higher than the left side (mean±SD; 4,86±1,39), andmeasurements of RLLCP and LLLCP were found to be statistically alike ($p<0.05$). The difference between the means of RLLCP and LLLCP parameters

is 0,340 a statistically significant value (p=0.000 mean of difference). There is a positive correlation between RLLCP and LLLCP variables, and a correlation coefficient of r=0,784 is a statistically significant value. Change in RLLCP parameter affects the LLLCP parameter at 62%.

Although, no significant difference was found between the right and left LLCP in women and men, the mean of men was found to be higher than the mean of women (p>0.05). The mean of right LLCP was found to be statistically significantly higher (p<0.05) (**Table 2**) Middle turbinate anatomic variations according to symmetry/asymmetry of ethmoid roof and differences of LLCP were analyzed (**Table 3**). None of the parameters were found to be associated with asymmetry of the ethmoid roof (p>0.05). None of the parameters were found to be associated with the asymmetry of the ethmoid roof (p>0.05). According to paired sample t-test; the mean differences of LLCP, in patients without unilateral/bilateral BMT, unilateral/bilateral PMT (**Figure 1**), unilateral/bilateral AMT (**Figure 2**), unilateral/bilateral SeMT, unilateral/bilateral bullous SeMT were statistically significant (p<0.05). In patients with bilateral BMT, unilateral AMT, and bilateral SeMT significant relation was found in the mean difference of LLCP (p<0.05).

Table 2. Distribution of length of LLCP by gender and side.

		n	Mean±SD (mm)	t	p
Gender					
Female	RLLCP LLLCP	64	5.1109±1.41333 4.7891±1.35120	2.916	.005
Male	RLLCP LLLCP	60	5.2983±1.57636 4.9383±1.45207	2.706	.009
Side					
	RLLCP LLLCP	124 124	5.2016±1.49127 4.8613±1.39719	3.975	0.000

RLLCP: Right lateral lamella of cribriform plate length, LLLCP: Left lateral lamella of cribriform plate length. **lines that make up the statistical difference (p<0.05), t value: is found when degree of freedom and confidence level is known in the statistical table and gives an idea about effect size (Cohen's d).

Table 3. Distributions of middle turbinate anatomic variations according to symmetry/asymmetry of ethmoid roof.

		n	Mean±SD	t	p	symmetry	asymmetry	p"
Unilateral BMT	+	32	5.5531±1.57909 5.3000±1.37278	1.567	.127	29 (23.4%)	3 (2.4%)	0.55
	-	92	5.0793±1.44842 4.7087±1.38037	3.666	.000**	82 (66.1%)	10 (8.1%)	
Bilateral BMT	+	58	5.0914±1.37360 4.7052±1.28451	3.538	.001**	53 (42.7%)	5 (4%)	0.369
	-	66	5.2985±1.59166 4.9985±1.48536	2.312	.024**	58 (46.8%)	8 (6.5%)	
Unilateral PMT	+	9	5.4889±.58129 5.5444±1.46553	-.280	.787	9 (7.3%)	0 (0%)	0.356
	-	115	5.1791±1.47616 4.8078±1.38413	4.101	.000**	102 (82.3%)	13 (10.5%)	
Bilateral PMT	+	6	4.5667±2.70160 4.8333±2.21871	-.684	.524	5 (4%)	1 (0.8%)	0.61
	-	118	5.2339±1.41574 4.8627±1.35715	4.257	.000**	106 (85.5%)	12 (9.7%)	
Unilateral AMT	+	19	5.4105±1.64042 4.8211±1.77093	3.526	.002**	17 (13.7%)	2 (1.6%)	0.99
	-	105	5.1638±1.46800 4.8686±1.32877	3.072	.003**	94 (75.8%)	11 (8.9%)	
Bilateral AMT	+	19	5.7211±1.35834 5.3368±1.01883	1.361	.190	17	2	0.99
	-	105	5.1076±1.50088 4.7752±1.44234	3.778	.000**	94	11	
Unilateral BSeMT	+	13	4.9154±1.99284 4.9692±1.71968	-.203	.843	11 (8.9%)	2 (1.6%)	0.54
	-	111	5.2351±1.42922 4.8486±1.36334	4.302	.000**	100 (80.6%)	11 (8.9%)	
Bilateral BSeMT	+	14	4.9929±1.48917 5.0571±1.58051	-.420	.682	14 (11.3%)	0 (0%)	0.17
	-	110	5.2282±1.49624 4.8364±1.37819	4.188	.000**	97 (78.2%)	13 (10.5%)	
Unilateral SeMT	+	29	5.0207±1.83875 4.9517±1.67089	.379	.708	26 (21%)	3 (2.4%)	0.97
	-	95	5.2568±1.37467 4.8337±1.31129	4.413	.000**	85 (68.5%)	10 (8.1%)	
Bilateral SeMT	+	41	5.1976±1.38969 4.8341±1.24129	2.306	.026**	37 (29.8%)	4 (3.2%)	0.85
	-	83	5.2036±1.54718 4.8747±1.47515	3.219	.002**	74 (59.7%)	9 (7.3%)	

BMT: Bullous middle turbinate, PMT: Paradoxical middle turbinate, AMT: Accessory middle turbinate, BSeMT: Bullous secondary middle turbinate, SeMT: Secondary middle turbinate, **lines that make up the statistical difference (p<0.05), p Independent t-test, p"Chi-square test
t value: is found when degree of freedom and confidence level is known in statistical table and gives idea about effect size(Cohen's d).

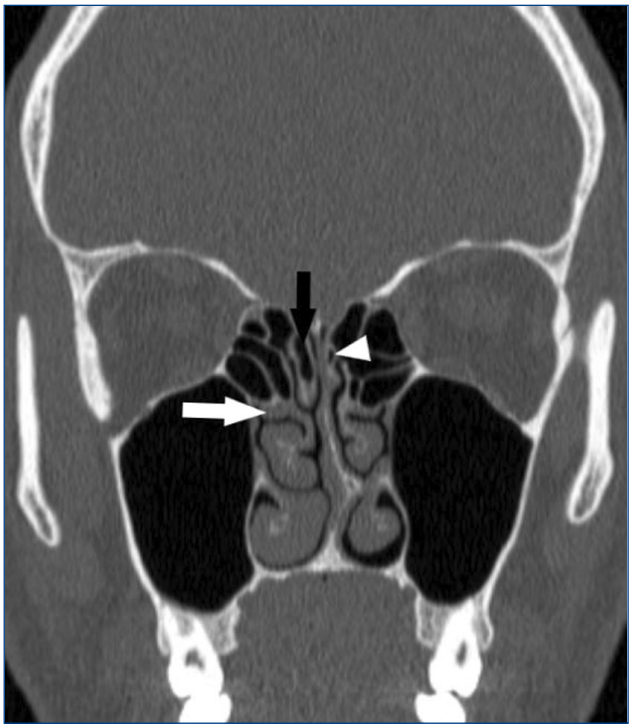

Figure 2. Coronal reformatted image. Right accessory middle turbinate (white arrow), right pneumatized superior turbinate (black arrow), left pneumatized superior turbinate (white arrowhead).

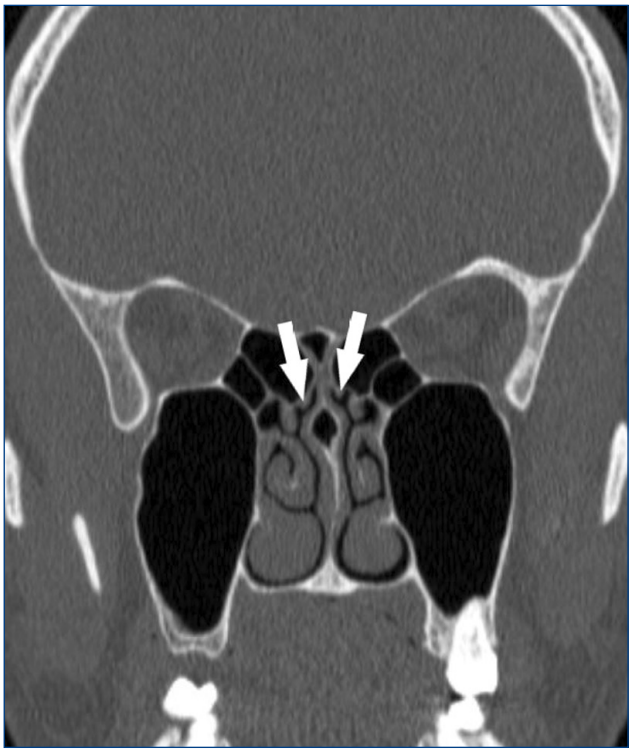

Figure 3. Coronal reformatted image. Bilateral supreme conchae (white arrow).

The presence and bullosity of superior and supreme turbinate were evaluated and their relation to symmetry/asymmetry of the ethmoid roof and mean of difference of LLCP were analyzed (**Figure 2**), (**Table 4**). None of the parameters were found to be associated if there is asymmetry or not (p>0.05). According to the mean of difference of LLCP, patients without; unilateral/bilateral SCB, and bilateral SuprT (**Figure 3**), unilateral/bilateral bullous SuprT were statistically significant. In patients with; bilateral SCB, bilateral SuprT was statistically significant (p<0.05) (**Table 4**).

Table 4. Superior and supreme concha and their anatomic variations with symmetry/asymmetry of the ethmoid roof

		n	Mean±SD(mm)	t	p	symmetry	asymmetry	p"
Unilateral SCB	+	19	5.0789±1.95607 5.0263±1.49177	.226	.824	15 (12.1%)	4 (3.2%)	0.10
	-	105	5.2238±1.40168 4.8314±1.38483	4.290	.000**	96 (77.4%)	9 (7.3%)	
Bilateral SCB	+	31	5.6161±1.62421 5.1581±1.65263	2.284	.030**	28 (22.6%)	3 (2.4%)	0.86
	-	93	5.0634±1.42682 4.7624±1.29606	3.241	.002**	83 (66.9%)	10 (8.1%)	
Unilateral SuprT	+	23	6.2522±1.82853 5.5217±1.74927	3.033	.006	19 (15.3%)	4 (3.2%)	0.23
	-	101	4.9624±1.29930 4.7109±1.26680	2.859	.005	92 (74.2%)	9 (7.3%)	
Bilateral SuprT	+	49	4.9878±1.36605 4.7061±1.31266	2.163	.036**	42 (33.9%)	7 (5.6%)	0.26
	-	75	5.3413±1.56076 4.9627±1.44940	3.332	.001**	69 (55.6%)	6 (4.8%)	
Unilateral BSuprT	+	7	4.6000±1.65126 4.2143±1.40882	1.113	.308	6 (4.8%)	1 (0.8%)	0.73
	-	117	5.2376±1.48119 4.9000±1.39302	3.807	.000**	105 (84.7%)	12 (9.7%)	
Bilateral BSuprT	+	2	3.6500±1.20208 3.8000±0.84853	-.600	.656	2 (1.6%)	0 (0%)	0.62
	-	122	5.2270±1.48603 4.8787±1.39984	4.014	.000**	109 (87.9%)	13 (10.5%)	

SCB: Superior concha bullosa, SuprT: Supreme turbinate, BSuprT: Bullous supreme turbinate, **lines that make up the statistical difference (p<0.05), p Independent t-test, p"Chi-square test, t value: is found when degree of freedom and confidence level is known in statistical table and gives an idea about effect size(Cohen's d).

Table 5.Correlation of measurements of ethmoid roof and superior turbinate vertical diameter

		RLFE	LLFE	RLMCP	LLMCP	RSTvertical	LSTvertical	RLLCP	LLLCP
RLFE	r (correlation coefficient)	1	.816 (**)	-.223 (*)	-.190 (*)	.072	-.030	.022	.103
	p		0.000	.013	.034	.428	.744	.807	.257
	n	124	124	124	124	124	124	124	124
LLFE	Pearson Correlation	.816 (**)	1	-.154	-.370 (**)	.030	.015	-.048	.077
	Sig. (2-tailed)	.000		.087	.000	.742	.869	.597	.394
	N	124	124	124	124	124	124	124	124
RLMCP	Pearson Correlation	-.223 (*)	-.154	1	.432 (**)	.006	.019	-.014	-.030
	Sig. (2-tailed)	.013	.087		.000	.943	.832	.881	.737
	N	124	124	124	124	124	124	124	124
LLMCP	Pearson Correlation	-.190 (*)	-.370 (**)	.432 (**)	1	.104	.096	.099	-.014
	Sig. (2-tailed)	.034	.000	.000		.249	.291	.274	.876
	N	124	124	124	124	124	124	124	124
RSTvertical	Pearson Correlation	.072	.030	.006	.104	1	.895 (**)	.303 (**)	.344 (**)
	Sig. (2-tailed)	.428	.742	.943	.249		.000	.001	.000
	N	124	124	124	124	124	124	124	124
LSTvertical	Pearson Correlation	-.030	.015	.019	.096	.895 (**)	1	.291 (**)	.322 (**)
	Sig. (2-tailed)	.744	.869	.832	.291	.000		.001	.000
	N	124	124	124	124	124	124	124	124
RLLCP	Pearson Correlation	.022	-.048	-.014	.099	.303 (**)	.291 (**)	1	.784 (**)
	Sig. (2-tailed)	.807	.597	.881	.274	.001	.001		.000
	N	124	124	124	124	124	124	124	124
LLLCP	Pearson Correlation	.103	.077	-.030	-.014	.344 (**)	.322 (**)	.784 (**)	1
	Sig. (2-tailed)	.257	.394	.737	.876	.000	.000	.000	
	N	124	124	124	124	124	124	124	124

RLFE: Right fovea ethmoidalis, LLFE: Left fovea ethmoidalis, RLMCP: Right medial cribriform plate length, LLMCP: Left medial cribriform plate length, RSTvertical: Right superior turbinate vertical diameter, LSTvertical: Left superior turbinate vertical diameter, RLLCP: Right lateral lamella of cribriform plate length, LLLCP: Left lateral lamella of cribriform plate length. **lines that make up the statistical difference (p<0.05)

In correlation analysis in **Table 5**; correlation was seen between RSTvertical and LSTvertical (r=0,89, p<0.05), RLLCP (r=0,30, p<0.05), LLLCP (r=0,34, p<0.05). Correlation was observed between LSTvertical and RSTvertical (r=0,89, p<0.05), RLLLCP (r=0,29, p<0.05), LLLCP (r=0,32, p<0.05). For further details, see table **Table 5**.

DISCUSSION

Nasal turbinates originate from the embryological lateral nasal wall. Inferior nasal turbinate is a separate bone derived from maxilloturbinate whereas uncinate process, middle turbinate, superior turbinate, and, if exists, supreme turbinates are derived from ethmoturbinals that are the ethmoidal bone origin. In 1882, Emil Zuckerkandl described the fourth nasal ethmoidal turbinate; supreme turbinate or concha of Zuckerkandl. Nieto in 2015 described the first supreme turbinate; Santorini and the second supreme turbinate; Zuckerkandl. Santorini can be found in 95%, and Zuckerkandl can be found in 6.7% (18). Pneumatizations of turbinates, SeMT, and AMT are the other variations of lateral nasal wall. SeMT originates from middle turbinate, whereas AMT is described as a medially twisted uncinate process. Incidence of SeMT is 0,8-6,8 % (19). Turbinate pneumatization is the existence of air cells inside turbinates. (20) In this study, we studied the relation of the asymmetry of the ethmoid roof with variations of turbinates.

Middle turbinate variations are concha bullosa, paradoxical middle turbinate, accessory middle turbinate and secondary middle turbinate (21). Concha bullosa (CB) is a prevelant variation seen at 10%-50% in the population. CB affects nearby structures. Açıkalın et al. examined the relationship between unilateral CB and ethmoid roof asymmetry and found that ethmoid roof asymmetry was higher in patients with unilateralCB (15). In this study, unilateral BMT was seen at 25,5%, and bilateral BMT was seen at 46,8%. Gün et al. observed a relationship significantly between the width of the anterior ethmoid roof and the axial diameter of middle CB. In this study, in bilateral CB mean differences of LLCP between the right and the left side were statistically significant. In a study conducted by Açıkalın, a statistically significant difference was observed between the group with and without unilateral CB. Also, in the presence of unilateral accessory middle turbinate (AMT) (**Figure 4**), bilateral secondary middle turbinate (SeMT) mean of the difference between right and left LLCP is statistically significant. In the absence of unilateral/bilateral PMT (**Figure 1**), the mean difference between right and left LLCP is statistically significant. But, no significant relation was found between the groups with and without asymmetry in other variations of nasal turbinates that are examined in this study.

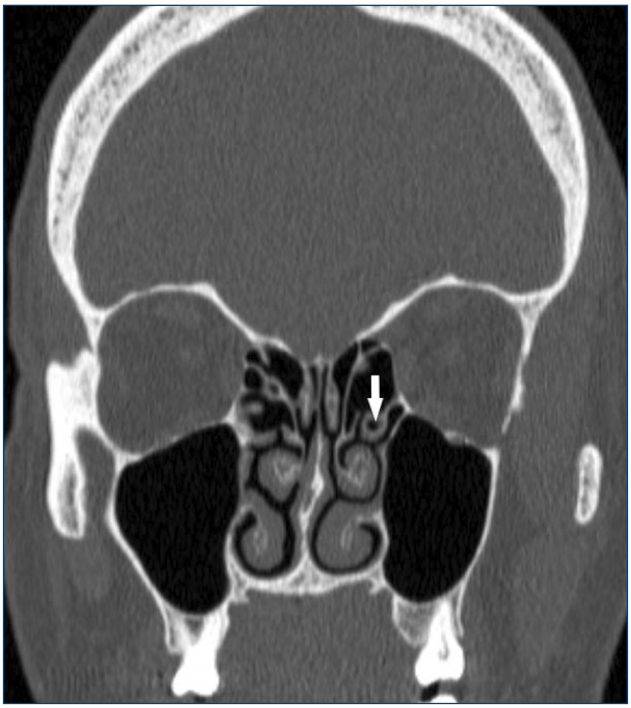

Figure 4. Coronal reformatted image. Pneumatized left accessory turbinate (white arrow).

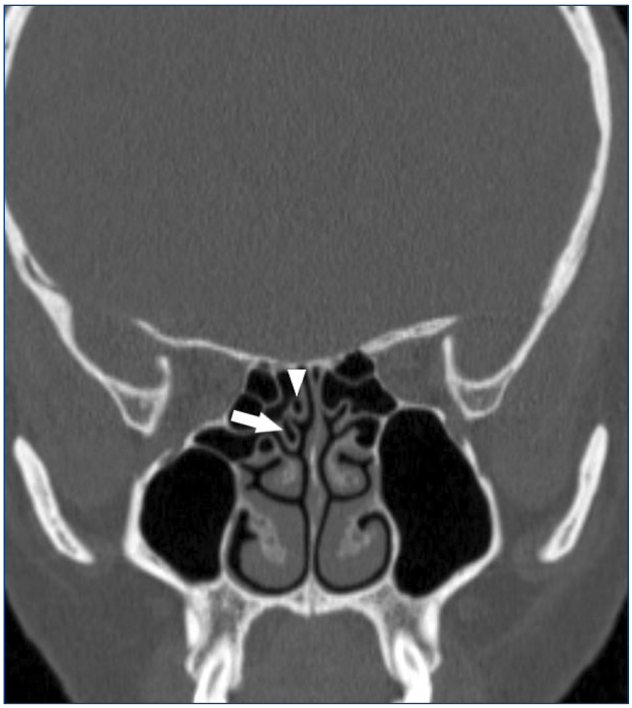

Figure 5. Coronal reformatted image. Right bullous superior turbinate (white arrow), right bullous supreme turbinate (white arrowhead).

Superior turbinate is a vantage point in endoscopic posterior ethmoidectomy and sphenoidotomy (22). Superior turbinate was identified in 100% of cases in a study by Eweiss et al. (22). Pneumatization of superior turbinate was observed at 7,1% by Kajiwara et al. (23). SCB is a quite rare abnormality and is usually seen together with the other nasal anatomic abnormalities like septum deviation, middle concha bullosa, and sinusitis. The incidence of the superior pneumatized turbinate is between 12,2-50%.

Ila et al. in their study observed 61,1% unilateral SCB and 38,9% bilateral SCB (24). In this study,unilateral SCB was seen at 15,3% and bilateral SCB was seen at 25%. In the presence of bilateral SCB, the asymmetry or difference of LLLCP is statistically significant. Bullosity in superior turbinate and asymmetry of the ethmoid roof were not related statistically. The vertical diameter of superior turbinate was found to be statistically related to the diameter of the opposite side and LLCP of the same side and opposite side in this study.

SuprT is an additional landmark besides superior turbinate when superior turbinate and middle turbinate are destroyed by tumor etc in FESS. It is located lateral to the sphenoid ostium. Its prevalence is 60-77% and may be present unilateral or bilateral (25). In this study, unilateral SuprT was seen at 18,5%, bilateral SuprT has seen at 39,5% (**Figure 5**). Bullosity of supreme turbinate 7% unilateral, 2% bilateral on CT examination. Also in the literature bullosity of supreme turbinate was present (26). In unilateral and bilateral SuprT, the mean difference between right and left LLCP was found to be statistically significant. Therefore, unilateral and bilateral SuprT points out asymmetry of the ethmoid roof.

Our study has some limitation, in some subgroups number of variations were relatively small number. More accurate results should be obtained if studied with a larger number of participants. As far as we know, it is the first study examining the correlation of ethmoid roof with turbinate variations like superior, supreme concha, and accessory and secondary turbinates. More accurate results should be obtained if studied in a larger number of cases.

CONCLUSION

Our conclusion from the study is that LLCP should be carefully evaluated in patients with turbinate variations (bilateral middle concha bullosa, unilateral AMT, bilateral SCB, unilateral and bilateral SuprT).

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the Ethical Committee of noninvasive Clinical Research of the Mardin Artuklu University (Date: Oct 11,2021 and numbered :2021/2)
Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.
Referee Evaluation Process: Externally peer-reviewed.
Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Cashman EC, Macmahon PJ, Smyth D. Computed tomography scans of paranasal sinuses before 308 functional endoscopic sinus surgery. World J Radiol 2011;28:199-204
2. Lee JC, Song, YJ, Chung YS, Lee BJ, Jang YJ. Height and shape of the skull base as risk factors for skull base penetration during endoscopic sinus surgery. Ann of Otol Rhinol Laryngol, 2007;116:199-205.
3. Stankiewicz JA, Chow JM. The low skull base: an invitation to disaster. Am J Rhinol 2004;18:35-40
4. Hashemi SM, Berjis N, Ebrahimi H. Relationship between Height of Ethmoid Skull Base and Length of Lateral Lamella by Sectional Coronal Computed Tomography Scan before Endoscopic Sinus Surgery. Adv Biomed Res 2018;7:48
5. Madani GA, El-Mardi AS, El-Din WA. Analysis of the anatomic variations of the ethmoid roof among Saudi population: A radiological study. Eur J Anat 2020;24:121-8.
6. Muñoz-Leija MA, Yamamoto-Ramos M, Barrera-Flores FJ, et al. Anatomical variations of the ethmoidal roof: differences between men and women. Eur Arch Otorhinolaryngol 2018;275:1831-6.
7. Costa ALF, Paixão AK, Gonçalves BC, et al. Cone Beam Computed Tomography-Based Anatomical Assessment of the Olfactory Fossa. Int J Dent 2019:1-7
8. Keros P. On the practical value of differences in the level of the lamina cribrosa of the ethmoid. Z Laryngol Rhinol Otol. 1962;41:809-13.
9. Ali A, Kurien M, Shyamkumar NK, Selveraj. Anterior skull base: High risk areas in endoscopic sinus surgery in chronic rhinosinusitis: A computed tomographic analysis. Indian J Otolaryngol Head Neck Surg, 2005;57:5-8
10. Adeel M, Ikram M, Rajput MS, Arain A, Khattak YJ. Asymmetry of lateral lamella of the cribriform plate: a software-based analysis of coronal computed tomography and its clinical relevance in endoscopic sinus surgery. Surg Radiol Anat 2013;9:843-7.
11. 11.Damar M, Dinç AE, Eliçora SŞ, et al. Does the degree of septal deviation affect cribriform plate dimensions and middle turbinate length? J Craniofac Surg 2016;27:51-5.
12. Kayabasi S, Hizli O, Ozkan D. Does paranasal sinus development affect olfactory fossa depth and lateral lamella length? Laryngoscope 2019;129:2458-63.
13. Kizilkaya E, Kantarci M, Cinar Basekim C, et al. Asymmetry of the height of the ethmoid roof in relationship to handedness. Laterality 2006;11:297-303
14. Gumus C, Yildirim A. Radiological correlation between pneumatization of frontal sinus and height of fovea ethmoidalis. Am J Rhinol 2007;21:626-8.
15. Acikalin RM, Bayram O, Haci C, et al. Is there a relationship between middle concha bullosa and ethmoid roof asymmetry? Braz J Otorhinolaryngol 2022;88:101-4.
16. Gun R, Yorgancilar E, Bakir, et al. The relationship between pneumatized middle turbinate and the anterior ethmoid roof dimensions: a radiologic study. Eur Arch Otorhinolaryngol 2013;270:1365-71.
17. Saylisoy S, Acar M, San T, Karabag A, Muluk NB, Cingi C Is there a relationship between cribriform plate dimensions and septal deviation angle? Eur Arch Otorhinolaryngol, 2014;271:1067-71.
18. Rusu MC, Săndulescu M, Mogoantă CA, Jianu AM The extremely rare concha of Zuckerkandl reviewed and reported. Rom J Morphol Embryol 2019;60:775-9.
19. Lin YL, Lin YS, Su WF, Wang CH A secondary middle turbinate co-existing with an accessory middle turbinate: an unusual combination of two anatomic variations. Acta Otolaryngol 2006;126:429-31.
20. Köse E, Dönmez Tarakçı Ö. First report of lateral nasal wall pneumatization. Surg Radiol Anat 2019;41:979-81.
21. El-Anwar MW, Ali AH, Almolla RM, Abdulmonaem G, Raafat A, Hassan ME. Radiological middle turbinate variations and their relation to nasal septum deviation in asymptomatic adult. Egypt J Radiol Nuclear Med 2020;51:1-5.
22. Eweiss AZ, Ibrahim AA, Khalil HS. The safe gate to the posterior paranasal sinuses: reassessing the role of the superior turbinate. Eur Arch Otorhinolaryngol 2012;269:1451-6.
23. Kajiwara R, Omura K, Takeda T, et al. Anatomical variation of the pneumatized superior turbinate and its impact on endoscopic sinus surgery in chronic rhinosinusitis. Surg Radiol Anat 2020;42:81-6.
24. İla K, Yilmaz N, Öner S, Başaran E, Öner Z. Evaluation of superior concha bullosa by computed tomography. Surg Radiol Anat, 2018;40:841-6.
25. Abdullah SN, Abdullah B. Supreme Nasal Turbinate as an Additional Surgical Landmark in Endoscopic Sinus and Skull Base Surgeries. Cureus 2020;12:8132.
26. Măru N, Rusu MC, Săndulescu M. Variant anatomy of nasal turbinates: supreme, superior and middle conchae bullosae, paradoxical superior and inferior turbinates, and middle accessory turbinate. Rom J Morphol Embryol 2015;56:1223-6.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Erectile Dysfunction in Patients with Lumbar Herniated Disc

Lomber Disk Hernili Hastalarda Erektil Disfonksiyon

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ABSTRACT

Introduction: Erectile dysfunction (ED), is defined as a man's inability to achieve or maintain a sufficient level of penile erection for sexual intercourse. It is reported that ED's prevalence is between 30-52% in patients aged 40-70. There are many studies examining the effects of chronic pain, diabetes, rheumatoid diseases and knee arthroplasty on ED in the literature. In this study we aimed to examine the effects of lumbar disc herniation on ED.

Material and Method: In this study there are two groups named control group and experimental group. The experimental group includes male patients, who have been admitted to the neurosurgery clinics, diagnosed with lumbar disc herniation clinically and radiological. Patients with a history of other risc factors to ED excluded from the study. Furthermore, patients diagnosed with conus medullaris or cauda equina syndrome were also excluded. VAS scores, whether any motor losses in clinical findings, or any sense or reflex losses were noted. Radiological findings were recorded and classified. FSH, LH, and testosterone levels were noted. IIEF (International Index of Erectile Function), Beck Depression Inventory, and Beck Anxiety Inventory tests were performed. Obtained data was analysed statistically.

Results: No statistically significant ED prevalence differences were found between the patients who have been diagnosed with lumbar herniated disc and the control group. It has been found out that disc location affects ED prevalence and severity and there are statistically significant differences in terms of IIEF-5 scores between the cases of laterally herniated disc and centrally herniated discs. Contrary to other studies in the literature, no significant relationship between VAS and ED was found out.

Conclusion: The higher incidence of ED in patients with centrally herniated disc may be due to the pressure to sacral roots. Therefore, we think that male patients with disc herniation causing central canal compression should be evaluated more carefully in terms of ED.

Keywords: Erectile dysfunction, Lumbar Herniated disc, depression

ÖZ

Giriş: Erektil disfonksiyon (ED), bir erkeğin cinsel ilişki için yeterli düzeyde penis ereksiyonunu sağlayamaması veya sürdürememesi olarak tanımlanır. 40-70 yaş arası hastalarda ED prevalansının %30-52 arasında olduğu bildirilmektedir. Literatürde kronik ağrı, diyabet, romatoid hastalıklar ve diz artroplastisinin ED üzerine etkilerini inceleyen bazı çalışmalar bulunmaktadır. Bizim bu çalışmadaki amacımız lomber disk hernisinin ED üzerine etkisini göstermektir.

Gereç ve Yöntem: Bu çalışmada kontrol grubu ve deneysel grup olarak iki grup bulunmaktadır. Deney grubu, beyin cerrahisi kliniklerine başvuran, klinik ve radyolojik olarak lomber disk hernisi tanısı almış erkek hastalardan oluşmaktadır. Acil servis için diğer risk faktörlerinin öyküsü olan hastalar çalışma dışı bırakıldı. Ayrıca konus medullaris veya kauda ekina sendromu tanısı alan hastalar da çalışma dışı bırakıldı.VAS skorları, klinik bulgularda herhangi bir motor kayıp veya duyu veya refleks kaybı olup olmadığı not edildi. Radyolojik bulgular kaydedildi ve sınıflandırıldı. FSH, LH ve testosteron seviyeleri kaydedildi. IIEF (Uluslararası Erektil Fonksiyon İndeksi), Beck Depresyon Envanteri ve Beck Anksiyete Envanteri testleri yapıldı. Elde edilen veriler istatistiksel olarak analiz edildi.

Bulgular: Bel fıtığı tanısı konan hastalar ile kontrol grubu arasında ED prevalansı açısından istatistiksel olarak anlamlı fark bulunmadı. Disk yerleşiminin ED prevalansını ve şiddetini etkilediği ve lateral disk hernisi ve santral disk hernisi olguları arasında IIEF-5 puanları açısından istatistiksel olarak anlamlı farklar olduğu bulundu. Literatürde yapılan diğer benzer çalışmaların aksine VAS ve ED arasında anlamlı bir ilişki bulunamamıştır.

Sonuç: Santral disk hernili hastalarda ED insidansının daha yüksek olması sakral köklere olan baskıya bağlı olabilir. Bu nedenle santral kanal basısına neden olan disk hernisi olan erkek hastalarının ED açısından daha dikkatli değerlendirilmesi gerektiğini düşünüyoruz.

Anahtar Kelimeler: Erektil disfonksiyon, Lomber Herniye disk, depresyon

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INTRODUCTION

Erectile dysfunction (ED), is defined as a man's inability to achieve or maintain a sufficient level of penile erection for sexual intercourse (1). It is reported that ED's prevalence is between 30-52% in patients aged 40-70 and reaches up to 80% in patients over 70's. In a population-based study conducted in Turkey, ED's prevalence was found to be as 69.2% (33.2% mild, 27.5% moderate and 8.5% severe ED) (2). Findings of Massachusetts Male Aging Study (MMAS) indicated that in patients aged between 40-70, prevalence of mild, moderate, and severe ED were 17%, 25% and 10%, respectively (3).

Just like all functions in the human body, sexual functions are also controlled by the central nervous system. It is known that especially medial preoptic area of hypothalamus (mPOA), parasagittal area where the genital region's sensory fibers end, temporal region, frontal area, and rhinencephalon in central nervous system are associated with sexual functions. Moreover, it has also been reported that the maintenance of the erection is associated with temporal cortex, inferior frontal gyrus, insula and medial nucleus of amygdala (4,5). These centers are controlled and influenced by many neuroendocrine mediators like dopamine, monoamine system, gamma aminobutyric acid (GABA), oxytocin and prolactin (4,5). Various pathologies may affect these centers in the brain directly or may block pathways associated with these centers.

Aside from the central nervous system, it is known that innervation of penis is autonomic (sympathetic and parasympathetic) and somatic (sensory and motor) and is regulated by pelvic parasympathetic nerves, hypogastric sympathetic nerves and somatic pudendal nerves (6). While sympathetic and parasympathetic nerves are associated with cavernosal nerves, somatic nerves are essentially associated with penile sensory nerves and contraction of bulbocavernosus or ischiocavernosus muscles. Whereas spinal cord structures associated with erectile function responsible for psychogenic erection are sympathetic (T10-L2), structures responsible for basic reflexogenic erection are parasympathetic. Furthermore, Onuf's nucleus and somatic nerve structures (S2-S4) contribute to penile sensitivity with ischiocavernosus and bulbocavernosus muscles which are necessary for rigid erection (7-12).

After spinal cord pathologies, male sexual functions may be adversely affected. Generally, in males who have upper motor neuron lesion (UMNL) on T11 and above (cases with suprasacral-spinal lesion) while reflex erections occur, psychogenic erections do not; in contrast, in those who have complete lower motor neuron lesions, while reflex erections do not occur, psychogenic erections do. This condition is also dependent on the ratio of protected fibers (13, 14). It is known that erection requires normal function of a complex unit in which hormonal factors, vascular structures, peripheral and central mediators and nervous system play a role, therefore, psychogenic, hormonal, neurogenic and arterial pathologies, drugs, iatrogenic reasons, systemic and chronic diseases take part in ED's etiology.

When risk factors for male sexual function disorder are examined, mostly aging, diabetes mellitus (DM) – a chronic disorder, peripheral vascular diseases, cardiac reasons and hypertension, atherosclerosis and smoking associated with cardiac reasons are noticed; subsequently endocrine, neurogenic and psychogenic reasons follow (15). Neurogenic ED may be defined as difficulty in achieving and maintaining penile erection which develops due to a neurological disorder or dysfunction. Neurogenic reasons make up 5-20% of ED etiology (14, 15). In neurogenic ED, the problem may be in the brain or medulla spinalis, pudendal and cavernosal nerves and nerve endings and receptors.

Neurological disorders which are known to cause erectile dysfunction include multiple sclerosis (MS), cerebrovascular cases, spinal cord injuries (SCI), surgery, temporal lobe epilepsy, Guillian Barré syndrome, autonomic neuropathy, Alzheimer's disease, Parkinson's disease, central and peripheral nervous system tumors, polyneuropathies and lumbar disc herniation. Neurogenic ED may be due to toxins such as heavy metals, DM, uremia, alcoholism, HIV infection, leprosy, viral infections, systemic lupus erythematosus (SLE) and diseases such as hemochromatosis or may be seen as peripheral neurogenic ED due to peripheral surgery such as radical prostatectomy, radical cystectomy, lower intestinal surgeries (15).

Lumbar disc herniation is a common disease. Depending on the severity of the patients' pain and presence of neurologic symptoms, its treatment includes drug therapy – called conservative therapy, physical therapy and surgical treatment are practiced. Patients with sexual dysfunction may benefit from surgical treatments compared to other treatments (16).

Neural tube defects, which are known as congenital defects of spinal cord, affect lumbar region in 90% of the cases and sexual function disorders in these cases are mostly seen as ejaculatory disorders. Although ED may arise after a damage related to surgical treatment of spina bifida. it is known that phosphodiesterase 5 inhibitors (PDE5I) are successful in the treatment of this pathology (17). While there are many studies examining the effects of chronic pain, diabetes, rheumatoid diseases and knee arthroplasty on ED. Studies about ED in patients who suffer from lumbar herniated disc are limited. This study intends to determine ED in patients with herniated lumbar disc.

MATERIAL AND METHOD

In the present study, a total of 109 patients at Gaziosmanpaşa University Faculty of Medicine, Department of Neurosurgery and Urology were investigated. The study was approved by the TOGU School of Medicine Research Ethics Committee (01/03/2016, Project No: 16 KAEK 049). This study was conducted in accordance with the Declaration of Helsinki principles. The informed consent forms were obtained from all the patients included in this study.

All the patients' VAS (visual analogue scale) scores, whether there are any motor losses in clinical findings, and whether there are any sense or reflex losses were noted. Radiological findings were recorded and classified (as median and others) according to the distance of the disc, its nature and location. In addition, some laboratory tests and some tests in the form of questions and answers were applied to the patients in order to evaluate the erectile functions of the patients. FSH (follicle stimulating hormone), LH (luteinizing hormone) and total and free testosterone levels in these patients were noted. Later on these patients, IIEF (International Index of Erectile Function), Beck Depression Inventory and Beck Anxiety Inventory tests were performed. Patients with a history of diabetes mellitus, drug use a known neurological disorder other than lumbar disc herniation, surgery related to urinary tract infections, prostate, seminal vesicles and other pelvic organs and testes, in the last month were excluded from the study. Furthermore, patients diagnosed with conus medullaris or cauda equina syndrome were also excluded from the study. In VAS assessment, patients were asked to report the severity of pain visually on VAS scale and were scored from 1 up to 10. The IIEF assessment was evaluated as follows; 6-10: severe, 11-16: moderate, 17-25: mild, 26-30: no erectile dysfunction. In the Beck Depression Inventory test; 10-16 points were considered as mild depressive symptoms, 17-29 points as moderate depressive symptoms and 30-63 points as severe depressive symptoms. In Beck Anxiety Inventory test the following evaluation was made; 8-15 points was considered as mild anxiety, 16-25 points as moderate anxiety, and 26-63 points as severe anxiety.

Two groups were formed in our study to show the relationship between lumbar disc herniation and erectile dysfunction. Group 1 was the experimental group and included 69 patients diagnosed with lumbar disc herniation. Group 1 includes male patients, aged between 18-70, who have been admitted to the neurosurgery clinic, diagnosed with lumbar disc herniation clinically and radiologically, and having symptoms for four or more weeks.

Group 2 was control group. Group 2 was formed with 32 patients who were admitted to urology clinic for infertility and kidney stone examination. The differences between control group and experimental group and whether these results have any statistical significance are examined.

Statistical analysis was made to obtain information about general characteristics of experimental groups. Data for continuous variables are presented as mean ± standard deviation; data related to categorical variables are presented as n (%). When comparing the averages of quantitative variables between groups, The Test of Significance Between Two Means (T test) or one-way analysis of variance (ANOVA) was used. To evaluate the relationship between qualitative variables, Chi-square test was used. When p values were less than 0.05, they were considered as statistically significant. Statistical software was used in calculations (IBM SPSS Statistics 19, SPSS inc., an IBM Co., Somers, NY).

RESULTS

While the mean age in the experimental group was 37.09 ± 7.01 years, it was found to be 34.91 ± 7.75 years in the control group. It is determined that there are no statistically significant differences between them. Parameters of the experimental group in IIEF-5, Beck Depression and Beck Anxiety Inventory test scores were examined and means were found to be 19 ± 4.7, 11.87 ± 10.62 and 13.06 ± 10.86 respectively. The means of these parameters in the control group were determined as 17.91 ± 3.16, 10.91 ± 8.47 and 14.69 ± 7.7 respectively. It is determined that there are no statistically significant differences between means of IIEF-5, Beck Depression and Beck Anxiety Inventory scores. The results are summarized in **Table 1**.

Table 1. Distribution of Quantitative Variables across Groups

Variables	Group 1 (n=69)	Group 2 (n=32)	t	p
Age	37.09±7.01	34.91±7.75	1.407	0.163
IIEF-5	19±4.7	17.91±3.16	1.376	0.172
Beck depression score	11.87±10.62	10.91±8.47	0.489	0.626
Beck anxiety score	13.06±10.86	14.69±7.7	0.863	0.390

Data are presented as Mean ± SD. p: The Test of Significance Between Two Means (t Test), IEF: International Index of Erectile Function

Patients were classified according to their IIEF scores as 6-10: severe, 11-16: moderate, 17-25: mild and 26-30: no erectile dysfunction. When differences between groups were examined, a statistically significant difference was found (p=0.036). The results are summarized in **Table 2**.

Table 2. Distribution of IIEF Scores across Groups

Variables	Group 1 (n=69)	Group 2 (n=32)	X 2	p
IIEF Group			8.541	0.036
0	27(84)	5(16)		
1	15(52)	14(48)		
2	25(66)	13(34)		
3	2(100)	0(0)		

Data are presented as n (%).p: Chi-square test, IIEF: International Index of Erectile Function

When the relation between IIEF-5 variables and lower back and leg pain, motor, sensory and deep tendon reflex loss and disk location parameters are examined, no statistically significant differences in parameters, except for disc location, were found. Statistically significant difference of IIEF-5 scores between patients who have centrally herniated discs and laterally herniated discs have been found out; patients who have centrally herniated discs have significantly lower IIEF-5 scores. Findings are summarized in **Table 3**.

Table 3. Distribution of Qualitative Variables across IIEF-5 Scores

Variables	n (69)	IIEF-5	t/F	p
Lower back pain			0.684	0.498
0	60	18.85±4.84		
1	9	20.00±3.74		
Leg pain			2.516	0.066*
0 (none)	2	23.00±2.83		
1 (left)	19	18.37±4.69		
2 (right)	29	20.34±4.69		
3 (bilateral)	19	17.16±4.26		
Sense loss			0.870	0.388
0	33	19.51±4.87		
1	36	18.52±4.56		
Motor loss			0.361	0.719
0	63	19.06±4.56		
1	3	18.33±6.50		
DTR loss			0.125	0.901
0	63	19.02±4.69		
1	3	18.67±6.03		
Disc location			2.322	0.023
1 (central)	55	18.55±4.73		
2 (lateral)	12	21.92±3.42		

Data are presented as Mean ± SD. p: The Test of Significance Between Two Means (T Test), p*: One-way analysis of variance (ANOVA)
IIEF: International Index of Erectile Function, DTR: Deep tendon reflexes

Patients were grouped according to their IIEF scores as 6-10: severe, 11-16: moderate, 17-25: mild and 26-30: no erectile dysfunction. When means of VAS scores are compared, no statistically significant differences between groups has been found. Findings are presented in **Table 4**.

Table 4. Distribution of IIEF-5 Scores in terms of VAS Scores

Variables	n (69)	VAS	F	p
IIEF-5			1.314	0.277
0	27	6.13±1.67		
1	15	6.13±2.45		
2	25	6.96±1.95		
3	2	2.82±2.00		

Data are presented as Mean ± SD. p: One-way analysis of variance (ANOVA), IIEF: International Index of Erectile Function, VAS: Visual Analogue Scale

DISCUSSION

The primary event in erection, which is influenced by central and peripheral nervous system and hormonal factors, is the beginning of sinusoids swelling with blood subsequent to relaxation of smooth muscle elements in corpus cavernosum in penis after sexual stimulation. As a result of parasympathetic stimuli from preganglionic nerves in intermediolateral column of 2nd and 4th segments of sacral spinal cord and stimuli from cavernosal nerve endings, neurogenic nitric oxide synthase (nNOS) and endothelial nitric oxide synthase (eNOS) is released, subsequently this lipophilic nitric oxide (NO) is released. This NO enters into a smooth muscle cell and mediates the synthesis of cyclic guanosine monophosphate (cGMP). cGMP decreases CA+2 levels in the smooth muscle cell via various mechanisms and initiates and maintains erection by relaxing the cavernosal smooth muscle tissue. Compression of small venules between enlarged sinusoids and tunica albuginea causes the decrease of venous flow, thus keeping the blood in corpus cavernosum. It has been shown that there are many neurotransmitters playing a role in erection and a disruption in any stage of the aforementioned mechanisms may result in erectile dysfunction (7-9).

Neurogenic reasons make up 5-20% of ED etiology. In neurogenic ED, the problem may be in the brain, medulla spinalis, pudendal and cavernosal nerves and nerve endings and receptors. Neurological disorders are known to cause erectile dysfunction include multiple sclerosis (MS), cerebrovascular cases, temporal lobe epilepsy, Guillian Barré syndrome, autonomic neuropathy, Alzheimer's disease, Parkinson's disease, central and peripheral nervous system tumors, polyneuropathies and lumbar disc herniation. For instance, the prevalence of erectile dysfunction in patients with MS is reported to be 43-71% (9).

Another pathology associated with central nervous system are spinal cord injuries (SCI). Spinal cord injuries occur due to not only direct trauma but also hematoma, bone fractures, tumor and spinal artery ischemia. It has been shown that there are abnormalities in EMG's of bulbocavernosus muscle and cavernosal structures, pudendal sensory structures, somatosensory perception, genital sympathetic potential and that SCI disrupts the innervations related to erection (9, 10). Sexual dysfunction may be seen in spinal cord injuries depending on the severity of the injury and whether it is complete or incomplete. While 95% of cases with complete upper spinal cord lesions may have reflex erections, this rate decreases to around 25% when cases with complete lower spinal cord lesions are concerned (9, 10).

Just like spinal cord traumas, it is also known that many bodily functions are disrupted after cerebrovascular cases. A study conducted by Jeon et al. indicated sexual dysfunction rate after this pathology is 47.4%. With a prevalence of approximately 1%, lumbar disc herniation may cause ED by affecting structures in spinal cord, thus

suspending parasympathetic erectogenic pathways going to pelvic plexus. It is known that if the pressure is incomplete then the erection is known to be maintained up to 90% (21).

In a study, Braun et al. reported that disc herniation causes ED in 23.2% of the cases (22). However, no statistically significant relation between lumbar disc herniation and ED was found in our study. In another study, it has been reported that sexual activities are restricted due to pain in 94% of patients with lumbosacral disc herniation (23). However, no statistically significant relation between VAS pain scale and ED was noted in our study either.

Causing radiculopathy in lumbosacral disc herniation, nerve root pressure may also negatively affect erection mechanism since it would also disrupt the release of nitric oxide (nerve-mediated NO/nNO) regulated by parasympathetic nerves. In cases with herniated lumbar disc, in addition to localization of the hernia, age is also an important factor and it is indicated that erection is better especially in young patients under the age of 30 (24-26). In our study, experimental group and control group ages were made to be similar taking the age factor into account; also, the distributions were statistically similar.

In cases with herniated lumbar disc, in addition to localization of the hernia, age is also an important factor and it is indicated that erection is better especially in young patients under the age of 30. In a study examining a total of 43 cases with the mean age of 41.4, it has been reported that 55% of males who suffered from ED after the onset of back pain, had often experienced decreased libido (18%), premature ejaculation and ED. This study indicates that 78% of the cases reported an increase in the frequency and quality of sexual intercourse after surgery (27). In a case report study, a patient who suffered from ED for 15 years reported that these complaints have been alleviated with a surgery he had when he was 35 (28). Similar results have been reported in many studies (29).

Degree of recovery in patients with severe ED who had a surgery related to herniation may not be at a desirable level (4). 19 cases suffering from ED under age of 55 with cervical spondylosis were examined. Mean age of the cases was 48.8 and their post-operative IIEF scores have increased from 12.1±5.6 to 17.6±5.5 after 11.8 months of monitoring. It has been shown that ED has improved by 84.2% in the last monitoring. Berg et al. reported that sexual quality of life has improved thanks to decreased back pain after lumbar disc herniation treatment (25). Another study indicates mild ED accompanied by radiculopathy have improved after lumbar disc surgery (26). However, Doğan et al. reported in a study that examines herniated lumbar disc cases causing cauda equina syndrome, sexual dysfunction in one case did not improve after surgery (28).

Excluding surgery, first-line therapy is prescribing PDE5I's to the patients. Oral treatments should be considered before and after decompression to achieve erections earlier. For patients who continue to have complaints despite the application of conservative treatments or drug therapy, penile prostheses may be effective since there is a fibrosis in penile tissue level, even if they go through decompression surgery.

CONCLUSION

We could find no studies neither in Turkish nor in English literature specifically about ED prevalence in patients with lumbar disc herniation. Our study aimed to determine the prevalence and severity of erectile dysfunction in patients with lumbar disc herniation and reveal their relation to parameters such as lower back and leg pain, VAS score, motor, sensory and deep tendon reflex losses and location of the disc hernia. When the results were analyzed, the following has been found:

No statistically significant ED prevalence differences were found between the patients who have been diagnosed with lumbar herniated disc and the control group. The most important reason for this is found to be the incidence of ED being quite high but neurogenic causes of ED making up only 10-20% of the cases.

It has been found out that disc location affects ED prevalence and severity and there are statistically significant differences in terms of IIEF-5 scores between the cases of laterally herniated disc and centrally herniated discs. The higher incidence of ED in patients with centrally herniated disc is thought to be the pressure to sacral roots. Contrary to other studies in the literature, no significant relationship between VAS and ED was found out.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was approved by the TOGU School of Medicine Research Ethics Committee (01/03/2016, Project No: 16 KAEK 049).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. NIH Consensus Conference. Impotence. NIH Consensus Development Panel on Impotence. JAMA 1993;270(1):83-90.
2. Akkus E, Kadioglu A, Esen A, et al. Prevalence and correlates of erectile dysfunction in Turkey: a population-based study. Eur Urol 2002;41(3):298-304.
3. Feldman HA, Goldstein I, Hatzichristou DG, Krane RJ, McKinlay JB. Impotence and its medical and psychosocial correlates: results of the Massachusetts Male Aging Study. J Urol 1994;151(1):54-61.
4. Biri H. Tunç L. Erektil Disfonksiyon için risk faktörleri Erkek ve kadın cinsel sağlığı stanbul 2004:125-33.
5. Dean RC, Lue TF. Physiology of penile erection and pathophysiology of erectile dysfunction. Urologic Clin North Am 2005;32(4):379.
6. Lue TF. Neurogenic erectile dysfunction. Clin Auto Res 2001;11(5):285-94.
7. Lincoln TM. Cyclic GMP and mechanisms of vasodilation. Pharmacol Therap 1989;41(3):479-502.
8. Gratzke C, Angulo J, Chitaley K, et al. Anatomy, physiology, and pathophysiology of erectile dysfunction. J Sex Med 2010;7(1pt2):445-75.
9. Lue TF. Erectile dysfunction. New Engl J Med 2000;342:1802-13.
10. Schmid D, Hauri D, Schurch B. Nocturnal penile tumescence and rigidity (NPTR) findings in spinal cord injured men with erectile dysfunction. Int J Impot Res 2004;16(5):433-40.
11. McKenna K. Central control of penile erection. Int J Impot Res 1998;10:S25-34.
12. Linsenmeyer TA. Treatment of erectile dysfunction following spinal cord injury. Curr Urol Rep 2009;10(6):478-84.
13. Schmid DM, Schurch B, Hauri D. Sildenafil in the Treatment of Sexual Dysfunction in Spinal Cord–Injured Male Patients. Eur Urol 2000;38(2):184-93.
14. Courtois F, Charvier K, Leriche A, Raymond D. Sexual function in spinal cord injury men. I. Assessing sexual capability. Spinal Cord 1993;31(12):771-84.
15. Wespes E. Eardley I, Giuliano F, Hatzichristou D, Hatzimouratidis K (vicechair), Moncada I, Salonia A, Vardi Y. Guidelines on Male Sexual Dysfunction: Erectile dysfunction and premature ejaculation European Association of Urology 2013.
16. Anafarta K. Erkek cinsel işlev bozuklukları. Temel Üroloji Kitabı. Editörler: Anafarta K, Bedük Y, Arıkan N. 3. Baskı. Güneş Tıp Kitabevi 2007:1013-52.
17. Kreuter M, Sullivan M, Siösteen A. Sexual adjustment after spinal cord injury (SCI) focusing on partner experiences. Spinal Cord 1994;32(4):225-35.
18. Laffosse J-M, Tricoire J-L, Chiron P, Puget J. Sexual function before and after primary total hip arthroplasty. Joint Bone Spine 2008;75(2):189-94.
19. Maigne J-Y, Chatellier G. Assessment of sexual activity in patients with back pain compared with patients with neck pain. Clin Orthop Relat Res 2001;385:82-7.
20. Steinke E, Patterson-Midgley P. Sexual counseling following acute myocardial infarction. Clin Nurs Res 1996;5(4):462-72.
21. Kasimcan O, Kaptan H. Lomber Disk Hernisinde Spontan Regresyon. Turkiye Klinikleri J Med Sci 2008;28(3):422-4.
22. Braun M, Sommer F, Lehmacher W, Raible A, Bondarenko B, Engelmann U. Erektile Dysfunktion. DMW-Deutsche Medizinische Wochenschrift 2004;129(04):131-6.
23. 23.Dzierżanowski M, Wrzecion K, Słomko W, Radzimińska A, Kaźmierczak U, Strojek K, et al. Discopathy of the lumbar-sacral segment and its influence on sexual dysfunction. Adv Clin Exper Med 2012;22(1):93-100.
24. Qian J, Tian Y, Hu J. Clinical study of cervical spondylosis and male erectile dysfunction. Zhonghua yi xue za zhi 2010;90(47):3368-70.
25. Roar Orlin J, Klevmark B. Successful disc surgery after 17 years of erectile dysfunction caused by a "silent" disc protrusion. Scand J Urol Nephrol 2008;42(1):91-3.
26. CHOY DS. Early relief of erectile dysfunction after laser decompression of herniated lumbar disc. J Clin Laser Med Surg 1999;17(1):25-7.
27. Khorrami M, Javid A, Moshtaghi D, Nourimahdavi K, Mortazavi A, Zia H. Sildenafil efficacy in erectile dysfunction secondary to spinal cord injury depends on the level of cord injuries. Int J Androl 2010;33(6):861-4.
28. Doğan Ş, Türkan A, Caner B, Kaplan T, Bekar A. Bel ağrısında acil bir durum: kauda equina sendromu ile kendini gösteren lomber disk hernisi. Uludağ Üniversitesi Tıp Fakültesi Derg 2007;33:141-4.
29. Bodner D, Leffler B, Frost F. The role of intracavernous injection of vasoactive medications for the restoration of erection in spinal cord injured males: a three year follow up. Spinal Cord 1992;30(2):118-20.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Diagnostic Performance Evaluation of Complete Urinalysis in the Diagnosis of Urinary Tract Infection

İdrar Yolu Enfeksiyonu Tanısında Tam İdrar Tetkikinin Tanısal Performansının Değerlendirilmesi

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ABSTRACT

Aim: The aim was to evaluate the adequacy of the diagnostic performance of urinalysis parameters in the diagnosis of urinary tract infection.

Material and Method: In this retrospective study, the results of 13,315 individuals who had urine culture and complete urinalysis were analyzed. Midstream urine culture results were taken as a reference in the diagnosis of urinary tract infections. The diagnostic performance of urinalysis' chemical parameters [appearance, leukocyte esterase(LE), nitrite] and microscopic parameters (bacteria and squamous epithelium) individually and in combination were evaluated. Two different cut-off values (trace and 1+) were used while performing the analysis. Sensitivity, specificity, positive predictive value, negative predictive value, and likelihood ratios were calculated. The area under the curve (AUC) was evaluated with receiver operating curve (ROC) analysis.

Results: Of the samples, 10.1% were evaluated as culture positive. The highest sensitivity rate was observed in the combination of the presence of any of the LE (trace), nitrite (trace), and bacteria parameters (86%). When evaluated as a single parameter, the highest sensitivity was observed in the LE(trace) parameter (81.6%). The negative predictive value was >90% in both single-parameter and combination evaluations. The AUC of the LE and nitrite tests was calculated as 0.758 and 0.718, respectively.

Conclusion: The parameters evaluated in this study, singly or in combination, showed sufficient performance in predicting negative urine cultures. Although complete urinalysis analyses cannot replace culture examinations, we believe that they can reduce unnecessary culture examinations.

Keywords: complete urinalysis, urine culture, diagnostic performance

ÖZ

Amaç: İdrar yolu enfeksiyonu (İYE) tanısında idrar tetkiki parametrelerinin tanısal performans yeterliliğinin değerlendirilmesi amaçlandı.

Gereç ve Yöntem: Retrospektif dizayn edilen bu çalışmada 13,315 bireye ait idrar kültürü ve tam idrar tetkiki analizi çalışmaya dahil edildi. İYE tanısında orta akım idrar kültürü sonuçları referans alındı. İdrar tetkiki kimyasal parametreleri [görünüm, lökosit esteraz (LE), nitrit] ve mikroskopik parametrelerin (bakteri,skuamöz epitel) tanısal performansları tekil ve kombinasyon halinde değerlendirildi. Değerlendirme yapılırken iki farklı cut-off değeri (Eser ve1+) kullanıldı. Sensitivite,spesifite, pozitif ve negative prediktif değer ve olabilirlik oranları hesaplandı. Receiver operating curve (ROC) analizi ile eğri altındaki alan (AUC) değerlendirildi.

Bulgular: Sonuçların %10.1'i kültür pozitif olarak değerlendirildi. En yüksek sensitivite oranı LE (eser), nitrite (eser), bakteri testlerinin herhangi birinin pozitifliği kombinasyonunda izlendi (%86.6). Tek bir parametre olarak değerlendirildiğinde ise en yüksek sensitivite oranı LE (eser) testinde izlendi (%81.6). Negatif prediktif değer; tek veya kombinasyon halindeki incelemelerin tümünde >%90 oranındaydı. LE ve nitrit testeri için AUC sırasıyla 0.758 ve 0.718 olarak hesaplandı.

Sonuç: Çalışmada değerlendirmeye alınan herbir parametre tekil olarak veya kombinasyon halinde negatif idrar kültürünü öngörmede yeterli performans gösterdi. Kültür incelemelerinin yerini alamayacak olsa da tam idrar tetkikinin gereksiz kültür incelemelerini azaltabileceği kanaatindeyiz.

Anahtar Kelimeler: tam idrar tetkiki, idrar kültürü, tanısal performans

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INTRODUCTION

Urinary tract infections (UTIs), which are among the most common infections, cover a wide range of clinical conditions, ranging from asymptomatic bacterial colonization to sepsis. Various types of pathogens, such as Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Enterococcus faecalis, and Staphylococcus saprophyticus, can cause UTI (1, 2). Pollakiuria, polyuria, dysuria, suprapubic pain, hematuria, and fever can be seen with UTI (3). Laboratory findings include leukocytosis, increased CRP and erythrocyte sedimentation rate, leukocyte esterase and nitrite positivity in urine chemical analysis, and the presence of leukocytes and bacteria in urine microscopy. To diagnose UTI by microbiological culture, some threshold values indicating significant growth have been determined. When a uropathogen is detected in the culture examination of midstream urine specimens, this value is 104 cfu/ml; when two uropathogens are detected, it is 105 cfu/ml for each isolate (4). Urine is sterile in healthy individuals. If bacteria are seen in the urine, UTI or contamination should be suspected. Bacteria in the form of bacilli are the most common bacteria in urine. If bacteria without pyuria are identified, contamination should be considered by reviewing the preanalytical phase (5,6).

Many studies have examined the performance of urinalysis (UA) parameters in the diagnosis of UTI. However, the results of the studies vary widely (12-19). This study aimed to evaluate the adequacy of the diagnostic performance of the chemical and microscopy parameters of complete UA by taking culture examinations as a reference in the diagnosis of urinary tract infections.

MATERIAL AND METHOD

80,055 urinalysis and 19,529 midstream urine culture tests analyzed in xxx Central Laboratory between January and December 2016, were retrospectively scanned. Individuals whose ages ranged from 0–65 years were included in the study. Among them, the results of a total of 13,315 individuals whose urine culture and UA samples were taken simultaneously were evaluated.

Midstream urine specimens sent in a sterile urine container were planted in 5% sheep blood agar and eosin-methylene blue agar with 0.01 µl essence without waiting. The media were incubated for 18–24 hours in a 37°C aerobic environment. 104 cfu/ml in the presence of one uropathogen and 105 cfu/ml for each isolate in the presence of two uropathogens; was used as a positive cut-off value in culture analysis (4). Growths containing three uropathogens and more bacterial species were considered contaminated (4). Candida growth, which is seen in urine culture, can be an indication of not only urinary tract infection but also contamination, colonization, or disseminated candida infection (9). Therefore, specimens evaluated as contaminated or showing Candida growth were excluded from the study. The identification and antibiotic susceptibility of the grown bacteria were determined with the BD PhoenixTM automated system. Complete urinalysis and chemical and microscopic analyses were performed on the AX-4280 (Arkray, Kyoto, Japan), and iQ200 (Iris Diagnostics, Chatsworth, CA, ABD) devices.

Urine culture examinations were taken as the reference in the diagnosis of UTI. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio [LHR(+)] and negative likelihood ratio [LHR(-)] were calculated for some strip chemical parameters (appearance, leukocyte esterase, nitrite) and some microscopic analysis parameters (bacteria and squamous epithelial cells). The AUC was calculated by ROC analysis. These values were also calculated for the combination parameters. The combinations were as follows:

1. The positivity of all three tests of LE, nitrite, and bacteria (LE + nitrite + bacteria)
2. The positivity of any of the LE, nitrite, or bacteria tests (LE / nitrite / bacteria)

LE, nitrite, which were analyzed semi-quantitatively, were evaluated by taking two limit values at the trace and 1 (+) levels. A cloudy or very cloudy appearance, bacteria 1 (+) and above, and squamous epithelium > 5/hpf were evaluated as positive (8).

The data were analyzed using the Microsoft Excel and SPSS Statistics 22 programs. A $p < 0.05$ level was considered statistically significant.

RESULTS

Of the total individuals, 60.0% were female (7,989). Of the samples, 10.1% (1,351) were evaluated as culture positive, while 65.9% (890) of the positive samples showed E. coli growth.

Indications regarding the diagnostic performance of the tests are summarized in **Table 1** and **Figure 1**. When each parameter was evaluated singly, for LE (trace) and 1 (+) levels, the sensitivity was 81.6% and 74.9% and the specificity was 70.1% and 76.7%, respectively. For the nitrite (trace) and 1 (+) levels, the sensitivity was 46.0%; 46.0%, and the specificity was 97.2%; 97.7%, respectively.

The highest sensitivity was calculated in LE (trace)/ nitrite(trace)/bacteria combinations (86%). The lowest sensitivity was calculated in LE(1+)+nitrite(1+)+bacteria combinations (8.1%). When evaluated with a single parameter, the highest sensitivity was calculated in LE (trace), (81.6%) and the lowest sensitivity in the squamous epithelium test (5.7%).

Table 1. Data on diagnostic accuracy performance of complete urinalysis parameters.

Parameter/ Combination	Sensitivity (±%95 CI)	Spesifity (±%95 CI)	PPV (±%95 CI)	NPV (±%95 CI)	LHR(+) (±%95 CI)	LHR(-) (±%95 CI)	AUC
LE (1+) + Nitrite (1+) + Bct	8.1 (6.7-9.7)	99.9 (99.8-99.9)	89.3 (82.5-93.7)	90.6 (90.5-90.8)	74.3 (41.9-131.6)	0.9 (0.91-0.93)	0.540
LE (t) + Nitrite (t) + Bct	8.6 (7.2-10.2)	99.9 (99.8-99.9)	89.2 (82.7-93.5)	90.6 (90.5-90.8)	73.4 (42.3-127.5)	0.9 (0.9-0.93)	
LE (1+) / Nitrite (1+) / Bct	82.3 (80.2-84.3)	74.9 (74.1-75.7)	27.0 (26.2-27.7)	97.4 (97.1-97.7)	3.3 (3.1-3.4)	0.2 (0.21-0.26)	0.786
LE (t) / Nitrite (t) / Bct*	86.0 (84.0-87.8)	68.4 (67.6-69.3)	23.5 (22.9-24.1)	97.7 (97.4-98.0)	2.7 (2.6-2.8)	0.2 (0.18-0.23)	
LE (1+)	74.9 (72.5-77.2)	76.7 (75.9-77.5)	26.6 (25.8-27.5)	96.4 (96.1-96.7)	3.2 (3.1-3.4)	0.3 (0.3-0.4)	0.758
LE (t)	81.6 (79.4-83.6)	70.1 (69.3-70.9)	23.5 (22.9-24.2)	97.1 (96.8-97.4)	2.7 (2.6-2.8)	0.26 (0.23-0.29)	
Nitrite (1+)	46.0 (43.4-48.7)	97.7 (97.4-97.9)	68.9 (66.0-71.6)	94.1 (93.8-94.4)	19.6 (17.2-22.3)	0.5 (0.53-0.58)	0.718
Nitrite (t)	46.0 (43.3-48.7)	97.2 (96.8-97.4)	64.6 (61.8-67.3)	94.1 (93.8-94.4)	16.1 (14.3-18.2)	0.56 (0.53-0.58)	
Bct	16.1 (14.1-18.1)	98.9 (98.7-99.0)	61.5 (56.5-66.2)	91.3 (91.1-91.4)	14.1 (11.5-17.4)	0.8 (0.83-0.87	0.574
Appearance	66.1 (63.5-68.6)	75.2 (74.5-76.0)	23.2 (22.3-24.1)	95.2 (94.8-95.5)	2.7 (2.5-2.8)	0.4 (0.4-0.5	0.707
Epithelium	5.7 (4.5-7.1)	93.8 (93.4-94.2)	9.4 (7.7-11.6)	90.0 (89.9-90.1)	0.9 (0.7-1.2)	1.0 (0.99-1.01)	0.498

LE: leukocyte esterase, Bct: bacteria, t*: trace, PPV: ositive predictive value, NPV: negative predictive value, LHR:likelihood ratio, (AUC: area under the curve, CI:confidence interval. LE + nitrite + bacteria: The positivity of all three tests of LE, nitrite, and bacteria, LE / nitrite / bacteria: The positivity of any of the LE, nitrite, or bacteria tests

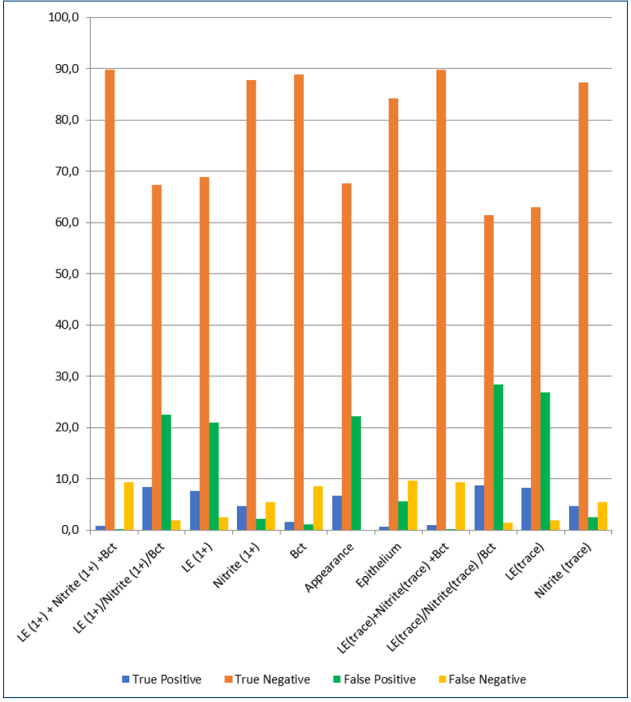

Figure 1. Percentage rates regarding the diagnostic performance of tests.

LE: leukocyte esterase, Bct: bacteria.

- LE + nitrite + bacteria: The positivity of all three tests of LE, nitrite, and bacteria.
- LE / nitrite / bacteria: The positivity of any of the LE, nitrite, or bacteria tests

The highest specificity rate was calculated in the combination LE(1+) + nitrite(1+) + bacteria (99.9%). When considered as the single parameter, the highest specificity was calculated for the positivity of bacteria (98.9%).

The highest PPV was calculated in LE(1+) + nitrite(1+) + bacteria (89.3%), When evaluated with a single parameter, the highest PPV was calculated in the nitrite test (68.9%). The highest NPV was calculated in the LE(trace) / nitrite(trace) / bacteria combination (97.7%). When evaluated with a single parameter, the highest NPV was calculated in the LE (trace) (97.1%).

DISCUSSION

Urine evaluations have an important place in the diagnosis of urinary tract infections. Complete urinalysis with fast results can be used in preliminary diagnosis (9). Costly and time-consuming culture examinations are accepted as the gold standard test in diagnosis (10,11). Many studies have examined the accuracy of UA parameters in the diagnosis of UTI. However, the results are different at a level that can be considered inconsistent (12-19). In present study, the diagnostic performance of UA parameters was evaluated with reference to urine culture in the diagnosis of UTI. All the parameters singly or in combination included in present study performed well in predicting negative urine culture, with an NPV of ≥ 90%.

Memişoğulları et al., in their study with 250 samples, reported the culture positive rate as 35.6% and the E. coli rate as 24.4%. Şahin et al. reported a 12% positive culture analysis in their study with 550 samples. Yüksel et al. reported 33% positive culture analysis in their study with 362 samples, and Yusuf et al. reported 14 % positive culture analysis in their study with 2,351 samples (12-15).

In present study, 10.1% of the samples were evaluated as having a positive culture examination. Of positive samples, 66% were from E. coli growth. In present study, an evaluation was made on a larger sample, and although the literature results differ considerably, the results that we obtained were evaluated as comparable.

While the NPV was calculated as 96%–100% in studies examining the exclusion of UTI by clear-looking urine (16), a similar rate of 95.2% was obtained in present study. Examining the appearance of urine alone performs well in predicting a negative urine culture.

When we look at the results of different studies, it can be seen that the sensitivity values calculated for the LE test cover a very wide range (14.1%–89.3%),(12-15,17-20). In our study, the sensitivity for LE (trace) was calculated as 81.6%. When various studies are examined, similarly, it is possible to talk about a ratio between 93.6% and 18.2% for the specificity of the LE test (12-14,17,19-21) In present study, the specificity for the LE1 (+) level was calculated as 76.7%. The PPV was reported to be between 33.6% and 97.8% in previous studies; it was calculated as 26.6% in present study. The NPV was reported between 58% and 99.3% (12,15,17,19,20,28) in the studies performed; this value was calculated as 97.1% in present study. In the case of LE positivity in patients with negative cultures, it would be beneficial to consider organisms such as Chlamydia and Ureaplasma urealyticum. In addition, in the case of sterile pyuria, it will be useful to review the presence of balanitis, urethritis, tuberculosis, bladder tumors, viral infections, nephrolithiasis, foreign bodies, exercise, and glomerulonephritis, and to question the use of medical treatment.

For the nitrite test in different studies, the sensitivity was calculated as 10.8%–51.5%, specificity was calculated as 86.3%–99.7%, PPV was calculated as 78%–89%, and NPV was calculated at different rates between 69.6%–91.4% (13-15,17,19,21). For nitrit1 (+) in present study, the sensitivity was calculated as 46%, specificity was calculated as 97.7%, PPV was calculated as 68.9%, and NPV was evaluated with a rate of 94.1%. Nitrite positivity can predict significant bacteriuria, and its specificity is high. However, its sensitivity is limited, as determined in present study. It should be kept in mind that false-negative results can be encountered in cases such as high specific gravity and urobilinogen levels, the presence of nitrate reductase negative bacteria, a pH < 6.0, the presence of ascorbic acid, and poor nutrition from nitrate (6).

In various studies on the combination of LE and nitrite, the sensitivity was evaluated as between 66.7%–96.9% and the specificity as between 68.9%–93.8%; the PPV was reported as between 53%–66.9% and the NPV as between 77.4%–98.7% (17-19,22-26). For the combination of LE and bacteria, the sensitivity was calculated as 37.9%, specificity as 92%, PPV as 69.4%, and NPV as 76.6% by Yüksel et al (14). For the LE, nitrite, and blood combination, the sensitivity was calculated as 80%, specificity as 60%, PPV as 52%, and NPV as 84% by Memişoğulları et al (12). In present study, sensitivity of the LE/nitrite/bacteria combination was calculated as >80% and the NPV as >97%. For the LE + nitrite + bacteria combination, the specificity was calculated as 99.9%, and the PPV was >89%. The sensitivity was found to be quite low (8.6%).

In the study by De Boer et al., the sensitivity was calculated as 94.7%, and the specificity was 88.2% for the bacteria parameter using the flow cytometry method (27). For Patrick et al., in a study (using the flow cytometry method) adopting a threshold value of ≥105 cfu/ml, the sensitivity for the bacteria test was 98%, the specificity was 93.7%, and the NPV was 99.3% (28). In a study performed by Yusuf et al., taking ≥105 cfu/ml as a reference, they calculated the sensitivity, specificity, PPV, and NPV values as 91.7%, 87.5%, 53.9%, and 98.5%, respectively (15). In another study conducted by Conker et al., they calculated the sensitivity as 100%, specificity as 43.5%, PPV as 17%, and the NPV as 100% for the threshold of 10 bacteria/µL (in microscobic analysis) taking ≥10 3 cfu/ml as a reference (in urine culture) (29). In present study, the sensitivity of the bacteria test, which was examined by the digital flow microscopy method, was very low at 16.1%. The specificity was very good at 98.9%; the PPV and NPV (61.5%; 91.3%) were similar to those of previous studies. Excessive pyuria can mask the diagnosis of bacteria. Although it is analyzed with automated systems, the examination and reporting of microscopy parameters can depend on the user, and the evaluation of the images of the examinations of the same sample can be interpreted in a different way. Manual microscopy is accepted as the gold standard, although automated urine sediment analyzers provide time and labor benefits compared to manual microscopy.

In the studies, the AUC was calculated between 0.61 and 0.84 for single LE, single nitrite, LE or nitrite combination tests. It was calculated in the range of 0.61–0.96 for single bacterial positivity (19,27,30). The results obtained for LE and nitrite in present study were at a similar level (**Table 1**).

CONCLUSION

The parameters evaluated in present study, alone or in combination, showed sufficient performance to predict a negative urine culture. We are of the opinion that the use of complete urinalysis tests in combination, rather than based on only a single parameter, can increase sensitivity and be more useful in the decision-making processes of clinicians. Urinalysis can predict a negative urine culture. Although complete urinalysis cannot replace culture examinations, it can reduce unnecessary empirical antibiotic therapy and guide the clinician in excluding the diagnosis of UTI in appropriate patient groups.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Van Yüzüncü Yıl University Ethics Committee (Date: 2021, Decision No: 06-16).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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REFERENCES

1. Masajtis-Zagajewska A, Nowicki M. New markers of urinary tract infection. Clin Chim Acta. 2017;471:286-91.
2. Flores-Mireles AL, Walker JN, Caparon M, Hultgren SJ. Urinary tract infections: epidemiology, mechanisms of infection and treatment options. Nat Rev Microbiol. 2015;13(5):269-84.
3. Rubin RH, Shapiro ED, Andriole VT, Davis RJ, Stamm WE. Evaluation of new anti-infective drugs for the treatment of urinary tract infection. Infectious Diseases Society of America and the Food and Drug Administration. Clin Infect Dis. 1992;15 Suppl 1:216-27.
4. Garcia, L. S. (Ed.). (2010). Clinical microbiology procedures handbook (Vol. 2). American Society for Microbiology Press.
5. Lamb EJ, Price CP. Kidney Function Tests. In: Burtis CA, Ashwood ER. Tietz Textbook of Clinical Chemistry. 5th ed. Elsevier Saunder. Philadelphia, 2012; 669-676
6. Simerville JA, Maxted WC, Pahira JJ. Urinalysis: a comprehensive review [published correction appears in Am Fam Physician. 2006 Oct 1;74(7):1096]. Am Fam Physician. 2005;71(6):1153-62.
7. Brunzel NA. (2019). İdrar ve Vücut Sıvılarının Analiz Prensipleri. Editör: Turhan T, Konukoğlu D. Palme Yayınevi, 126-83.
8. Alan H.B. (2006). Tietz Clinical Guide to Laboratory Tests. 4th ed. Elsevier Saunder.
9. Fisher JF, Newman CL, Sobel JD. Yeast in the urine: solutions for a budding problem. Clin Infect Dis. 1995;20(1):183-9.
10. Najeeb S, Munir T, Rehman S, Hafiz A, Gilani M, Latif M. Comparison of urine dipstick test with conventional urine culture in diagnosis of urinary tract infection. J Coll Physicians Surg Pak. 2015;25(2):108-10.
11. Perkins J, Perkins K, Vilke GM, Almazroua FY. Is culture-positive urinary tract infection in febrile children accurately identified by urine dipstick or microanalysis?. J Emerg Med. 2012;43(6):1155-9.
12. Memişoğulları R, Yüksel H, Yıldırım HA, Yavuz Ö. Performance Characteristics of Dipstick and Microscopic Urinalysis for Diagnosis of Urinary Tract Infection. EUR J GEN MED. 2010;7(2), 174-8.
13. Şahin, E., Yürüken, Z., Alanbayi, U., Çinar, T., & Göçmen, J. S. (2011). A new scoring method in evaluation of urine samples. Klimik Derg 2011; 24: 86-9.
14. Yüksel H, Kaplan İ, Dal T, Kuş S, Toprak G, Evliyaoğlu O. The performance of fully automated urine analysis results for predicting the need of urine culture test. J Clin Exp Invest. 2014;5(2):286-9.
15. Yusuf E, Van Herendael B, van Schaeren J. Performance of urinalysis tests and their ability in predicting results of urine cultures: a comparison between automated test strip analyser and flow cytometry in various subpopulations and types of samples. J Clin Pathol. 2017;70(7):631-6.
16. Bulloch B, Bausher JC, Pomerantz WJ, Connors JM, Mahabee-Gittens M, Dowd MD. Can urine clarity exclude the diagnosis of urinary tract infection?. Pediatrics. 2000;106(5):E60.
17. Najeeb S, Munir T, Rehman S, Hafiz A, Gilani M, Latif M. Comparison of urine dipstick test with conventional urine culture in diagnosis of urinary tract infection. J Coll Physicians Surg Pak. 2015;25(2):108-10.
18. Laosu-angkoon S. The sensitivity and specificity of a urine leukocyte esterase dipstick test for the diagnosis of urinary tract infection in the outpatient clinic of Rajavithi Hospital. J Med Assoc Thai. 2013;96(7):849-53.
19. Marques AG, Doi AM, Pasternak J, Damascena MDS, França CN, Martino MDV. Performance of the dipstick screening test as a predictor of negative urine culture. Einstein (Sao Paulo). 2017;15(1):34-9.
20. Velasco R, Benito H, Mozun R, et al. Using a urine dipstick to identify a positive urine culture in young febrile infants is as effective as in older patients. Acta Paediatr. 2015;104(1):39-44.
21. Gülcan A, Çelik G, Gülcan E, Cansever Z, Aladağ DM. İdrar Yolu Enfeksiyonu Şüpheli Hastalarda Tam İdrar Analizi ve Kültür Sonuçlarının Performans Değerlendirmesi. Abant Med J. 2012; 1(2): 61-4.
22. Taneja N, Chatterjee SS, Singh M, Sivapriya S, Sharma M, Sharma SK. Validity of quantitative unspun urine microscopy, dipstick test leucocyte esterase and nitrite tests in rapidly diagnosing urinary tract infections. J Assoc Physicians India. 2010;58:485-7.
23. Glissmeyer EW, Korgenski EK, Wilkes J, et al. Dipstick screening for urinary tract infection in febrile infants. Pediatrics. 2014;133(5):e1121-7.
24. Shimoni Z, Hermush V, Glick J, Froom P. No need for a urine culture in elderly hospitalized patients with a negative dipstick test result. Eur J Clin Microbiol Infect Dis. 2018;37(8):1459-64.
25. Ginting F, Sugianli AK, Kusumawati RL, et al. Predictive value of the urinary dipstick test in the management of patients with urinary tract infection-associated symptoms in primary care in Indonesia: a cross-sectional study. BMJ Open. 2018;8(8):e023051.
26. Shimoni Z, Glick J, Hermush V, Froom P. Sensitivity of the dipstick in detecting bacteremic urinary tract infections in elderly hospitalized patients. PLoS One. 2017;12(10):e0187381.
27. de Boer FJ, Gieteling E, van Egmond-Kreileman H, et al. Accurate and fast urinalysis in febrile patients by flow cytometry. Infect Dis (Lond). 2017;49(5):380-7.
28. Erdman P, Anderson B, Zacko JC, Taylor K, Donaldson K. The Accuracy of the Sysmex UF-1000i in Urine Bacterial Detection Compared With the Standard Urine Analysis and Culture. Arch Pathol Lab Med. 2017;141(11):1540-3.
29. Conkar S, Mir S. Urine Flow Cytometry in the Diagnosis of Urinary Tract Infection. Indian J Pediatr. 2018;85(11):995-9.
30. Kocer D, Sariguzel FM, Ciraci MZ, Karakukcu C, Oz L. Diagnostic Accuracy of a New Urinalysis System, DongJiu, for Diagnosis of Urinary Tract Infection. Ann Clin Lab Sci. 2015;45(6):686-91.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Early Effects of Sleeve Gastrectomy on Ambulatory Blood Pressure and Protenuria

Sleeve Gastrektomi'nin Ambulatuar Kan Basıncı ve Proteinüri Üzerine Erken Etkileri

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ABSTRACT

Aim: Obesity is increasing in prevalence worldwide is a serious health problem that causes significant morbidity and mortality. One of these morbidity is hypertension. Our aim is to perform laparoscopic sleeve gastrectomy on obese patients and to observe the effects of surgery on ambulatory blood pressure and dipper or non-dipper hypertension. Also we evaluate the effect of laparoscopic sleeve gastrectomy on biochemical parameters such as urinary protein creatinin ratio fasting glucose.

Material and Method: 44 patients which laparoscopic sleeve gastrectomy planned by reason of obesity were included in the study. Ambulatory blood pressure monitoring has been recorded for obese patients before surgery and after surgery for three months. Demographic data and laboratory tests were scanned and saved before surgery and three months after the surgery.

Results: After laparoscopic sleeve gastrectomy surgery, at the end of the third month, significant decrease on the daytime diastolic and nighttime systolic and diastolic blood pressure on ambulatory blood pressure monitoring measurements has been observed. Also, we found a negative correlation between weight loss and diastolic blood pressure. After the surgery; the usage of antihypertensive medicines are decreased remarkably in comparison with before surgery. Indeed urinary protein/creatinine ratio (UPCR) declined significantly for patients at the end of third month after surgery. At the same time; white blood cell, neutrophils, platelet counts and fasting blood sugar are decreased.

Conclusions: After such a short time as three months of laparoscopic sleeve gastrectomy surgery, blood pressure and proteinuria decreased in morbid obese remarkably.

Keywords: ABPM, laparoscopic sleeve gastrectomy, obesity, proteinuria

ÖZ

Amaç: Obezite, dünya genelinde prevalansı giderek artan, önemli morbidite ve mortaliteye neden olan ciddi bir sağlık sorunudur. Bu morbiditelerden biri de hipertansiyondur. Amacımız obez hastalarda laparoskopik sleeve gastrektomi yapılan hastalarda cerrahinin ambulatuar kan basıncı ve dipper veya non-dipper hipertansiyon üzerine etkilerini gözlemlemektir. Ayrıca laparoskopik sleeve gastrektominin üriner protein kreatinin atılım oranı, açlık glukozu gibi biyokimyasal parametreler üzerindeki etkisini de değerlendirmeyi amaçladık.

Gereç ve Yöntem: Çalışmaya obezite nedeni ile laparoskopik sleeve gastrektomi planlanan 44 hasta dahil edildi. Hastalarda ameliyat öncesi ve ameliyattan 3 ay sonra ambulatuvar kan basıncı takibi yapıldı. Demografik veriler ve laboratuvar testleri ameliyattan önce ve ameliyattan üç ay sonra tarandı ve kaydedildi.

Bulgular: Laparoskopik sleeve gastrektomi ameliyatı sonrası üçüncü ayın sonunda ambulatuar kan basıncı monitör ölçümlerinde gündüz diyastolik ve gece sistolik ve diyastolik kan basınçlarında anlamlı düşüş gözlendi. Ayrıca kilo kaybı ile diyastolik kan basıncı arasında negatif bir ilişki bulduk. Ameliyattan sonra antihipertansif ilaç kullanımı ameliyat öncesine göre oldukça azaldı. İdrar protein/kreatinin oranı (UPCR), ameliyattan sonraki üçüncü ayın sonunda önemli ölçüde azaldı. Aynı zamanda; beyaz kan hücresi, nötrofil, trombosit sayısı ve açlık kan şekeri de düştü.

Sonuç: Laparoskopik sleeve gastrektomi ameliyatından üç ay gibi kısa bir süre sonra morbid obezlerde kan basıncı ve proteinüri önemli ölçüde azalma saptanmıştır.

Anahtar Kelimeler: ABPM, laparoskopik sleeve gastrektomi, obezite, proteinüri

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INTRODUCTION

Obesity is associated with an increase in mortality and with risk of many disorders, including diabetes mellitus, hypertension, dyslipidemia, heart disease, stroke, sleep apnea, cancer (1). Overweight is defined as a body mass index (BMI) of 25 to 29.9 kg/m^2; obesity is defined as a BMI of ≥30 kg/m^2. Severe obesity is defined as a BMI ≥40 kg/m^2 or ≥35 kg/m^2 in the presence of comorbidities (1). Treatment options for obesity; diet, exercise, and behavioral modification, pharmacologic therapy or bariatric surgery. For patients with BMI ≥40 kg/m^2 who have failed to lose weight with diet, exercise and drug therapy or individuals with BMI >35 kg/m^2 with obesity-related comorbidities who have failed diet, exercise, and drug therapy are also potential surgical candidates . The most commonly performed procedures are Roux-en-Y gastric bypass (RYGB), adjustable gastric banding (AGB), and sleeve gastrectomy (SG) (3). In addition to achieving weight loss, bariatric procedures result in marked improvement or resolution of many obesity-related health problems, such as type II diabetes, dyslipidemia, obstructive sleep apnea, gastroesophageal reflux disease, infertility and hypertension (4). Weight loss contributes to remission or improves obesity-linked hypertension. Bariatric surgery (BS) is currently the most effective therapy to achieve significant and long- term weight loss in obese individuals. Several series of BS in hypertensive patients have reported a remission or improvement in hypertension in %60 of the patients (9,10). According to the available data, sleeve gastrectomy is the most frequently performed bariatric surgery method in Western countries (5). The aim of current study, assessing whether laparoscopic sleeve gastectomy and thus induced weight loss have any effect on circadian blood pressure (BP) variation in morbidly obese hypertensive subjects with normal or impaired 24-h BP rhythm and evaluate on metabolic parameters and proteinuria in obese adults.

MATERIAL AND METHOD

Patients

Patients with severe obesity and hypertension undergoing laparoscopic were invited to participate in this prospective study. The following inclusion criteria were used: age between 18 and 65 years, fulfilment of criteria for BS defined as body mass index (BMI)≥40 kg/m^2 or 35–40 kg/m^2 with major obesity-associated co-morbidities, antihypertensive treatment with 3 or less antihypertensive drugs and normal renal function (creatinine 1.4 mg/dL in males or 1.3 mg/dL in females). Patients were excluded if they had secondary hypertension or established cardiovascular disease. All patients were evaluated 2 times: before SG and at 3 months postoperatively. The preoperative information obtained included: age, height (cm), weight (kg), BMI (kg/m^2), gender, full medication list, blood urea nitrogen (BUN), creatinin, fasting glucose, urine test, UPCR, low density lipoprotein (LDL). Postoperatively, body weight (BW) was measured and the BMI, body weight loss (BWL) were calculated and again, full medication list, BUN, creatinin, urine test, UPCR.

Ambulatory BP Monitoring

Ambulatory monitoring of BP (ABPM) was performed using a portable, automated, computer-programmed oscillometric device from Mobil-O-Graph NG Ambulatory 24 hour blood pressure monitoring system, Salzburg, Germany, 2009. The recorder was set to take a BP and pulse measurement every 20 min in the daytime and every 30 min at night. They were asked to go to bed no later than 23:00 hours and to arise no earlier than 07:00 hours. Each participant had the arm cuff positioned on the nondominant arm by a trained nurse at the hospital. The measurements were done on working days of average activity. BP load was defined as the percentages of BP measurements that were ≥130/80 mm Hg in the 24-hour period, 135/85 mm Hg during the daytime period, and 120/70 mm Hg during the nighttime period. All participants returned to the hospital after completion of the study the next day. All patients were evaluated 2 times: the first, within a week before the SG surgery and the second, three monthly after surgery. Patients, who in their first measurement, failed to produce minimum 10% decrease in nighttime systolic or diastolic BP were diagnosed as nondipper.

Definitions

Hypertension was defined as the permanent use of antihypertensive treatment and confirmed by ABPM when the mean 24-hour systolic blood pressure (SBP) and diastolic blood pressure (DBP) were 130/80 mmHg and remission of HT was defined as a mean 24h- hour SBP and DBP 130/80 mmHg associated with a discontinuation of all antihypertensive drugs. All patients provided written informed consent to participate. Our study was carried out in accordance with the Declaration of Helsinki Principles (https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/).

Laparoscopic Sleeve Gastrectomy (LSG) Technique

All patients were operated on using standardized operation techniques. In all patients, we used five trocars (three 5 mm, two10 -12 mm trocar) and a 38-Fr bougie along the lesser curvature for calibration of the gastric tube. A Harmonic Scalpel™ (Ethicon Endo-Surgery), was used for freeing the greater gastric curvature, and all stapling was performed using an Echelon 60 Compact Linear Cutter™ (60 mm), loaded with yellow and blue cartridges, which delivers 6 rows of stapling clips (Ethicon EndoSurgery). The longitudinal resection of the stomach began at 2-4 cm from the pylorus in the

patients. The staple line was not reinforced in any patient. We use surgical endoclips (Ethicon EndoSurgery) control the bleeding of the staple line when necessary. Hiatal hernias were explored and were repaired if present, with posterior closure of the crura using nonabsorbable stitches.

Statistical Analysis

Baseline data are given as either mean (standard deviation) or number (%). Paired t-tests was used to compare the changes within the groups. For evaluating the average age were analyzed using independent samples t-test. McNemar's test was performed to compare categorical variables. Pearson correlation was calculated. The results of these analyses are presented as OR (95%CI). All analyses were performed using SPSS 20.0 (SPSS, Inc.,Chicago, IL) and a p value of <0.05 was considered to be significantly different.

RESULTS

A total of 44 patients were included in the study. **Table 1** shows the demographic characteristics and laboratory data of the patient population at baseline.

Table 1. Comparison of demographic data and ABPM data before SG and after SG.

	Before SG	After SG	p
BW (kg)	124.9±15.4	100.4±12.2	<0.001
BMI (kg/m^2)	46.3±6.5	37.7±6.6	<0.001
24h Average SBP (mmHg)	124±15	117.3±9.3	<0.001
24h Average DBP (mmHg)	75.1±9.2	73.±8.5	0.06
Daytime SBP (mmHg)	125.2±15.2	119.3±9.2	<0.001
Nighttime SBP (mmHg)	122.3±18.6	111±12.6	<0.005
Daytime DBP (mmHg)	76.5±9.4	75.1±8.1	<0.001
Nighttime DBP (mmHg)	72.5±11.7	67.3±9.9	<0.001
Non-dippers	30	24	0.24
AntihypertensiveDrugs	0.72±1.18	0.09±0.4	<0.001
WBC (/mm^3)	9.12±2.39	7.81±2.35	0.01
Neutrophil (/mm^3)	5.8±2.36	4.5±1.83	0.01
Platelet (/mm^3)	308±58.2	281±59	0.01
Glucose (mg/dL)	123.2±64.2	98.3±23.4	0.03
LDL (mg/dl)	106±43	97.2±23	0.4
Urine protein: creatinine ratio (UPCR)	129±171	74±30.8	0.01

BW: Body weight, BMI: Body mass index, Cre: Creatinine, DBP: Diastolic blood pressure, LDL: Low density lipoprotein, SBP: Systolic blood pressure, SG: Sleeve gastrectomy, TP: Total protein

Before SG surgery average BW was 124.9±.4 kg. afterwards 100.4±12.2 kg (p<0.001). Average BWL was 24.5±6.1 kg. Before surgery BMI was 46.3±6.5 kg/m^2. after surgery 37.7±6.6 kg/m^2 (p<0.001). Average BMI difference was 9.1+1.84 kg/m^2. Average % weight loss was %19.5± 3.55 (p<0.001).

24h average SBP for patients before surgery was 124± mmHg, after surgery was 117.3±9.3 mmHg. After surgery SBP decreased significantly (p<0.001). 24h average DBP 75.1±9.2 mmHg, after surgery was 73.±8.5 mmHg. After surgery DBP was decreased however statistically it was insignificant p:0.06).

Before surgery while 14 patients had 24h average blood pressure >130/80 mmHg, after surgery 8 patients had 24h average blood pressure >130/80 mmHg (p:0.10).

ABPM daytime average SBP for patients before surgery was 125.2±.2 mmHg, average daytime DBP was 76.5±9.4 mmHg. After surgery daytime average SBP was 119.3±9.2 mmHg and daytime average DBP was 75.1±8.1 mmHg, after surgery daytime SBP (p<0,001) and daytime DBP (p<0.001) decreased significantly.

In comparison for ABPM nighttime blood pressure, before surgery nighttime average SBP was 122.3±18.6 mmHg. after surgery it was 111±12.6 mmHg (p:0.005). Before surgery average nighttime DBP was 72.5±11.7 mmHg. after surgery 67.3±9.9 mmHg. After surgery. nighttime DBP decreased remarkably (p<0.001).

Before surgery, 30 patients were showing non- dipper trend, after surgery it was 24. Overall, nondipper trend for the total number of patients were decreased however statistically it was insignificant (p:0.28). Prescribed antihypertensive drugs usage before surgery was (0.72±1.18), after surgery (0.09±0.4), significant decreased was observed (p< 0.001) (**Table 1**).

While 14 patients using antihypertensive before operation, 2 patients were using antihypertensive postoperatively. The number of patients using antihypertensive decreased significantly after surgery (p< 0.001).

In laboratory parameters evaluation; before and after surgery white blood cell (WBC) count (p:0,01), neutrophil count (p:0.01). platelet count (p:0.01) and fasting glucose levels (p:0.03) were significantly decreased. Change for other laboratory parameters were insignificant. Before surgery average fasting blood glucose was 119.8±64.1 mg/dl, after third month of the surgery it was 96.8±22.2 mg/dl, after surgery fasting blood sugar was lower (p:0.008). LDL levels for preoperation and post operation were also compared. Preoperative average LDL was 106±43 mg/dl, end of third month postoperative was 97.2±23 mg/dl. LDL level was decreasing after surgery but statistically it was insignificant (p:0.17) (**Table1**) .

We reported spot urine protein/creatinine ratio to decrease from 129±171 mg/dl to 74±30.8 mg/dl in three months (p:0.01). Weight loss. ABPM average nighttime DBP (Pearson correlation -0.29. p:0.04) before surgery versus after surgery values showed a negative correlation. BMI decrease; ABPM average nighttime DBP (Pearson correlation -0.38. p<0.01) and ABPM average DBP (Pearson correlation -0.30. p:0.04) before surgery versus after surgery values showed a negative correlation (**Figure 1**).

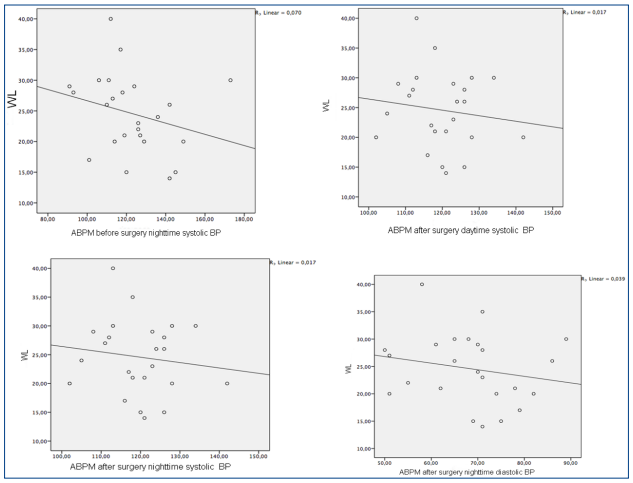

Figure 1. Correlation graffics between WL and ABPM

ABPM: Ambulatory Blood Pressure Monitoring, BP: Blood Pressure, WL: Weight Loss.

DISCUSSION

SG is a surgical bariatric operation in which removal of a large portion of the stomach along the greater curvature is practised. SG is currently the most frequently performed procedure worldwide (6,7). Along with RYGB, in SG first months of weight loss is the maximum, afterwards it has been observed as a steady state graph (8) . For our patient group, with SG at the end of third month weight loss was 2 4.5±6.1 kg ($p<0.001$) and decrease in BMI was 9.1+1.84 kg/m^2 ($p<0.001$). Different studies are showing SBP and DBP reduction during policlinic visits after BS . In 2005 study of Czupryniak et all. ABPM had been performed on 8 non- dipper hypertension and 8 normotensive patients after eight weeks of gastric by-pass surgery. They reported no change in the control group versus significant reduction for daytime/nighttime blood pressure values of hypertension patients and a steady circadian rhythm for non-dipper patients (9). Flores et all. performed ambulatory blood pressure measurements after fourth and twelfth months of post RYGB-SG surgeries in 37 obese patients. Their findings were consistent with ours where they reported insignificant decrease for non-dipper prevalence (10). In this study, only 6 of 30 patients with non-dipper blood pressure had been improved, but statistically it was insignificant (p:0.28). Nordstrant et all. had been reported a remarkable decline on 24 hour daytime/nighttime SBP and DBP after one year of post RYGB for 49 morbid obese pateints (11). In a study of 529 patients covering seven centers, it was observed that the rate of hypertensive patients decreased from 30.4% to 21.5% at 5-year follow-up (12) In a retrospective study conducted in Poland, 123 of 143 hypertensive patients before SG operation had complete or partial blood pressure control 12 months after the operation (13) We observed a similar significant decline but after 3 months of post SG on 24 hour daytime/nighttime SBP and DBP. However it was not statistically meaningul (p:0.29) for our patients even though daytime DBP was decreased. Proteinuria was not observed to change in diabetic and non-diabetic patients after twelve months of RYG, SG and gastric banding operations, versus in our study we reported spot urine protein/creatinine ratio to decrease from 129±171 mg/dl 74±30,8 mg/dl in three months (p:0.01) (14). Bonfils et al. post sixth week of RYGB, in 12 hypertension patients they observed a significant change in blood pressure during 24 hours ABPM. In our studies, post twelfth week SG, we reported significant decrease in blood pressure during 24 hours ABPM. Also, Bonfils et al. showed a significant decrease in prescribed antihypertensive medications after one year postoperation mean while we observed significant decrease of antihypertensive medication usage at the end of twelfth week post SG surgery ($p<0,001$) (15). Weight loss, ABPM average nighttime DBP (Pearson correlation -0.29, p:0.04)before surgery versus after surgery values showed a negative correlation. BMI decrease; ABPM average nighttime DBP (Pearson correlation -0.38, $p<0.01$) and ABPM average DBP (r: -0.30. p:0.04) before surgery versus after surgery values showed a negative correlation.

Effects of bariatric surgery on lipid profile has been shown in studies. In a retrospective study, LDL and triglyceride levels were observed to reduce significantly after RYGB (16) . In another study, one year remission was found to be more in hyperlipidemia for the post surgery of the patients of RYGB versus AGB and SG (17). Al and Taşkın, in their retrospective study that included mildly obese patients, observed a significant improvement in the lipid profile at the end of 12 months (18). In our studies, we observed LDL levels. LDL level was decreasing after surgery but statistically it was insignificant (p:0.4).

Leukocyte count (p:0.01). neutrophil count (p:0.01) and platelet count (p:0.01) were reduced significantly post surgery. In 2012 study of Dallal et all. WBC and platelet counts were observed to decrease in post RYGB patients (19) . Also in other studies, WBC and neutrophil counts were observed to reduce after bariatric surgery (20,21). With all information in hand, it can be concluded as obesity is an subclinical inflammation situation and post surgery; WBC, neutrophil and platelet count decrease results in drop back in inflammatory phase.

BS methods are shown to be effective for the control of DM and remission. HbA1C levels were observed to decrease and diabetic recovery were observed after RYGB, SG and AGB. In general these studies are performed after 12 months post surgery (22-24). In our study, we observed meaningful decline in fasting blood glucose three months after surgery versus preoperative results (p:0.03).

CONCLUSION

Hypertension that is related with obesity is the most important factor for developing renal dysfunction. In morbid obese, after short time of SG operation, although average BMI >35 kg/m^2, it can be concluded that the decrease has been observed for blood pressure controls and proteinuria..

ETHICAL DECLARATIONS

Ethics Committee Approval: In this research, the data before 2020 was used and the research was concluded before 2020. According to the Regulation on Clinical Researches published in the Official Gazette of the Republic of Turkey with the number 28617 dated 3 November 2015, the ethics committee approval was not obtained in accordance with the article "Retrospective studies are outside the scope of the regulation (article 2-(2))". This study was prepared in accordance with the Law on Protection of Personal Data, by anonymizing patient data and in accordance with the 2013 Brazil revision of the Helsinki Declaration and guidelines for Good Clinical Practice.

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Wharton S, Lau DCW, Vallis M, et al. Obesity in adults: a clinical practice guideline. Cmaj. 2020;192(31):E875-e91.
2. Flodgren G, Gonçalves-Bradley DC, Summerbell CD. Interventions to change the behaviour of health professionals and the organisation of care to promote weight reduction in children and adults with overweight or obesity. Cochrane Database Systematic Rev 2017;11(11):CD000984-CD.
3. Di Lorenzo N, Antoniou SA, Batterham RL, et al. Clinical practice guidelines of the European Association for Endoscopic Surgery (EAES) on bariatric surgery: update 2020 endorsed by IFSO-EC, EASO and ESPCOP. Surg Endoscopy. 2020;34(6):2332-58.
4. Wiggins T, Guidozzi N, Welbourn R, Ahmed AR, Markar SR. Association of bariatric surgery with all-cause mortality and incidence of obesity-related disease at a population level: A systematic review and meta-analysis. PLoS Med 2020;17(7):e1003206-e.
5. Welbourn R, Hollyman M, Kinsman R, et al. Bariatric Surgery Worldwide: Baseline Demographic Description and One-Year Outcomes from the Fourth IFSO Global Registry Report 2018. Obes Surg. 2019;29(3):782-95.
6. Oh TJ, Lee HJ, Cho YM. East Asian perspectives in metabolic and bariatric surgery. J Diabetes Investig. 2022 May;13(5):756-761.
7. Rives-Lange C, Rassy N, Carette C,et al. Seventy years of bariatric surgery: A systematic mapping review of randomized controlled trials. Obes Rev. 2022 May;23(5):e13420. doi: 10.11118.
8. Uhe I, Douissard J, Podetta M, et al. Roux-en-Y gastric bypass, sleeve gastrectomy, or one-anastomosis gastric bypass? A systematic review and meta-analysis of randomized-controlled trials. Obesity (Silver Spring). 2022 Mar;30(3):614-627.
9. Czupryniak L, Strzelczyk J, Pawlowski M, Loba J. Circadian blood pressure variation in morbidly obese hypertensive patients undergoing gastric bypass surgery. Am J Hypertens. 2005;18(4 Pt 1):446-51.
10. Flores L, Vidal J, Núñez I, Rueda S, Viaplana J, Esmatjes E. Longitudinal changes of blood pressure after weight loss: factors involved. Surg Obes Relat Dis. 2015;11(1):215-21.
11. Nordstrand N, Hertel JK, Hofsø D, et al. A controlled clinical trial of the effect of gastric bypass surgery and intensive lifestyle intervention on nocturnal hypertension and the circadian blood pressure rhythm in patients with morbid obesity. Surgery. 2012;151(5):674-80.
12. El Moussaoui I, Van Vyve E, Johanet H, et al. Five-year Outcomes of Sleeve Gastrectomy: A Prospective Multicenter study. Am Surg 2021:3134821991984.
13. Diemieszczyk I, Woźniewska P, Gołaszewski P, et al. Does weight loss after laparoscopic sleeve gastrectomy contribute to reduction in blood pressure? Pol Arch Intern Med. 2021;131(7-8):693-700.
14. Agrawal V, Khan I, Rai B, et al. The effect of weight loss after bariatric surgery on albuminuria. Clin Nephrol. 2008;70(3):194-202.
15. Bonfils PK, Taskiran M, Damgaard M, et al. Roux-en-Y gastric bypass alleviates hypertension and is associated with an increase in mid-regional pro-atrial natriuretic peptide in morbid obese patients. J Hypertens. 2015;33(6):1215-25.
16. Nguyen NT, Varela E, Sabio A, Tran CL, Stamos M, Wilson SE. Resolution of hyperlipidemia after laparoscopic Roux-en-Y gastric bypass. J Am Coll Surg. 2006;203(1):24-9.
17. Hutter MM, Schirmer BD, Jones DB, et al. First report from the American College of Surgeons Bariatric Surgery Center Network: laparoscopic sleeve gastrectomy has morbidity and effectiveness positioned between the band and the bypass. Ann Surg. 2011;254(3):410-20.
18. Al M, Taskin HE. Sleeve gastrectomy with transit bipartition in a series of 883 patients with mild obesity: early effectiveness and safety outcomes. Surg Endosc. 2022;36(4):2631-2642.19.
19. Dallal RM, Leighton J, Trang A. Analysis of leukopenia and anemia after gastric bypass surgery. Surg Obes Relat Dis. 2012;8(2):164-8.
20. Chen SB, Lee YC, Ser KH, et al. Serum C-reactive protein and white blood cell count in morbidly obese surgical patients. Obes Surg. 2009;19(4):461-6.
21. Hanusch-Enserer U, Cauza E, Spak M, et al. Acute-phase response and immunological markers in morbid obese patients and patients following adjustable gastric banding. Int J Obes Relat Metab Disord. 2003;27(3):355-61.
22. Mechanick JI, Apovian C, Brethauer S, et al. Clinical Practice Guidelines for the Perioperative Nutrition, Metabolic, and Nonsurgical Support of Patients Undergoing Bariatric Procedures - 2019 Update: Cosponsored by American Association of Clinical Endocrinologists/American College of Endocrinology, The Obesity Society, American Society for Metabolic and Bariatric Surgery, Obesity Medicine Association, and American Society of Anesthesiologists. Obesity (Silver Spring). 2020;28(4):O1-o58.
23. Keating CL, Dixon JB, Moodie ML, Peeters A, Playfair J, O'Brien PE. Cost-efficacy of surgically induced weight loss for the management of type 2 diabetes: a randomized controlled trial. Diabetes Care. 2009;32(4):580-4.
24. Ahn SM, Pomp A, Rubino F. Metabolic surgery for type 2 diabetes. Ann N Y Acad Sci. 2010;1212:37-45.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

What Causes Joint Pain in Rheumatoid Arthritis Patients with Clinical Remission and Low Disease Activity according to DAS28?

DAS28'e göre Klinik Remisyon ve Düşük Hastalık Aktivitesi Olan Romatoid Artritli Hastalarda Eklem Ağrısına Ne Sebep Olur?

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ABSTRACT

Objective: The aim of this study was to evaluate synovial activity in patients with rheumatoid arthritis (RA) who were in remission or had low disease activity according to the DAS-28 (Disease activity scale-28) but complained of joint pain.

Material and Method: A retrospective review was made of the records and admission files of patients diagnosed with RA according to the American Rheumatism Association criteria between January 2016 and January 2018. The modified health assessment questionnaire (m-HAQ) and ultrasonographic evaluations of patients were recorded. Patients were compared in terms of demographic and disease characteristics according to the presence of synovitis detected with ultrasongraphy. Correlations between the presence of synovitis and demographic and disease characteristics were also evaluated.

Results: This trial included 53 patients with the diagnosis of RA who were in remission or had low disease activity (DAS-28 <3.2) for at least 6 months and had pain symptoms in at least one joint. Synovitis was detected on US in 23 (43.4%) patients, and in these patients, tenderness joint count (TJC) (p =0.03) and m-HAQ (p =0.019) were significantly higher. The presence of synovitis was associated with an increase in TJC (r: 0.518, p=0.001) and a deterioration in general health(r: 0.318, p=0.025). This relationship was shown to continue in the multivariate regression analysis

Conclusion: Even if patients show clinical remission or low disease activity, ultrasonographic evaluation should be performed in the presence of joint complaints. The use of US will continue to play an important role in the management of patients with RA, including in the assessment of disease activity when the disease activity status is not clinically apparent.

Keywords: Rheumatoid arthritis, ultrasonography, DAS28

ÖZ

Amaç: Bu makale, romatoid artritli (RA) remisyonda olan veya DAS-28'e (Hastalık Aktivite Skalası-28) göre hastalık aktivitesi düşük olan ancak eklem ağrısından yakınan hastalarda sinovyal aktiviteyi değerlendirmeyi amaçlamaktadır.

Gereç ve Yöntem: Ocak 2016-Ocak 2018 tarihleri arasında Amerikan Romatizma Derneği kriterlerine göre RA tanısı alan hastaların kayıt ve başvuru dosyaları geriye dönük olarak incelendi. Hastaların modifiye sağlık değerlendirme anketi (m-HAQ) ve ultrasonografik değerlendirmesi kaydedildi. Hastalar ultrasonografi ile saptanan sinovit varlığına göre demografik ve hastalık özellikleri açısından karşılaştırıldı. Ayrıca sinovit varlığı ile demografik ve hastalık özellikleri arasındaki korelasyonlar değerlendirildi.

Bulgular: Bu çalışmaya en az 6 aydır remisyonda olan veya hastalık aktivitesi düşük (DAS-28 <3.2) olan ve en az bir eklemde ağrı semptomları olan RA tanılı 53 hasta dahil edildi. Ultrasona göe 23 (%43,4) hastada sinovit mevcuttu, bu hastalarda hassas eklem sayısı (p=0,03) ve m-HAQ (p=0,019) anlamlı olarak yüksekti. Sinovit varlığı, hassas eklem sayısında bir artış (r: 0.518, p=0.001) ve genel sağlıkta bir bozulma (r: 0.318, p=0.025) ile ilişkili olarak bulundu. Bu ilişkinin çok değişkenli regresyon analizinde devam ettiği gösterildi.

Sonuç: Hastalar klinik remisyon veya düşük hastalık aktivitesi gösterse bile eklem şikayetlerinin varlığında ultrasonografik değerlendirme yapılmalıdır. Ultrason kullanımı, hastalık aktivite durumu klinik olarak belirgin olmadığında hastalık aktivitesinin değerlendirilmesi dahil, RA'lı hastaların yönetiminde önemli bir rol oynamaya devam edecektir.

Anahtar Kelimeler: Romatoid artrit, ultrasonografi, DAS28

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INTRODUCTION

Rheumatoid arthritis (RA) is a chronic systemic connective tissue disease that causes symmetrical multiple joint damage through inflammation of the synovial membrane (1). The clinical evaluation of RA patients includes questionnaires that address history, physical examination, disease activity scores and quality of life (2). The European League Against Rheumatism (EULAR) recommended that the treatment of RA should target remission or low disease activity in each patient (3). The currently recommended RA management strategies are guided by close monitoring of disease activity using composite indices such as the disease activity score in 28 joints (DAS28), simplified disease activity index (SDAI) or clinical disease activity score (CDAI) (4). However, the clinical disease activity indexes have several limitations, as the clinical examination may not detect subclinical synovitis (5).

In recent years, musculoskeletal ultrasound (US) has been increasingly used in rheumatology practice worldwide, especially in cases with RA (6). One of the most common applications of US in RA is the evaluation of joint involvement for both diagnosis and follow-up after therapeutic procedures. Moreover, several studies have shown that US is more sensitive than clinical examination in the detection of synovitis (7, 8).

The aim of this study was to evaluate synovial activity in patients with RA who were in remission or had low disease activity according to the DAS-28 but complained of joint pain.

MATERIAL AND METHOD

A retrospective review was made of the medical charts of 53 patients diagnosed with RA according to the criteria of the American Rheumatism Association (ACR), who attended the outpatient clinic for follow-up visits between 2016 and 2018.

The study inclusion criteria were patients aged >18 years, who were in remission or had low disease activity (DAS-28 <3.2) for at least 6 months (9) and who had pain symptoms in at least one joint.

Exclusion criteria were defined as patients with moderate or severe disease activity, a history of trauma, surgery in the extremities, malignancy, other inflammatory and connective tissue disease, painful non-inflammatory diseases (such as fibromyalgia, osteoarthritis), progressive and non-progressive central and peripheral nervous disease, or known psychiatric and mood disorders.

Demographic and Disease Characteristics

The medical records of the patients included in the study were retrospectively evaluated. A record was made of demographic characteristics including age, gender, education status, employment status, comorbidities, and disease features including disease duration, used medication, and painful, tender and swollen joints (28 joints including bilateral shoulders, elbows, wrists, metacarpophalangeal 1-5, interphalangeal 1 and proximal interphalangeal 2-5). Disease-related laboratory parameters, including rheumatoid factor (RF), erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) levels were recorded on the same day as the ultrasonographic evaluation.

The outcome measures included the following: patient global assessment (PGA), local pain level of painful joints measured with a visual analogue scale (VAS) of 100 mm, and the functional status of the patients evaluated using the modified Health Assessment Questionnaire (m-HAQ).

The m-HAQ consists of 8 items that evaluate the disability of the patients in daily activities. A high score indicates poor health status (10). The m-HAQ of patients was calculated using the number of tender and swollen joints, PGA and ESR level.

All US examinations were performed by a single experienced PMR specialist. The standard assessments of the joint began with the patient sitting or lying supine according to the joint region being examined. Optimal imaging was obtained with both longitudinal and transverse scanning using a 7-12 MHz linear array transducer (Logiq P5, GE, Medical Systems, USA). The painful joint was evaluated with gray-scale for synovitis (hypertrophy and/or effusion) and with power Doppler for synovial blood flow signals. The bone, muscle and tendons around the joint were also scanned. According to the results of the ultrasonographic evaluation, the presence or absence of synovitis in the painful joint was recorded.

Study Protocol

Clinical and US evaluations were performed by different specialists on the same day. Patients were compared in terms of demographic and disease characteristics according to the presence of synovitis evaluated on US. Correlations were investigated between synovitis presence and demographic and disease characteristics.

Statistical Analysis

Data obtained in the study were analyzed statistically using Statistical Package for the Social Sciences (SPSS 22.0 for Windows) software. The conformity of continuous variables to normal distribution was evaluated using the Kolmogorov-Smirnov test. In descriptive statistics, the data were expressed as median (minimum-maximum) for continuous variables, and as frequencies and percentages (%) for nominal variables. Statistically significant differences between the groups were analyzed with the Mann Whitney-U test. Spearman's rho correlation coefficient was performed to measure the relationship between synovitis and the evaluation parameters. For significant correlations, multivariate regression analysis was performed using the parameters in patients without synovitis as the dependent variable. A value of $p<0.05$ was considered statistically significant.

RESULTS

The 53 patients included in the study comprised 38 (71.7%) females and 15 (28.3%) males with a median age of 45.50 years (range, 27.0-63.0 years). Comorbidities were determined in 22 (41.5%) patients.

The demographic and disease characteristics of the patients are presented in **Tables 1** and **2.**

Table 1. Demographic characteristics of the patients

	n=53
Age (year) median (min-max)	45.50 (27.0-63.0)
Gender n (%)	
Female	38 (71.7)
Male	15 (28.3)
Education duration n (%)	
Illiterate	0
Just literate	4 (7.5)
5 years	29 (54.7)
8 years	10 (18.9)
11 years	10 (18.9)
>11 years	0
Job n (%)	
Housewife	31 (58.5)
Blue collar	6 (11.3)
White collar	0
Retired	16 (30.2)
Additional comorbidities n (%)	
Number of patients with comorbidity	22 (41.5)
HT	11 (20.8)
DM	3 (5.7)
Hyperlipidemia	6 (11.3)
Cardiac disease	2 (3.8)
Osteoporosis	1 (1.9)
Hypothyroidism	2 (3.8)
Peptic ulcer	4 (7.5)

Min-max: minimum-maximum; HT: hypertension, DM: diabetes mellitus.

The median disease duration was 15.0 years (range, 7.0-28.0 years) and the median DAS-28 score was 2.05 (range, 1.0-3.18). The most painful joints of the patients were the metacarpophalangeal joint (n=24, 45.3%), knee (n=16, 30.2%), wrist and ankle (n=9, 17%), metatarsophalangeal joint (n=5, 9.4%). and proximal interphalangeal joint (n=4, 7.5%), respectively. Joint pain was bilateral in 18 (34%) patients.

Synovitis was detected on US in 23 (43.4%) patients. The median local VAS for the painful joint was 50.0 (range, 25.0-75.0). The comparisons of demographic and disease characteristics of patients with (n=23) and without (n=30) synovitis are shown in **Table 3**.

In patients with synovitis, TJC and health disability were significantly higher (p=0.03, p=0.019, respectively). There was no difference in other parameters.

Table 2. The disease characteristics of the patients

Parameter	n=53
Disease duration (year) median (min-max)	15.0 (7.0-28.0)
Number of tender joints (0-28) median (min-max)	2.0 (0.0-8.0)
Number of swollen joints (0-28) median (min-max)	0.0 (0.0-0.0)
PGA (0-100 mm) median (min-max)	10.0 (0.0-25.0)
DAS 28 score median (min-max)	2.05 (1.0-3.18)
ESR level (mm/hour) (0-20) median (min-max)	13.0 (4.0-40.0)
CRP (µg/dl) (0-5) median (min-max)	4.10 (1.50-11.0)
RF (IU/mL) (0-20) median (min-max)	21.0 (5.0-87.0)
m-HAQ (0-3) median (min-max)	1.0 (0.50-1.75)
Used medication n (%)	
NSAID	42 (79.2)
Methotrexate	35 (66.0)
Sulphasalazine	37 (69.8)
Hydroxychloroquine	13 (24.5)
Leflunomide	11 (20.8)

Min-max: minimum-maximum, DAS 28: disease activity score 28, ESR: Erythrocyte sedimentation rate, CRP: C - reactive protein, RF: Rheumatoid factor, m-HAQ: modified health assessment questionnaire. PGA: patient general health assessment, NSAID: nonsteroidal anti-inflammatory drugs

Table 3. Comparison of evaluation parameters of patients with and without synovitis

Parameter	Patients with synovitis n=23	Patient without synovitis n=30	p
Age (year) median (min-max)	44.00 (29.0-63.0)	46.00 (27.0-58.0)	0.190
Gender			0.758
Female	17 (73.9)	21 (70.0)	
Male	6 (26.1)	9 (30.0)	
Presence of additional comorbidity n (%)	9 (39.1)	13 (43.3)	0.614
Disease duration (year) median (min-max)	15.0 (7.0-20.0)	12.0 (8.0-28.0)	0.209
Number of tender joints (0-28) median (min-max)	5.0 (0.0-10.0)	2.0 (0.0-5.0)	0.003
Number of swollen joints (0-28) median (min-max)	0 (0.0-0.0)	0.0 (0.0-0.0)	1.000
PGA (0-100 mm) median (min-max)	10.0 (10.0-25.0)	10.0 (0.0-25.0)	0.116
DAS 28 score median (min-max)	2.0 (1.0-3.18)	2.15 (1.65-3.07)	0.485
ESR level (mm/hour) (0-20) median (min-max)	14.0 (7.0-40.0)	13.0 (4.0-10.0)	0.102
CRP (µg/dl) (0-5) median (min-max)	4.05 (1.50-11.0)	4.10 (1.68-10.5)	0.930
RF (IU/mL) (0-20) median (min-max)	24.0 (19.0-87.0)	25.0 (5.0-78.0)	0.540
m-HAQ (0-3) median (min-max)	1.25 (0.50-1.75)	1.00 (0.50-1.25)	0.019
Local VAS for painful joint median (min-max)	50.0 (30.0-75.0)	50.0 (25.0-70.0)	0.114

Min-max: minimum-maximum, PGA: patient general health assessment, DAS 28: disease activity score 28, ESR: Erythrocyte sedimentation rate, CRP: C - reactive protein, RF: Rheumatoid factor, m-HAQ: modified health assessment questionnaire, VAS: visual analogue scale

The correlation analysis between the presence of synovitis and the demographic and disease characteristics of the patients is presented in **Table 4**.

Table 4. Correlation analysis between the presence of synovitis and demographic and disease characteristics

Parameter	r	p
Age	-0.232	0.094
Presence of additional comorbidity	0.043	0.760
Disease duration (year)	-0.128	0.362
Number of tender joints (0-28)	0.518	0.001
PGA (0-100 mm)	0.092	0.513
DAS 28 score	-0.040	0.776
ESR level (mm/hour) (0-20)	0.040	0.572
CRP (µg/dl) (0-5)	0.080	0.369
RF (IU/mL) (0-20)	0.143	0.308
m-HAQ (0-3)	0.318	0.025
Local VAS for painful joint (0-100 mm)	-0.157	0.262

r: correlation coefficient, PGA: patient general health assessment, DAS 28: disease activity score 28, ESR: Erythrocyte sedimentation rate, CRP: C - reactive protein, RF: Rheumatoid factor, m-HAQ: modified health assessment questionnaire, VAS: visual analogue scale

The presence of synovitis was found to be associated with an increase in TJC (r: 0.518, p=0.001) and a deterioration in general health (r: 0.318, p=0.025). This relationship was shown to continue in the multivariate regression analysis (**Table 5**).

Table 5. Multivariate regression analysis

	β	SE	P value	95 CI	
				lower bound	upper bound
Number of tender joint	0.107	0.030	0.003	-0.046	0.168
m-HAQ	0.104	0.212	0.037	-0.321	0.530

95% CI: 95% confidence interval; SE: standard error, m-HAQ: modified health assessment questionnaire

DISCUSSION

US is increasingly being used in both clinical practice and clinical trials to detect and monitor arthritis in RA (11). The examination of aching joints with US can help to identify the cause of pain, which may result from irreversible destructive changes or active inflammation of the synovial membrane (12). Ultrasound can evaluate the morphology and quantity of synovitis with gray scale (GS) and synovial vascularity with power Doppler (PD) (13). The combined use of PD and GS is an easy and non-invasive imaging modality in RA and has been shown to be an objective and sensitive tool for synovial inflammatory joint changes which cannot be detected in conventional clinical and radiographic examinations. (7,14,15).

GS and PD may show subclinical synovitis in patients with RA in remission achieved by the use of synthetic or biological disease-modifying antirheumatic drugs (DMARDs). Some studies have shown that US is superior to clinical examination in the detection of arthritis in RA (8).

In the current study, consistent with the literature, synovitis was detected in 43.4% of the patients in the US examination of the joints with pain despite clinical remission or low disease activity. In a study by Macchioni et al., it was reported that regardless of the specific criteria of remission used, when evaluated with US, synovitis activity is detected in 60–80% of patients (16). In another study, PD activity was found in 15–62% of patients in clinical remission according to the DAS28, ACR or SDAI remission criteria (17). In contrast, Ventura-Ríos et al reported a low percentage of active synovitis according to a score of 7 PD on US in RA patients with long remission (18).

The DAS28 has been used for the monitoring of RA activity for many years. It includes physical examination of tender and swollen joints, laboratory parameters, and an overall assessment of the patient's health status. DAS28 is used in both early and long-term RA patients. This may lead to conditions where pain is considered to be from destructive lesions rather than active inflammation or joint swelling from irreversible synovial hypertrophy due to prolonged inflammation. However, physical examination cannot determine subclinical synovitis (19). Therefore, the correlation between US findings and DAS28 scores tends to be weak. Nevertheless, it should be noted that this is due to differences in evaluation methods rather than the superiority of one method over another (20).

In a previous study which used SAS 1 score as a tool for RA activity assessment with US, this was seen to provide more objective results than the DAS28, which has subjective bias as it is a patient self-assessment of general health and evaluation of tender and swollen joint counts. The use of the SAS 1 score was also reported to provide results of remission more frequently than the DAS28 score, as synovitis collapse can be more easily evaluated on US, while in the same patient the DAS28 score may remain increased due to elevated ESR caused by old age or irreversibly damaged joints which remain tender [19]. DAS28 is less valid in cases where for example, a patient with concomitant fibromyalgia will have high TJC and VAS, or for obese patients in whom clinical joint examination may be difficult and who may have higher ESR without joint inflammation (21). In the APPRAISE study, it was shown that there was no exact correlation between disease activity assessments with PD and DAS28 (22). Some studies investigating US predictors for clinical remission have shown that US is not predictive of clinical remission (23, 24).

Another result of the current study was that in patients with synovitis, the TJC and HAQ scores were significantly higher. In a study by Zavada et al, PD and GS synovitis were found to be significantly positively correlated with the current HAQ score, similar to the finding of the current study (25).

This study had some limitations. Previous studies have reported a lack of complete overlap between ultrasound-assessed disease activity and clinical measures, with one study suggesting that the SDAI is more in line with US assessment of disease state than DAS28 (26). Furthermore, other studies have reported that PD results were more strongly correlated with the clinical assessment based on the SDAI (17, 22). A further limitation of the study was that although the DMARD used by the patient may affect the degree of synovitis, the relationship between DMARD and synovitis was not examined.

CONCLUSION

The disease activity scores used in daily practice for patients with RA may overlook the subclinical activity in these patients. Even if the patient shows clinical remission or low disease activity, ultrasonographic evaluation should be performed in the presence of joint complaints. Given the increased use of US in the evaluation of synovitis, this study is important in respect of further validating the role of US in the daily evaluation of clinical disease activity. Although both US and DAS28 have been shown to be valid indicators of patient health improvements, it would not be correct to seek a relationship between them as they reflect different aspects of the disease. Ultrasound will continue to play an important role in the management of patients with RA, including assessment of disease activity when the disease activity status is not clinically apparent..

ETHICAL DECLARATIONS

Ethics Committee Approval: In this research, the data before 2020 was used and the research was concluded before 2020. According to the Regulation on Clinical Researches published in the Official Gazette of the Republic of Turkey with the number 28617 dated 3 November 2015, the ethics committee approval was not obtained in accordance with the article "Retrospective studies are outside the scope of the regulation (article 2-(2))". This study was prepared in accordance with the Law on Protection of Personal Data, by anonymizing patient data and in accordance with the 2013 Brazil revision of the Helsinki Declaration and guidelines for Good Clinical Practice.

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

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REFERENCES

1. Grassi W, Angelis RD, Lamanna G, Cervini C. The clinical features of rheumatoid arthritis. Eur J Radiol 1998;27(Suppl 1):18-24.
2. Smolen JS, Aletaha D, McInnes IB. Rheumatoid arthritis. Lancet 2016;388(10055):2023-38.
3. Smolen JS, Landewe RBM, Bijlsma JWJ, et al. EULAR recommendations for the management of rheumatoid arthritis with synthetic and biological disease-modifying antirheumatic drugs: 2019 update. Ann Rheum Dis 2020;79(6):685-99.
4. Stoffer MA, Schoels MM, Smolen JS, et al. Evidence for treating rheumatoid arthritis to target: results of a systematic literature search update. Ann Rheum Dis 2016;75(1):16-22.
5. Dale J, Purves D, McConnachie A, McInnes I, Porter D. Tightening up? Impact of musculoskeletal ultrasound disease activity assessment on early rheumatoid arthritis patients treated using a treat to target strategy. Arthritis Care Res (Hoboken) 2014;66(1):19-26.
6. Ohrndorf S, Backhaus M. Pro musculoskeletal ultrasonography in rheumatoid arthritis. Clin Exp Rheumatol. 2015;33(4 Suppl 92):50-3.
7. Peericone C, Ceeccarelli F, Modesti M, et al. The 6-joint ultrasonographic assessment: a valid, sensitive-to-change and feasible method for evaluating joint inflammation in RA. Rheumatology (Oxford) 2012;51(5):866-73.
8. Ten Cate DF, Luime JJ, Swen N, et al. Role of ultrasonography in diagnosing early rheumatoid arthritis and remission of rheumatoid arthritis – a systematic review of the literature. Arthritis Res Ther 2013;15(1):R4.
9. Ajeganova S, Huizinga T. Sustained remission in rheumatoid arthritis: latest evidence and clinical considerations. Ther Adv Musculoskelet Dis 2017;9(10):249-62.
10. Pincus T, Summey JA, Soraci SA Jr, Wallston KA, Hummon NP. Assessment of patient satisfaction in activities of daily living using a modified Stanford health assessment questionnaire. Arthritis Rheum 1983;26(11):1346-53.
11. do Prado AD, Staub HL, Bisi MC, et al. Ultrasound and its clinical use in rheumatoid arthritis: where do we stand. Adv Rheumatol 2018;58(1):19.
12. Jeka S, Dura M, Żuchowski P, Zwierko B, Wojciechowski R. The role of ultrasonography in monitoring long-standingmrheumatoid arthritis: a pilot study. Reumatologia 2017;55(4):177-82.
13. Szkudlarek M, Wakefield RJ, Backhaus M, Terslev L. The discriminatory capacity of ultrasound in rheumatoid arthritis: active vs inactive, early vs advanced, and more. Rheumatology (Oxford) 2012;518(Suppl 7):6-9.
14. Wakefield RJ, D'Agostino MA, Naredo E, et al. After treat-to-target: can a targeted ultrasound initiative improve RA outcomes. Ann Rheum Dis 2012;71(6):799-803.
15. Caporali R, Smolen JS. Back to the future: forget ultrasound and focus on clinical assessment in rheumatoid arthritis management. Ann Rheum Dis 2018;77(1):18-20.
16. Macchioni P, Magnani M, Mule R, et al. Ultrasonographic predictors for the development of joint damage in rheumatoid arthritis patients: a single joint prospective study. Clin Exp Rheumatol 2013;31(1):8-17.
17. Saleem B, Brown AK, Keen H, et al. Should imaging be a component of rheumatoid arthritis remission criteria? A comparison between traditional and modified composite remission scores and imaging assessments. Ann Rheum Dis 2011;70(5):792-8.
18. Ventura-Rios L, Bringas GS, Hernandez-Diaz C, Cruz-Arenas E, Burgos-Vargas R. Subclinical synovitis and tenosynovitis by ultrasonography (US) 7 score in patients with rheumatoid arthritis treated with synthetic drugs, in clinical remission by DAS28. Reumatol Clin 2019;15(5):e5-e9.
19. Barczyńska TA, Dura M, Blumfield E, et al. DAS28 score vs. ultrasound examination for assessment of rheumatoid arthritis disease activity: comparison and discussion of pros and cons. Reumatologia 2015;53(4):213-8.
20. Dura M, Zuchowski P, Gorgolewski P, Waszczak-Jeka M, Jeka S. The changing role of ultrasonography examination in patientsmwith rheumatoid arthritis in light of recent studies. Reumatologia 2020;58(3):155-61.
21. Jacobs JWG, Ten Cate DF, van Laar JM. Monitoring of rheumatoid arthritis disease activity in individual patients: still a hurdle when implementing the treat-to-target principle in daily clinical practice. Rheumatology (Oxford) 2015;54(6):959-61.

22. D'Agostino MA, Boers M, Wakefield RJ, et al. Exploring a new ultrasound score as a clinical predictive tool in patients with rheumatoid arthritis starting abatacept: results from the APPRAISE study. RMD Open 2016;2(1):e000237.
23. Horton SC, Tan AL, Freeston JE, Wakefield RJ, Buch MH, Emery P. Discordance between the predictors of clinical and imaging remission in patients with early rheumatoid arthritis in clinical practice: implications for the use of ultrasound within a treatment-to-target strategy. Rheumatology (Oxford) 2016;55(7):1177-87.
24. Ten Cate DF, Jacobs JWG, Swen WAA, et al. Can baseline ultrasound results help to predict failure to achieve DAS28 remission after 1 year of tight control treatment in early RA patients? Arthritis Res Ther 2018;20(1):15.
25. Závada J, Hánová P, Hurňáková J, et al. The relationship between synovitis quantified by an ultrasound 7-joint inflammation score and physical disability in rheumatoid arthritis – a cohort study. Arthritis Res Ther 2017;19(1):5.
26. Balsa A, de Miguel E, Castillo C, Peiteado D, Martin-Mola E. Superiority of SDAI over DAS-28 in assessment of remission in rheumatoid arthritis patients using power Doppler ultrasonography as a gold Standard. Rheumatology (Oxford) 2010;49(4):683-90.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Aile Sağlığı Merkezlerine Başvuran Yetişkinlerde Kolorektal Kanser Risk Faktörleri ve Kolorektal Kanser Taraması Farkındalık Düzeyleri

Colorectal Cancer Risk Factors and Colorectal Cancer Screening Awareness Levels İn Adults Applied to Family Health Centers

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ÖZ

Amaç: Bu çalışmanın amacı aile sağlığı merkezlerine başvuran yetişkinlerde kolorektal kanser (KRK) risk faktörleri ve KRK taraması farkındalık düzeylerinin belirlenmesidir.

Gereç ve Yöntem: Kesitsel türdeki çalışmanın evreni Tokat il merkezindeki üç ve ilçelerdeki iki aile sağlığı merkezine kayıtlı 20 yaş ve üzerindeki 83458 bireyden oluşmaktadır. Evreni belli olan gruptan örneklem hesaplama formülüyle minimum örnek büyüklüğü 784 olarak hesaplandı. 823 gönüllü katılımcıyla çalışma tamamlandı. Veriler aile sağlığı merkezlerine başvuran ve çalışmaya katılmayı kabul eden bireylere yüz yüze anket uygulanarak elde edildi. İstatistiksel analizde tanımlayıcı veriler için ortalama±standart sapma, sayı ve yüzde, gruplar arası kategorik verilerin karşılaştırılmasında ise Pearson Ki-kare testi kullanıldı. İstatistiksel anlamlılık düzeyi p<0,05 olarak kabul edildi.

Bulgular: Katılımcıların %50,2'si (413) kadın, %49,8'i (410) erkekti. Yaş ortalaması 40,9±14,1 (20-87 yaş), %26,7'si 50 yaş ve üzerinde, %59,2'si lise ve üzeri mezunuydu. %9,5'inin ailesinde KRK öyküsü vardı. %46,8'i hangi kanserlere yönelik taramaların yapıldığını biliyordu. %51,3'ünün kanser erken teşhis, tarama ve eğitim merkezi (KETEM) hakkında bilgisi vardı. %25,2'si erken tanı için herhangi bir kanser tarama testi yaptırmıştı. %41,2'si KRK tarama testleri varlığını biliyordu. %14,6'sı daha önce KRK tarama testi yaptırdığını (%80,7'si gaytada gizli kan testi, %19,3'ü rektosigmodioskopi / kolonoskopi) belirtti. %77,5'i aile hekiminin yönlendirmesiyle KRK tarama testlerini yaptırmıştı. Katılımcıların yaş grubu (p<0,001), eğitim düzeyi (p=0,028), çalışma durumu (p=0,002), sosyal güvence durumu (p=0,042) ve kronik hastalık durumuna (p<0,001) göre daha önce KRK tarama testleri yaptırma durumu arasında istatistiksel olarak anlamlı fark bulundu.

Sonuç: Çalışmamızda katılımcıların kanser taramaları ve KETEM hakkındaki farkındalıklarının istenilen düzeyde olmadığı, yaklaşık yarısının KRK tarama testleri hakkında bilgisinin olmadığı ve bu testleri yaptırma oranının düşük olduğu bulundu.

Anahtar Kelimeler: Kolorektal kanser taraması, farkındalık, aile sağlığı merkezi

ABSTRACT

Aim: The aim of this study is to determine the colorectal cancer (CRC) risk factors and CRC screening awareness levels in adults who apply to family health centers.

Material and Method: The universe of this cross-sectional study consists of 83.458 adult individuals aged 20 and over, who are affiliated with family health centers three in the city center of Tokat and two in the districts. The minimum sample size was calculated as 784 people with the formula for calculating a sample from a group with a certain population. The study was completed with 823 volunteer participants. The data were obtained by applying a face-to-face questionnaire to individuals who applied to family health centers and agreed to participate in the study. In statistical analysis, mean±standard deviation, number and percentage were used for descriptive data, and Pearson Chi-square test was used for comparison of categorical variables between groups. Statistical significance level was accepted as p<0.05.

Results: 50.2% (413) of the participants were female, 49.8% (410) were male. The mean age was 40.9±14.1 (20-87 years), 26.7% of them were 50 years old and over, 59.2% of them were high school graduates and above. 9.5% had a family history of CRC. 46.8% of them knew which cancers were screened in our country. 51.3% of them had knowledge about cancer early diagnosis, screening and education centers (CEDSEC). 25.2% of the participants about cancer screening stated that they had any cancer screening test for early diagnosis. 41.2% of the participants knew about the existence of CRC screening tests. 14.6% of the participants stated that they had a CRC screening test before, and 80.7% of them had a fecal occult blood test and 19.3% had a rectosigmodioscopy / colonoscopy. 77.5% of the participants had CRC screening tests performed by the guidance of their family physician. A statistically significant difference was found between the participants' previous CRC screening tests according to age group (p<0,001), education level (p=0,028), employment (p=0,002), social security (p=0,042) and chronic disease (p<0,001).

Conclusion: In our study, it was found that the awareness of the participants about cancer screenings and CEDSEC was not at the desired level, about half of them did not have knowledge about CRC screening tests, and the rate of having these tests was low.

Keywords: Colorectal cancer screening, awareness, family health center

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GİRİŞ

Nedeni bilinen ölüm nedenleri arasında kardiyovasküler hastalıklardan sonra ikinci sırada gelen kanser, tüm dünyada olduğu gibi Türkiye'de de en önemli halk sağlığı sorunlarından biridir. Dünya Sağlık Örgütü (DSÖ) 2020 yılı verilerine göre, dünyada 19.3 milyon yeni kanser vakası ve yaklaşık 10 milyon kanser kaynaklı ölüm olduğu öngörülmektedir. Dünyada en sık görülen ilk üç kanser erkeklerde akciğer (%14,3), prostat (%14,1) ve kolorektal (%10,6) iken kadınlarda meme (%24,5), kolorektal (%9,4) ve akciğer (%8,4) şeklindedir (1). Kanserle ilgili morbidite ve mortalitenin önemli nedenlerinden biri olan kolorektal kanser (KRK), evrensel bir sorun olup en sık görülen kanserler arasında erkeklerde üçüncü, kadınlarda ise ikinci sırada yer almaktadır. Türkiye'de ise en sık görülen üç kanser erkeklerde akciğer (%25,8), prostat (%14,6) ve kolorektal (%9) iken, kadınlarda meme (%23,9), tiroid (%10,9) ve kolorektal (%9,1) şeklinde olup KRK hem erkeklerde hem de kadınlarda üçüncü sırada yer almaktadır (2,3). KRK açısından başlıca risk faktörleri genetik ve tıbbi öykü (ailede KRK veya adenom öyküsü, inflamatuvar bağırsak hastalığı, tip 2 diyabet), değiştirilebilir faktörler (aşırı alkol tüketimi, obezite, kırmızı et tüketimi, işlenmiş et tüketimi, sigara kullanımı) ve riski azaltan faktörler (fiziksel aktivite, süt ürünleri tüketimi) olarak sınıflandırılmaktadır (4). Ayrıca diyet ve KRK arasındaki ilişkide bağırsak mikrobiyotasının rol oynadığı, uzun süreli ve yüksek dozda antibiyotik kullanımının KRK riskini artırdığı bildirilmektedir (5,6).

KRK için birincil korunma, değiştirilebilir risk faktörlerinin ortadan kaldırılması veya etkilerinin azaltılmasına dayalı uygulamaları kapsamaktadır. Hedef kitle sağlıklı bireyler olup henüz kansere ait hiçbir belirti yokken alınan önlemlerle kanser gelişimini engellemek amaçlanır. Birincil korunma toplum geneline yaygın şekilde ulaşılabilmesi ve ucuz olması nedeniyle etkili bir yaklaşım olarak kabul edilmektedir (7). KRK için ikincil korunmada ise tarama yöntemleriyle erken tanı konularak hemen tedaviye başlanması hedeflenmektedir. Morbidite ve mortalitesinin yüksek olması ve erken evrelerde saptandığında başarılı tedavi olasılığı gibi özellikleriyle temel bir halk sağlığı sorunu olan KRK, taramaya en uygun hastalıklardan biridir (8). Türkiye'de ulusal kanser tarama programı kapsamında kanser erken teşhis, tarama ve eğitim merkezleri (KETEM)'nde tanımlanmış risk gruplarına meme, serviks ve kolorektal kanserlere yönelik toplum tabanlı tarama programları yürütülmektedir. Ülkemizde KRK taramaları 2013 yılında başlamış olup 50-70 yaş arasındaki tüm erkek ve kadınlarda iki yılda bir gaitada gizli kan testi (GGK) ve 10 yılda bir kolonoskopi yapılmaktadır. Birinci derece akrabalarında KRK veya adenomatöz polip öyküsü olan yüksek riskli bireylerde ise 40 yaşından itibaren taramaya başlanır (9). GGK testi basit ve kolay uygulanabilir olması nedeniyle birinci basamakta da sık kullanılmaktadır. Kolonoskopi ise KRK tanı ve taramasında en etkili yöntem olup, yalnızca erken evre kanserlerin saptanmasına değil, aynı zamanda poliplerin saptanması ve çıkarılmasına da olanak tanıyarak KRK insidansı ve mortalitesi açısından uzun vadeli koruma sağlamaktadır (10).

Ülkemizde KRK taramaları ve farkındalık düzeyi ile ilgili farklı örneklem gruplarında yapılan çalışmalarda KRK taramalarını bilme ve yaptırma oranlarının düşük olduğu gösterilmiştir (11-15). Risk grubundaki sağlıklı bireylerin KRK farkındalık düzeylerinin arttırılmasıyla sağlık algılarının değişmesine yardım edilerek taramalara katılımları sağlanabilir. Böylece KRK'lerin topluma getirdiği yük de önemli ölçüde azaltılabilir. Bu çalışmada, Tokat ilinde aile sağlığı merkezlerine (ASM'lere) başvuran yetişkin bireylerde KRK risk faktörleri ve KRK taraması farkındalık düzeylerinin belirlenmesi amaçlandı.

GEREÇ VE YÖNTEM

Kesitsel tipteki bu araştırmanın evrenini Tokat il merkezindeki üç ASM (20 aile hekimliği birimi) ve iki ilçe ASM'ye (7 aile hekimliği birimi) bağlı ≥20 yaş toplam kayıtlı nüfus olan 83.458 yetişkin birey oluşturdu. Evreni belli olan gruptan örneklem hesaplama formülü ($n=Nxt^2xpxq/d^2(N-1)+t^2x(pxq)$ ile küme örnekleme yöntemiyle minimum örnek büyüklüğü 784 kişi olarak hesaplandı.

Tokat Gaziosmanpaşa Üniversitesi Tıp Fakültesi Klinik Araştırmalar Etik Kurulu'nun 21.11.2019 tarihli 19-KAEK-238 sayılı onayı alındı. Verilerinin toplanması amacıyla araştırmacılarca ilgili literatür eşliğinde hazırlanan anket formunda ilk bölümde tanımlayıcı bilgileri içeren 11 soru, ikinci bölümde sigara, alkol gibi alışkanlıklara yönelik 7 soru, üçüncü bölümde KRK erken tanısıyla ilgili 11 soru, dördüncü bölümde tarama programları hakkında 12 soru olmak üzere toplam 41 soru vardı. 01.12.2019 - 31.04.2020 tarihleri arasında örnekleme dahil edilen ASM'lere gidilerek, çalışmaya katılmayı kabul eden gönüllü bireylere yüz yüze anket uygulandı. Çalışma sonunda toplam 823 kişiye ulaşıldı.

İstatistiksel Analiz

Verilerin analizinde IBM SPSS Statistics Versiyon 20.0 programından yararlanıldı. İstatistiksel analizde tanımlayıcı veriler için ortalama±standart sapma ve/veya sayı (n), yüzde (%), gruplar arası kategorik verilerin karşılaştırılmasında ise Pearson Ki-kare testi kullanıldı. İstatistiksel anlamlılık düzeyi $p<0,05$ olarak kabul edildi.

BULGULAR

Araştırmaya katılan 823 kişinin %50,2'si (413) kadın, %49,8'i (410) erkekti. Katılımcıların yaş ortalaması 40,9±14,1 yıl (20-87 yaş) olup %26,7'si (220) KRK açısından risk grubu olan 50 yaş ve üzerindeydi. Eğitim düzeyine göre %27,1'i ilkokul ve altı, %36,1'i üniversite mezunuydu. Katılımcıların %75,7'si evli, %46,4'ü çalışıyor,

%27,2'si ev hanımı, %92,1'i kentsel bölgede yaşıyordu. Gelir durumuna göre %70,7'si orta gelirli, %90,9'unun sosyal güvencesi var, BKİ'ye göre %41,1'i hafif şişman, %19,4'ü obezdi. Katılımcıların %28,2'si halen sigara içmekte, %4,9'u alkol kullanmakta, %24,1'inin en az bir kronik hastalığı vardı. Katılımcıların %9,5'inin ailesi / yakın akrabalarında KRK öyküsü vardı (**Tablo 1**).

Tablo 1. Araştırma grubunun tanımlayıcı özelliklerine göre dağılımı (n=823)

Değişkenler		n	%
Cinsiyet	Kadın	413	50.2
	Erkek	410	49.8
Yaş grubu	20-29	204	24.8
	30-39	210	25.5
	40-49	189	23.0
	50 yaş ve üzeri	220	26.7
Eğitim düzeyi	İlkokul mezunu ve altı	223	27.1
	Ortaokul mezunu	113	13.7
	Lise mezunu	190	23.1
	Üniversite mezunu	297	36.1
Medeni durum	Evli	623	75.7
	Evli değil (Bekar/dul/boşanmış)	200	24.3
Çalışma durumu	Çalışıyor	382	46.4
	Çalışmıyor	441	53.6
Meslek	Ev hanımı	223	27.2
	Memur	223	27.2
	İşçi	214	26.0
	Esnaf	72	8.6
	Diğer	91	11.0
Yerleşim yeri	Kentsel bölge	758	92.1
	Kırsal bölge	65	7.9
Gelir durumu	Düşük gelirli	213	25.9
	Orta gelirli	582	70.7
	Yüksek gelirli	28	3.4
Sosyal güvence	Var	748	90.9
	Yok	75	9.1
Beden kitle indeksi (kg/m²)	Zayıf (< 18,5)	20	2.4
	Normal (18,5-24,99)	305	37.1
	Hafif şişman (25,0-29,99)	338	41.1
	Obez (≥30)	160	19.4
Sigara	Hayır	517	62.8
	Evet	232	28.2
	Bırakmış	74	9.0
Alkol	Hayır	764	92.8
	Evet	40	4.9
	Bırakmış	19	2.3
Egzersiz	Her gün	78	9.5
	Haftada 1-5 gün	178	21.6
	Nadiren	567	68.9
Kronik hastalık	Var	198	24.1
	Yok	625	75.9
Ailede / yakın akrabada kolorektal kanser (KRK) öyküsü	Var	79	9.5
	Yok	744	90.5
Toplam		823	100.0

Çalışmamızda tüm katılımcıların (n=823) %46,8'i genel olarak hangi kanserlere yönelik tarama yapıldığını bildiğini belirtti. En sık bilinen kanser tarama testlerinin mamografi (%43,3), pap smear (%39,7) ve kolonoskopi (%10,5) olduğu saptandı. Kanser tarama testleri bilgisinin kaynağı en sık (%52,8) sağlık çalışanlarıydı. Katılımcıların %25,2'si erken tanı için herhangi bir kanser tarama testi yaptırdığını ve bunların %33,8'i GGK testi, %27,1'i klinik muayene, %17'si mamografi, %12,1'i kolonoskopi ve %10'u pap smear yaptırdığını belirtti. Kanser tarama testi yaptırmama nedenleri sırasıyla ihtiyaç duymamak (%46,5), zaman ayıramamak (%24,2), tarama yapıldığını bilmemek (%17,5), nereye başvuracağını bilmemek (%7,8), doktora gitmeye çekinmek (%4) şeklinde belirtildi. Katılımcıların %35,7'sinin aile üyelerinden biri kanser tarama testlerinden birini yaptırmıştı. Katılımcıların %51,3'ü KETEM'i duyduğunu ve bilgisi olduğunu belirtti. Katılımcıların %16,9'u kanser taraması için KETEM'e yönlendirilmişti ve en sık (%71,2) yönlendiren kaynak aile hekimi idi. Katılımcıların %41,2'si KRK tarama testleri varlığını biliyordu. Katılımcıların %29,3'ü KRK taraması yaptırmaya başlama yaşını biliyordu. Katılımcıların %14,6'sı daha önce KRK tarama testi yaptırdığını ve bunların %80,7'si GGK testi, %19,3'ü rektosigmodioskopi / kolonoskopi yaptırdığını belirtti. Katılımcıların %77,5'i aile hekiminin yönlendirmesiyle KRK tarama testlerini yaptırmıştı (**Tablo 2**). KETEM'i bilme oranı kadınlarda %62, <50 yaş bireylerde %53,7, üniversite mezunu olanlarda %65,3, çalışanlarda %56,8, gelir durumu yüksek olanlarda %67,9, sosyal güvencesi olanlarda %53,6, sigara içmeyenlerde %55,5 olarak bulundu (p<0,05). Katılımcılara göre KRK tarama testlerinin amaçları en sık hastalığı erken dönemde yakalamak (%70,6) ve bağırsak kanserinin ortaya çıkmasını önlemek (%14,1) şeklinde belirtildi.

Çalışmamızda KRK açısından risk grubundaki 50 yaş ve üzerindeki katılımcıların (n=220) ise %47,7'si genel olarak hangi kanserlere yönelik tarama yapıldığını bildiğini, %39,1'i erken tanı amacıyla bir kanser tarama testi yaptırdığını, %44,5'i KETEM'i duyduğunu ve bilgisi olduğunu, %16,8'i kanser taraması için KETEM'e yönlendirildiğini, en sık (%78,4) yönlendiren kaynağın aile hekimi olduğunu belirtti. %42,3'ü KRK tarama testlerini ve %39,5'i KRK taramasına başlama yaşını biliyordu. %35'i daha önce KRK tarama testi yaptırdığını (%88,3'ü GGK testi, %11,7'si rektosigmodioskopi / kolonoskopi) ve %77,5'i aile hekiminin kendisini yönlendirdiğini belirtti.

Çalışmamızda tüm katılımcıların ailesinde / yakın akrabasında KRK öyküsü olanlarda (%53,2; p=0,023), ailesinden biri kanser tarama testi yaptıranlarda (%58,5; p<0,001), aile hekimi tarafından tarama testleri hakkında bilgilendirilenlerde (%72,1; p<0,001), KETEM hakkında bilgi sahibi olanlarda (%56,2; p<0,001) KRK tarama testi varlığının bilinmesi istatistiksel olarak anlamlı şekilde daha yüksek bulundu (**Tablo 3**). KRK açısından risk grubundaki 50 yaş ve üzeri katılımcıların ise ailesinde / yakın akrabasında KRK öyküsü olanlarda (%54,5; p=0,219), ailesinden biri kanser taraması yaptıranlarda (%63,9; p<0,001), aile hekimi tarafından tarama testleri hakkında bilgilendirilenlerde (%62,0; p<0,001), KETEM hakkında bilgi sahibi olanlarda (%63,3; p<0,001) KRK tarama testi varlığının daha yüksek oranda bilindiği saptandı.

Tablo 2. Araştırma grubunun kanser taramaları, KETEM ve bağırsak kanseri taramaları hakkında bilgi, tutum ve davranışlarına göre dağılımı (n=823)

Değişkenler		n	%
Kanser taramaları			
Hangi kanserlere yönelik tarama yapıldığını bilme durumu	Hayır	438	53,2
	Evet	385	46,8
Kanser tarama testleri bilgisinin kaynağı	Sağlık çalışanları	226	52,8
	TV ve internet vb.	75	17,5
	Yazılı medya	64	15,0
	Akraba ve arkadaş	63	14,7
Erken tanı için herhangi bir kanser tarama testi yaptırma durumu	Hayır	616	74,8
	Evet	207	25,2
Erken tanı için yaptırılan kanser taramaları (n=207)	Dışkıda gizli kan	70	33,8
	Klinik muayene	56	27,1
	Mamografi	35	17,0
	Kolonoskopi	25	12,1
	Pap smear	21	10,0
Erken tanı için kanser tarama testi yaptırmama nedenleri (n=616)	İhtiyaç duymama	286	46,5
	Zaman ayıramama	149	24,2
	Tarama yapıldığını bilmeme	108	17,5
	Nereye başvuracağını bilmeme	48	7,8
	Doktora gitmeye çekinme	25	4,0
Aileden birinin kanser tarama testi yaptırma durumu	Evet	294	35,7
	Hayır	446	54,2
	Bilmiyor	83	10,1
KETEM			
KETEM'i bilme durumu	Duymuş ve bilgisi var	422	51,3
	Duymuş ama ne işe yaradığını bilmiyor	144	17,5
	Bilgisi yok	257	31,2
Geçmişte kanser taraması için KETEM'e yönlendirilme durumu	Hayır	684	83,1
	Evet	139	16,9
KETEM'e yönlendiren kaynaklar	Aile hekimi	99	71,2
	Diğer sağlık personeli	31	22,4
	İnternet	9	6,4
Bağırsak kanseri taramaları			
Varlığını bilme durumu	Hayır	484	58,8
	Evet	339	41,2
Yaptırmaya başlama yaşını bilme durumu	Hayır	582	70,7
	Evet	241	29,3
Yaptırma durumu	Hayır	703	85,4
	Evet	120	14,6
Yaptırdıkları testler (n=120)	Gaytada gizli kan (GGK) testi	96	80,7
	Rektosigmodioskopi/Kolonoskopi	24	19,3
Yaptıranlara öneri yapan kaynaklar (n=120)	Aile hekimi	93	77,5
	Kendi isteğiyle	14	11,7
	Sağlık personeli	13	10,8
Yapıldığı yerler (n=120)	Aile sağlığı merkezi (ASM)	81	67,5
	Devlet hastanesi	17	14,2
	Üniversite hastanesi	12	10,0
	Özel sağlık kuruluşu	6	5,0
	KETEM	4	3,3

Tablo 3. Araştırma grubunun bazı özelliklere göre kolorektal kanser (KRK) tarama testi varlığını bilme durumu (n=823)

Özellikler	KRK tarama testi varlığını bilme durumu						x^2	p
	Evet		Hayır		Toplam			
	n	%	n	%	n	%		
Ailede /yakın akrabada KRK öyküsü							5,172	0,023
Yok	297	39,9[a]	447	60,1[a]	744	100,0		
Var	42	53,2[b]	37	46,8[b]	79	100,0		
Aileden birinin kanser tarama testi yaptırma durumu							60,563	<0,001
Yok	149	33,4[a]	297	66,6[a]	446	100,0		
Var	172	58,5[b]	122	41,5[b]	294	100,0		
Bilmiyor	18	21,7[a]	65	78,3[a]	83	100,0		
Aile hekimi tarafından tarama testi hakkında bilgilendirilme							119,681	<0,001
Hayır	179	29,8[a]	422	70,2[a]	601	100,0		
Evet	160	72,1[b]	62	27,9[b]	222	100,0		
KETEM'i bilme durumu							84,057	<0,001
Duymuş ve bilgisi var	237	56,2[a]	185	43,8[a]	422	100,0		
Duymuş ama ne işe yaradığını bilmiyor	46	31,9[b]	98	68,1[b]	144	100,0		
Bilgisi yok	56	21,8[b]	201	78,2[b]	257	100,0		
Toplam	339	41,2	484	58,8	823	100,0		

*Pearson Ki-kare testi kullanıldı. (ab): Kolon olarak ortak harf istatistiksel önemsizliği ifade etmektedir.

Çalışmamızda tüm katılımcıların yaş grubu (p<0,001), eğitim düzeyi (p=0,028), çalışma durumu (p=0,002), sosyal güvence durumu (p=0,042) ve kronik hastalık durumuna (p<0,001) göre daha önce KRK tarama testleri yaptırma durumu arasında istatistiksel olarak anlamlı fark saptandı. ≥50 yaş bireylerde (%35) daha genç olanlara (%7,1) göre; eğitim düzeyi ilkokul ve altı olanlarda (%20,2), ortaokul (%14,2), lise (%14,2) ve üniversite mezunu olanlara (%10,8) göre; çalışmayanlarda (%18,1) çalışanlara (%10,5) göre; sosyal güvencesi olanlarda (%15,4) sosyal güvencesi olmayanlara (%6,7) göre; kronik hastalığı olanlarda (%27,3) kronik hastalığı olmayanlara (%10,6) göre daha önce KRK tarama testleri yaptırma oranı istatistiksel olarak anlamlı şekilde daha yüksekti. Katılımcıların cinsiyeti, medeni durumu, yerleşim yeri, gelir durumu, obezite durumu, sigara ve alkol kullanma durumu ve egzersiz yapma durumunun ise daha önce KRK tarama testleri yaptırma durumu üzerine anlamlı etkisi yoktu (p>0,05), (**Tablo 4**). KRK açısından risk grubundaki 50 yaş ve üzeri katılımcıların ise gelir durumu orta-yüksek olanlarda (p=0,003) ve kronik hastalığı olanlarda (p=0,026) daha önce KRK tarama testleri yaptırma durumunun istatistiksel olarak anlamlı şekilde daha yüksek olduğu saptanmış olup katılımcıların cinsiyeti, eğitim düzeyi, medeni durumu, çalışma durumu, yerleşim yeri, sosyal güvence durumu, obezite durumu, sigara ve alkol kullanma durumu ve egzersiz yapma durumunun ise KRK tarama testleri yaptırma durumu üzerine anlamlı etkisi bulunmadı (p>0,05),

Tablo 4. Araştırma grubunun tanımlayıcı özelliklere göre daha önce kolorektal kanser (KRK) tarama testleri yaptırma durumu (n=823)

Tanımlayıcı Özellikler	KRK tarama testleri yaptırma durumu						x2	p
	Evet		Hayır		Toplam			
	n	%	n	%	n	%		
Cinsiyet								
Kadın	55	13,3	358	86,7	413	100,0	1,063	0,303
Erkek	65	15,9	345	84,1	410	100,0		
Yaş grubu								
50 yaş altı	43	7,1[a]	560	92,9[a]	403	100,0	100,518	<0,001
50 yaş ve üzeri	77	35,0[b]	143	65,0[b]	220	100,0		
Eğitim düzeyi								
İlkokul ve altı	45	20,2	178	79,8	223	100,0		
Ortaokul mezunu	16	14,2	97	85,8	113	100,0	9,104	0,028
Lise mezunu	27	14,2	163	85,8	190	100,0		
Üniversite mezunu	32	10,8	265	89,2	297	100,0		
Medeni durum								
Evli	97	15,6	526	84,4	623	100,0	2,013	0,156
Evli değil	23	11,5	177	88,5	200	100,0		
Çalışma durumu								
Çalışıyor	40	10,5[a]	342	89,5[a]	382	100,0	9,667	0,002
Çalışmıyor	80	18,1[b]	361	81,9[b]	441	100,0		
Yerleşim yeri								
Kent	109	14,4	649	85,6	759	100,0	0,311	0,577
Kır	11	16,9	54	83,1	65	100,0		
Gelir durumu								
Düşük gelirli	29	13,6	184	86,4	213	100,0	1,214	0,545
Orta gelirli	85	14,6	497	85,4	582	100,0		
Yüksek gelirli	6	21,4	22	78,6	28	100,0		
Sosyal güvence								
Var	115	15,4[a]	633	84,6[a]	748	100,0	4,150	0,042
Yok	5	6,7[b]	70	93,3[b]	75	100,0		
Obezite							3,665	0,056
Yok	89	13,4	574	86,6	663	100,0		
Var	31	19,4	129	80,6	160	100,0		
Sigara								
Hayır	76	14,7	441	85,3	517	100,0	4,127	0,127
Evet	28	12,1	204	87,9	232	100,0		
Bırakmış	16	21,6	58	78,4	74	100,0		
Alkol								
Hayır	114	14,9	650	85,1	764	100,0	1,704	0,427
Evet	3	7,5	37	92,5	40	100,0		
Bırakmış	3	15,8	16	84,2	19	100,0		
Egzersiz								
Her gün	13	16,7	65	83,3	78	100,0		
Haftada 1-5 gün	22	12,4	156	87,6	178	100,0	1,086	0,781
Nadiren	85	15,0	482	85,0	567	100,0		
Kronik hastalık								
Yok	66	10,6[a]	559	89,4[a]	625	100,0	33,721	<0,001
Var	54	27,3[b]	144	72,7[b]	198	100,0		
Toplam	120	14,6	703	85,4	823	100,0		

*Pearson Ki-kare testi kullanıldı. (ab): Kolon olarak ortak harf istatistiksel önemsizliği ifade etmektedir.

TARTIŞMA

Çalışmamızda tüm katılımcıların yaklaşık yarısı (%46,8) Türkiye'de hangi kanserlere yönelik tarama yapıldığını biliyordu. En sık bilinen kanser tarama testleri mamografi (%43,3) ve pap smear (%39,7) iken kolonoskopi daha az sıklıkta (%10,5) biliniyordu. Özer (2019)'in çalışmasında hangi kanserlerin taraması olduğu sorulduğunda en sık meme kanseri (%28,1), serviks kanseri (%24,3) ve kalın barsak kanseri (%19,3) şeklinde cevap verilmiştir (16). Benzer şekilde Kardaş (2019)'ın çalışmasında kanser taramaları hakkında bilgisi olanlara bu taramalardan hangilerini duydukları sorulduğunda, %58'si meme kanseri, %52,7'si serviks kanseri ve %44,3'ü kalın bağırsak kanseri olarak belirtmiştir (17). Çalışmamızda genel olarak kanser tarama testleri bilgisinin kaynağı en sık (%52,8) sağlık çalışanları idi. Babaoğlu ve ark. (2021)'nın çalışmasında katılımcıların %61,2'sini tarama testlerini yaptırması için bir sağlık personelinin bilgilendirildiği (%70,2'si ASM'de, %29,8'i ikinci / üçüncü basamak sağlık kuruluşunda) gösterilmiştir (18). Çalışmamızda sağlık çalışanlarınca bilgilendirilme oranının istenilen düzeyde olmamasının nedeni katılımcıların yarısından fazlasının tarama kapsamındaki kanserler açısından genç (20-39 yaş) olması ve bu yaş grubunda tarama testleriyle ilgili bilgilendirilme zorunluluğu olmamasından kaynaklanabilir.

Çalışmamızda tüm katılımcıların sadece dörtte birinin en az bir kanser tarama testi yaptırdığı saptandı. Bunların %33,8'i GGK testi, %27,1'i klinik muayene, %17'si mamografi, %12,1'i kolonoskopi ve %10'u pap smear yaptırdığını belirtti. Çalışma sonuçlarımızdan farklı olarak Özer (2019)'in çalışmasında katılımcıların üçte ikisinin kadın olması nedeniyle kanser taraması yaptıran kadınların en sık mamografi (%43,9) ve pap smear / HPV-DNA (%37,4) yaptırdığı, %15,3'ünün GGK testi, %12,1'inin ise kolonoskopi yaptırdığı belirlenmiştir (16). Çalışmamızda kanser tarama testi yaptırmama nedenleri sırasıyla ihtiyaç duymama (%46,5), zaman ayıramama (%24,2), tarama yapıldığını bilmeme (%17,5), nereye başvuracağını bilmeme (%7,8) ve doktora gitmeye çekinme (%4) şeklinde belirtildi. Babaoğlu ve ark. (2021)'nın çalışmasında katılımcıların kanser tarama testi yaptırmamasında en önemli nedenin, üç kanser türü (meme, serviks ve KRK) için de geçerli olmak üzere bilgi eksikliğine bağlı tarama yaptırmak gerektiğinin bilinmemesi olarak tespit edilmiştir (18). Bölükbaşı (2020)'nın çalışmasında vaka grubunda tarama yaptırmama nedeni olarak belirtilen "tarama sonucundan korkma" oranı kontrol grubuna göre yüksek bulunmuştur. Bilgisizlik, uygulamanın vereceği rahatsızlık, kendini risk grubunda görmeme, zaman yetersizliği, sağlık hizmetlerine ulaşma güçlüğü, tarama testlerine güvenmeme ve parasal yetersizlik gibi nedenlerin ise her iki grupta benzer sıklıkta olduğu belirlenmiştir (19). Özer (2019)'in çalışmasında tarama yaptırmayanların %46,3'ünün sağlıklı olduğunu düşündüğü için tarama yaptırmadığı, bu durumun katılımcıların %41,3'ünün daha genç yaş grubunda (20-39 yaş) olmasından kaynaklanabileceği bildirilmiştir. Aynı çalışmada katılımcıların cinsiyetine göre kanser taraması yaptırmama nedenleri arasında anlamlı ilişki olmadığı, buna karşılık yaş grubu, medeni durum, öğrenim düzeyi ve meslek grubunun kanser taraması yaptırmamayı anlamlı şekilde etkilediği saptanmıştır (16). Gök Uğur ve ark. (2019)'nın ASM'ye başvuran 30-70 yaş kadınlarda yürüttüğü çalışmada, kadınların çoğunun meme ve serviks kanseriyle ilgili bilgi düzeylerinin iyi olduğu ancak meme, serviks ve kolorektal kanserlere yönelik erken tanı uygulamalarının yetersiz olduğu saptanmıştır. Bu durumun nedeni olarak ise önemsememe, bilgi eksikliği, farkındalığın düşük olması, korku ve gidecekleri sağlık kuruluşunda kadın sağlık çalışanı olmadığı düşüncesiyle başvuru yapılmaması ve ulaşım gibi faktörlerin etkili olduğu gösterilmiştir (20). Alduraywish ve ark. (2020)'nın çalışmasında, kanser taraması yaptırmama nedenleri genel engeller, kolonoskopi engelleri ve kansere yakalanma korkusu engelleri olarak bildirilmiştir (21).

Çalışmamızda tüm katılımcıların yarısından fazlası KETEM'i duyduğunu ve bilgisi olduğunu belirtti. KETEM'i bilme durumu kadınlarda, <50 yaş bireylerde, üniversite mezunu olanlarda, çalışanlarda, gelir durumu yüksek olanlarda, sigara içmeyenlerde ve haftada bir gün egzersiz yapanlarda anlamlı şekilde daha yüksek saptandı ($p<0,05$). Çalışmamızda katılımcıların KETEM hakkındaki bilgi ve farkındalık düzeyinin yeterli olmadığı düşünülmektedir. Kadınlarda erkeklere göre KETEM'i bilme oranının daha fazla olması KETEM'de meme ve serviks kanseri taramalarının da yapılmasına bağlı olabilir. Literatürde bizim çalışma sonuçlarımıza benzer şekilde, Biçer (2018)'in çalışmasında <50 yaş bireylerde KETEM'i bilme durumu anlamlı şekilde yüksek bulunmuştur (22). Sancaktar ve ark. (2021)'nın çalışmasında bireylerin %62,7'sinin KETEM'i bilmediği, kadınların ve eğitim düzeyi yüksek olanların KETEM'i daha fazla oranda bildiği saptanmıştır (11). Özsöyler (2018)'in çalışmasında katılımcıların yarısından fazlasının (%56,1) KETEM hakkında bilgisi olmadığı bulunmuştur (23). Pirinççi ve ark. (2015)'nın üçüncü basamak sağlık kuruluşuna başvuranlarda yaptığı çalışmada, bireylerin %82,4'ü KETEM'i duymadığını belirtmiştir. KETEM'i bilmeme oranının bizim çalışmamıza göre yüksek olması yaş ortalamasının yüksek olması ve eğitim düzeyinin düşük olmasından kaynaklanabilir (15). Gök Uğur ve ark. (2019)'nın ASM'ye başvuran kadınlarda yaptıkları çalışmada, katılımcıların %57,3'ünün KETEM'i bildiği buna karşılık %19.3'ünün KETEM'e başvurduğu belirtilmiştir (20). Çalışmamızda katılımcıların %16,9'unun kanser taraması için KETEM'e yönlendirildiği, en sık yönlendiren kaynağın aile hekimleri olduğu bulundu.

Kolon ve rektumdaki polip ve kanserler genellikle büyük boyutlara ulaşıncaya kadar belirti vermezler. Tarama testleri ile premalign adenomatöz polipleri ve erken dönem lokalize kanserleri saptamak mümkündür. Bu açıdan

bakıldığında KRK için önlenebilir ve tedavi edilebilir bir hastalık olduğu söylenebilir. Bunlara ek olarak tarama testlerinin KRK mortalitesini de azalttığı kanıtlanmıştır. Çalışmamızda tüm katılımcıların %41,2'sinin (kadınlarda %56,9, erkeklerde %47,1) KRK tarama testlerini bildiği saptandı. Bizim sonuçlarımıza benzer şekilde Ata (2020)'nın çalışmasında bireylerin %45,5'inin KRK taramaları hakkında bilgisi olduğu bulunmuştur (24). Literatürde bağırsak kanseri tarama testlerini duyanların oranını Kardaş (2019) %70, Biçer (2018) %60,7 (kadınlarda %62,0, erkeklerde %58,6; p>0,05) olarak bildirmiştir (17, 22). Bizim çalışmamızda KRK tarama testlerini bilme oranının bu çalışma sonuçlarına göre düşük olması örneklem grubumuzun daha genç olmasına bağlanabilir. Benzer şekilde genç katılımcıların çoğunlukta olduğu Yiğitbaş ve ark. (2016)'nın çalışmasında bizim sonuçlarımıza benzer şekilde katılanların %41.8'inin GGK'yı ve %22.9'unun kolonoskopiyi duyduğu, bu testleri yaptırma oranlarının ise bizim çalışmamıza göre çok daha düşük olduğu bulunmuştur (25). Wong ve ark. (2013)'nın çalışmasında, KRK taraması bilgi düzeyinin erkeklerde ve sigara içenlerde daha düşük olduğu buna karşılık ailesinde KRK öyküsü olanlarda ise daha yüksek olduğu bildirilmiştir. Aynı çalışmada KRK erken tanısında bu yüksek riskli bireylerin taranmasının önemli yeri olduğu ve özellikle de sigara içen erkekleri hedefleyen eğitici müdahaleler yapılması gerektiği önerilmektedir (26).

Çalışmamızda tüm katılımcıların KRK tarama testleri hakkında bilgi edinme kaynakları en sık (%52,8) sağlık çalışanları daha sonra sırasıyla TV / internet, yazılı medya, akraba / arkadaş olarak bulundu. Biçer (2018)'in çalışmasında en sık (%19) yakın çevre, daha sonra sırasıyla internet, yazılı medya, TV ve sağlık çalışanları olarak belirtilmiştir (22). Özer (2019)'in çalışmasında bağırsak kanseri tarama testleri bilgi kaynakları aile hekimi (%21,8), sosyal medya (21,4) ve diğer sağlık personeli (%21) olarak bildirilmiştir (16). Karadeniz ve ark. (2020)'nın çalışmasında, katılımcıların kanser hakkındaki bilgi kaynakları en sık TV (%88,7), ikinci sırada arkadaş / akraba (%43), üçüncü sırada doktorlar (%32,4) olarak belirtilmiş, hemşireler yedinci (%8,4), ebeler onuncu sırada (%4.2) yer almıştır (27). Sancaktar ve ark. (2021)'nın çalışmasında KRK tarama testi yaptıranların %39,5'ini ASM'lerdeki sağlık personelinin yönlendirildiği bildirilmiştir (11). Çalışmamızda literatürdeki diğer çalışmalardan farklı olarak KRK tarama testleri bilgi kaynağının en sık aile hekimleri olduğu saptandı.

Çalışmamızda tüm katılımcıların KRK tarama testlerinin amaçlarıyla ilgili düşünceleri en sık erken dönemde yakalamak (%70,6) şeklinde belirtildi. Bizim sonuçlarımıza benzer şekilde Biçer (2018)'in çalışmasında katılımcıların çoğunluğu (%68) bağırsak kanserini erken dönemde yakalamak olarak belirtmiştir (22). KRK herhangi bir yaşta ortaya çıksa da hastaların büyük çoğunluğu 40 yaş üzerindedir. Ancak ABD'de son yıllarda KRK insidansının 50 yaş altında artarken daha yaşlı grupta azalması nedeniyle KRK hasta grubunun hızla gençleştiği bildirilmektedir (28,29). Çalışmamızda katılımcıların yaklaşık üçte biri KRK taramasına başlama yaşını bilmesine rağmen KRK tarama testi yaptırma oranı düşük (%14,6) bulundu. Göl ve ark. (2019)'nın ASM'ye başvuran ≥18 yaş sağlıklı bireylerde yaptıkları çalışmada, katılımcıların dörtte birinin KRK taramasını bilmesine karşılık, tarama yaptıranların oranı daha düşük (%15) bulunmuştur (30). Kardaş (2019)'ın çalışmasında, katılımcıların yarısı GGK testini duyduğunu belirtmesine karşılık bu testi yaptırma oranı %13,7 olarak bildirilmiştir (17). Yılmaz ve ark. (2021)'nın üniversite hastanesine başvuran 50-70 yaş grubu bireylerin KRK bilgileri ve tarama testlerine yönelik bilgi, tutum ve davranışlarını değerlendirdikleri çalışmada, katılımcıların %27,9'unun GGK testini, %38,5'inin kolonoskopiyi bildiği, buna karşılık sadece %19,2'sinin GGK testini, %8,7'sinin kolonoskopi yaptırdığı saptanmıştır (12). İzmir'de aile hekimliği polikliniğine başvuran bireylerde yürütülen bir çalışmada, tarama kapsamındaki kanserlerden KRK taramalarıyla ilgili bilgi ve yaptırma oranlarının meme ve serviks kanseri taramalarına göre oldukça düşük olduğu, tarama yaptırmama nedeninin de büyük çoğunlukla bilgi eksikliğine bağlı olduğu gösterilmiştir (13). Çalışmamızda KRK tarama oranının çok düşük olmasının örneklemdeki genç yaş grubunun fazlalığı ve KRK taramaları konusunda toplumsal farkındalığın yetersiz olmasıyla ilişkili olabileceği düşünülmektedir. ABD'de KRK taraması oranlarını artırmak için birden fazla tarama yöntemi ve çeşitli halk sağlığı girişimleri olmasına rağmen, risk altındaki nüfusunun yaklaşık üçte birinin KRK taraması yaptırmadığı bildirilmektedir (10). Hussain ve ark. (2021)'nın çalışmasında, katılımcıların %59,9'unun KRK risk faktörleriyle ilgili bilgisi olduğu, %90'dan fazlasının KRK'nın erken teşhis ile tedavi edebileceğini düşündüğü, buna karşılık katılımcıların dörtte birinin (%24,4) KRK taramasına katıldığı saptanmıştır. Tanı konulma korkusu ve tarama prosedürlerine bağlı yaşanan endişenin KRK taraması önündeki engellerden bazıları olduğu belirtilmiştir (31). Koo ve ark. (2012)'nın Asya-Pasifik bölgesindeki çok merkezli çalışmasında, ≥50 yaş katılımcıların %27'sinin daha önce KRK testi yaptırdığı saptanmıştır. En yüksek test yaptırma oranları Filipinler (%69), Avustralya (%48) ve Japonya'da (%38) iken, Hindistan (%1,5), Malezya (%3), Endonezya (%3), Pakistan (%7,5) ve Brunei (%13,7) en düşük oranlara sahipti. Doktor tavsiyesi ve tarama testleri hakkında yeterli bilgi olması, KRK testi yaptırılmasının önemli prediktörleri olarak bulunmuştur. Aynı çalışmada tarama yaptırma oranları düşük olan ülkelerde KRK risk faktörleri ve taramalar hakkında bilgi düzeyinin en az olduğu ve doktor tavsiyesinin en düşük olduğu bildirilmiştir (32).

Çalışmamıza katılanların %9,5'inde ailesinde/yakın akrabasında KRK öyküsü vardı. İzmir'de yapılan bir çalışmada bu oran %13 iken, Erzurum'da yapılan bir çalışmada ise %5 olarak bildirilmiştir (11,33). Bizim çalışma sonuçlarımıza benzer şekilde Biçer (2018)'in çalışmasında ailesinde KRK öyküsü olan katılımcıların ailesinde KRK öyküsü

olmayanlara göre kanser tarama testlerini daha yüksek oranda duyduğu (p<0,042) ve KRK tarama testleri hakkında daha fazla bilgisi olduğu saptanmıştır (p<0,013) (22). Özsöyler (2018)'in çalışmasında bizim sonuçlarımıza benzer şekilde, ailesinde kanser öyküsü olanlarda kanser taramasını bilme sıklığı istatistiksel olarak anlamlı şekilde daha yüksek bulunmuştur (p<0,037) (23). Genç ve ark. (2020)'nın çalışmasında ailede kanser öyküsü olmasının GGK testi yaptırma durumunu (OR=5,30) anlamlı şekilde arttırdığı gösterilmiştir (33). Le ve ark. (2014)'nın yaptığı çok uluslu çalışmada, ülkelere göre KRK tarama testleri hakkında bilgi durumu (Kore'de %63, Çin'de %61, Vietnam'da %47; p<0,0017), taramanın KRK'yi önleyebileceğine inanma durumu (Kore'de %79, Çin'de %72, Vietnam'da %57; p<0.0001) ve ailede KRK öyküsü olma durumuna göre kanser taramasına katılma durumu (Kore'de %95, Çin'de %95, Vietnam'da %80; p<0,0001) arasında anlamlı fark bulunmuştur. Vietnamlı katılımcıların diğerlerine göre önemli ölçüde kanser tarama testlerinden daha az haberdar olduğu, taramanın KRK'yi önleyebileceğine daha az inandığı ve ailede KRK öyküsü yoksa kanser taramasına daha az katıldıkları saptanmıştır (34). Çalışmamızda katılımcıların KRK tarama testlerini en sık ASM'de (%67,5), en az KETEM'de (%3,3) yaptırdıkları saptandı. Literatürdeki çalışma sonuçlarıyla kıyaslandığında, bizim çalışmamızda KRK tarama testleri yaptırma oranının ASM'de daha yüksek olduğu, KETEM'de ise bu oranın beklenen düzeyin çok altında olduğu saptandı.

Çalışmamızda daha önce KRK tarama testleri yaptırma durumu ile yaş grubu, eğitim düzeyi, çalışma durumu, sosyal güvence durumu ve kronik hastalık durumu arasında anlamlı fark bulundu. Sancaktar ve ark. (2021)'nın çalışmasında, katılımcıların %28,7'sinin KRK tarama testi yaptırdığı, ≥50 yaş grubunda bu oranın anlamlı şekilde daha yüksek (%39,7) olduğu bulunmuştur (11). Bayçelebi ve ark. (2015)'nın çalışmasında KRK tarama testleri yaptırma sıklığının erkeklerde belirgin şekilde fazla olduğu (GGK testi kadınlarda %6,6, erkeklerde %30; kolonoskopi kadınlarda %3,7, erkeklerde %10,8) saptanmıştır (35). Genç ve ark. (2020)'nın Erzurum'da bir ASM'ye kayıtlı 50-70 yaş grubu bireylerde yaptığı çalışmada, en az bir kez GGK testi yaptırma oranı %20,6 olarak bulunmuş olup, kadın cinsiyet (OR=0.36) ve ailesinde bağırsak kanseri öyküsü varlığının (OR=5.30) GGK testi yaptırma durumunu anlamlı şekilde etkilediği saptanmıştır (33). Biçer (2018)'in çalışmasında katılımcıların eğitim düzeyi yükseldikçe bağırsak kanseri tarama testlerini gerekli bulma oranının anlamlı şekilde arttığı (p<0,001); cinsiyet, yaş grubu, medeni durum, meslek ve aile öyküsünün ise anlamlı etkisi olmadığı gösterilmiştir (22). Ata (2020)'nın çalışmasında KRK tarama testi yaptıranların cinsiyeti, yaş grubu, gelir durumu, medeni durumu, eğitim düzeyi ve kronik hastalık durumuna göre kanser tarama testleri yaptırma durumu arasında anlamlı ilişki bulunmamıştır (p>0,05) (24). Her ne kadar kanser tarama testleri ücretsiz olarak yapılsa da ekonomik durumun KRK tarama düzeyini etkilediği, geliri giderinden az olan bireylerde KRK tarama oranlarının da düşük olduğu bildirilmektedir (36). Özsöyler (2018)'in çalışmasına katılanların %22,6'sı GGK testini duymuş, %10'u GGK testini yaptırmıştır. Katılımcıların yaş grubu, cinsiyeti, eğitim düzeyi, medeni durumu, gelir durumu, sigara ve alkol kullanma durumuna göre GGK taraması yaptırma durumu arasında anlamlı fark saptanmamıştır (p>0,05). GGK taraması yaptırma oranı kronik hastalığı olanlarda anlamlı şekilde daha yüksek olarak bulunmuştur (p<0,040) (23). Bölükbaşı (2020)'nın çalışmasında birinci derece yakınlarında KRK tanısı olanlardan test sonucundan korktuğu için tarama yaptırmayanların oranı kontrol grubuna göre anlamlı şekilde daha yüksek bulunmuştur. Her iki grupta tarama yaptırmama nedenlerinden bilgisizlik, uygulamanın vereceği rahatsızlık, kendini riskli görmeme, zaman yetersizliği, sağlık hizmetlerine ulaşma güçlüğü, tarama testlerine güvenmeme ve parasal yetersizlik gibi nedenlerin benzer sıklıkta olduğu saptanmıştır (19). Kroupa ve ark. (2019)'nın çalışmasında, katılımcıların büyük çoğunluğunun (%96) KRK taraması hakkında bilgisi olduğu, %75,3'ünün bir KRK taramasına katıldığı saptanmış olup >60 yaş bireylerde, kadınlarda ve KRK hastalarının yakınlarında taramaya katılım oranı daha yüksek bulunmuştur (37).

Çalışmamızın bazı sınırlılıkları vardır. Çalışmamıza sadece birinci basamak sağlık kuruluşu olan ASM'lere başvuran bireyler katılmış olup, ikinci ve üçüncü basamak dahil edilmedi. Üst basamakların da dahil edildiği daha geniş katılımlı çalışmalarda daha kapsamlı sonuçlar elde edilebilir. Çalışmamızda KRK taramaları açısından önemli yaş sınırı olan <50 yaş ve ≥50 yaş olarak ayrı anket çalışması yapılmadı, tüm katılımcılara aynı standart anket formu uygulandı. KRK açısından daha riskli olan yaş gruplarına özel topluma dayalı yürütülen çalışmalara ihtiyaç vardır. Bu çalışma Orta Karadeniz Bölgesi'nde bir ildeki ASM'lere başvuran sağlıklı bireylerde yürütülen kesitsel tipte bir çalışma olduğu için elde edilen sonuçlar sadece araştırma grubumuza genellenebilir.

SONUÇ

Çalışmamızda katılımcıların kanser taramaları ve KETEM hakkındaki farkındalıklarının istenilen düzeyde olmadığı, yaklaşık yarısının KRK tarama testleri hakkında bilgisinin olmadığı ve bu testleri yaptırma oranının düşük olduğu bulundu. Kanser taraması yaptırmama nedenleri çoğunlukla bireylerin sağlıklı oldukları düşüncesiyle ihtiyaç duymaması ve taramalar hakkında bilgi eksikliği idi. Kanser taraması yaptıranların çoğunluğunun hekim önerisiyle tarama yaptırmış olması hekimlerin tarama konusunda önemli bir temas noktası olduğunu göstermektedir. Hekimin hastaya kanser tarama testleri hakkında bilgi vermesi hem taramalara katılımı hem de erken tanı oranını artıracaktır. Katılımcıların ancak yarısının KETEM hakkında bilgisinin olması ülkemizde sağlık okuryazarlığı ve farkındalık açısından henüz yeterli seviyeye ulaşıl-

madığını göstermektedir. Sağlık Bakanlığı'nca yürütülen topluma yönelik bilgilendirme ve tarama uygulamalarının bireylerin sosyokültürel özelliklerine uygun şekilde organize edilerek ulaşılabilirlik yüzdesi artırılmalıdır. Çalışmamızda kadınlara yönelik tarama testlerinin bilinirlik oranının yüksek olması dikkat çekicidir. Bu durum ülkemizde kadınlara yönelik tarama uygulamalarının daha etkili olduğunun açık kanıtlarından biridir. Literatürde kanser taramaları ve farkındalık konusundaki çalışmaların büyük çoğunluğunu kadınlarda yapılan çalışmalar oluşturmaktadır. Cinsiyete özel kanser çalışmaları haricinde erkeklerde yapılan çalışma sayısının az olması bu alanda daha detaylı ileri çalışmaların yapılması gerekliliğini göstermektedir.

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KAYNAKLAR

1. Global Cancer Observatory (Globocan) 2020. World Health Organization (WHO), International Agency for Research on Cancer (IARC). Erişim Tarihi: 21.04.2021. https://gco.iarc.fr/today/data/factsheets/populations/900-world-fact-sheets.pdf
2. Global Cancer Observatory (Globocan), Turkey – 2020. World Health Organization (WHO), International Agency for Research on Cancer (IARC). Erişim Tarihi: 28.04.2021. https://gco.iarc.fr/today/data/factsheets/populations/792-turkey-fact-sheets.pdf
3. T.C. Sağlık Bakanlığı, Sağlık İstatistikleri Yıllığı 2019. Ankara 2021. Erişim Tarihi: 13.06.2021 https://sbsgm.saglik.gov.tr/Eklenti/40564/0/saglik-istatistikleri-yilligi-2019pdf.pdf
4. American Cancer Society. Colorectal Cancer Facts & Figures 2020-2022. Atlanta: American Cancer Society; 2020. Erişim Tarihi: 19.08.2021. https://www.cancer.org/content/dam/cancer-org/research/cancer-facts-and-statistics/colorectal-cancer-facts-and-figures/colorectal-cancer-facts-and-figures-2020-2022.pdf
5. Shivappa N, Godos J, Hébert JR, et al. Dietary inflammatory index and colorectal cancer risk-A meta-analysis. Nutrients, 2017;9(9):1043.
6. Armstrong D, Dregan A, Ashworth M, White P, McGee C, de Lusignan S. The association between colorectal cancer and prior antibiotic prescriptions: case control study. Br J Cancer, 2020;122(6): 912–17.
7. Çürük GN, Yüceler Kaçmaz H. Kolorektal kanserden korunma ve hemşirenin sorumlulukları. Gümüşhane Üniversitesi Sağlık Bilimleri Derg 2017;6(4):224-33.
8. Inadomi JM, Vijan S, Janz NK, et al. Adherence to colorectal cancer screening: a randomized clinical trial of competing strategies. Arch Intern Med 2012;172(7):575-82.
9. Ulusal Kanser Kontrol Planı 2013-2018. T.C. Sağlık Bakanlığı, Ankara. Erişim Tarihi:10.3.2021 https://hsgm.saglik.gov.tr/depo/birimler/kanser-db/yayinlar/raporlar/
10. Shaukat A, Kahi CJ, Burke CA, Rabeneck L, Sauer BG, Rex DK. ACG Clinical Guidelines: Colorectal Cancer Screening 2021. Am J Gastroenterol, 2021;116(3):458-79.
11. Sancaktar E, Tuncer Ö. Erişkin kişilerin kolorektal kanser risk faktörleri ve erken tanı yöntemleri hakkındaki bilgi, tutum ve davranışlarının incelenmesi. Türk Aile Hek Derg, 2021;25(2):53-8.
12. Yılmaz S, Emre N. 50-70 yaş arası kişilerin kolorektal kanser risk faktörleri ve erken tanısına yönelik bilgi tutum ve davranışlarının değerlendirilmesi. Pam Tıp Derg,2021;14:726-33.
13. Karakoyunlu Şen S, Kılıç Öztürk Y. Sağlık algısı ile kanser taraması farkındalığı arasındaki ilişki. Türk Aile Hek Derg, 2020;24(4):175-83.
14. Şahin NŞ, Üner BA, Aydin M. ve ark. Aydın merkez ilçede kolorektal kanser taramasına ilişkin bilgi, tutum ve engeller. Türk Aile Hek Derg, 2015;19(1):37-48.
15. Pirinççi S, Benli C, Okyay P. Üçüncü basamak sağlık merkezine başvuranlarda kolorektal kanser tarama programı farkındalık çalışması. TAF Prev Med Bull, 2015;(3):14.
16. Özer MK. Yetişkin bireylerin kanser taramaları hakkındaki bilgi, tutum ve davranışları. Tıpta Uzmanlık Tezi. Ordu Üniversitesi, 2019.
17. Kardaş ÇS. Onkoloji hastalarının yakınlarının kanser tarama testleri hakkında bilgi ve tutumları. Tıpta Uzmanlık Tezi. İstanbul Sağlık Bilimleri Üniversitesi, 2019.
18. Babaoğlu AB, Büyüközmen E, Can FE. İzmir'de toplumda kanser tarama testleri farkındalığı ve bireylerin kanser tarama testlerine katılımını etkileyen faktörler. Med J West Black Sea, 2021;5(2):173-81.
19. Bölükbaşı H. Birinci derece yakınlarında kolorektal kanser tanısı olan ve olmayan hastaların kanserden korunmaya yönelik bilgi, tutum ve davranışlarının değerlendirilmesi ve karşılaştırılması. Tıpta Uzmanlık Tezi. Hatay Mustafa Kemal Üniversitesi, 2020.
20. Gök Uğur H, Aksoy DY, Yılmaz Yavuz A, Şılbır MF, Öner A. Aile sağlığı merkezlerine başvuran 30-70 yaş grubu kadınların ulusal kanser taramalarına yönelik bilgi tutum ve davranışları: Karadeniz Bölgesi'nde bir il örneği. Sürekli Tıp Eğitimi Derg 2019;28(5):340-8.
21. Alduraywish SA, Altamimi LA, Almajed AA, et al. Barriers of colorectal cancer screening test among adults in the Saudi population: A cross-sectional study. Prevent Med Rep 2020;20:101235.
22. Biçer A. Kolorektal kanser tarama testlerinin farkındalık araştırması. Tıpta Uzmanlık Tezi. İstanbul Sağlık Bilimleri Üniversitesi, 2018.
23. Özsöyler M. Aile hekimliği polikliniğine başvuran 35 yaş ve üzeri hastaların kanser tarama testleri hakkında bilgi ve tutumları. Tıpta Uzmanlık Tezi. Sağlık Bilimleri Üniversitesi, 2018.
24. Ata A. Elli yaş ve üzeri bireylerde kolorektal kanser tarama davranışları ve sağlık okuryazarlık düzeyi arasındaki ilişki. Yüksek Lisans Tezi. Sivas Cumhuriyet Üniversitesi, 2020.
25. Yiğitbaş Ç, Bulut A, Bulut A, Semerci M. Bingöl devlet hastanesine başvuran yetişkinlerin kanser tarama testlerine ilişkin bilgi ve tutumları. Türk Jinekolojik Onkoloji Derg 2016;19(2):29-38.
26. Wong MC, Hirai HW, Luk AK, et al. The knowledge of colorectal cancer symptoms and risk factors among 10,078 screening participants: are high risk individuals more knowledgeable? PloS one, 2013;8(4), e60366.
27. Karadeniz H, Çetinkaya F. Knowledge levels and attitudes of adult individuals about cancer and its risk factors. Niger J Clin Pract, 2020;23:1607-14.
28. Meester RG, Mannalithara A, Lansdorp-Vogelaar I, Ladabaum U. Trends in incidence and stage at diagnosis of colorectal cancer in adults aged 40 through 49 years, 1975-2015. Jama, 2019;321(19):1933-4.
29. Siegel RL, Miller KD, Goding SA, et al. Colorectal cancer statistics, 2020. CA Cancer J Clin 2020;70(3):145-64.
30. Göl İ, Erkin Ö. Yetişkinler kanser tarama programları hakkında ne biliyor? TJFMPC,2019;13(2):167-76.

31. Hussain I, Majeed A, Rasool MF, Hussain M, Imran I, Ullah H. Knowledge, attitude, preventive practices and perceived barriers to screening about colorectal cancer among university students of newly merged district, Kpk, Pakistan-A cross-sectional study. J Oncol Pharm Prac 2021;27(2): 359-67.
32. Koo JH, Leong RW, Ching J, et al. Knowledge of attitudes toward and barriers to participation of colorectal cancer screening tests in the Asia-Pacific region: a multicenter study. Gastrointest Endosc, 2012;76(1):126-35.
33. Genç Z, Yalçınöz BH. Birinci basamağa başvuran bireylerin kolorektal kansere yönelik sağlık inançlarının gaitada gizli kan testi yaptırma durumlarına etkisi. Sağlık ve Toplum, 2020;30(2):90-7.
34. Le TD, Carney P A, Lee-Lin F, et al. Differences in knowledge, attitudes, beliefs, and perceived risks regarding colorectal cancer screening among Chinese, Korean, and Vietnamese sub-groups. J Commun Health, 2014;39(2):248-65.
35. Bayçelebi G, Aydın F, Gökosmanoğlu F, Tat TS, Varım C. Trabzon'da kanser tarama testleri farkındalığı. J Human Rhythm 2015:1(3): 90-4.
36. Topaloğlu MM, Gördes Aydoğdu N. The role of nurses in health belief model-based interventions to increase participation of poor individuals in colorectal cancer screening. J Educ Res Nurs. 2021;18(2):280-3.
37. Kroupa R, Ondrackova M, Kovalcikova P, et al. Viewpoints of the target population regarding barriers and facilitators of colorectal cancer screening in the Czech Republic. World J Gastroenterol 2019;25(9):1132–41.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

The Immoderate Decrease in Saliva pH During Hemodialysis is Related to Poor Oral Hygiene in Diabetics

Hemodiyaliz Süresince Tükürük pH'sındaki Aşırı Düşüş, Diyabet Hastalarında Kötü Ağız Hijyeni ile İlişkilidir

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ABSTRACT

Aim: Saliva is a body fluid that significantly balances oral acidity. Notably, saliva pH can also restore oral hygiene that can be labile in hemodialysis patients. Our study thus investigated the saliva pH alterations in a dialysis session and how they affect oral hygiene.

Material and Method: This quasi-experimental study was conducted with patients receiving hemodialysis. An internist took the unstimulated saliva samplings at the beginning and end of one hemodialysis session, and oral evaluations were accomplished by a dentist who was blind to patients' saliva status. Laboratory results were also obtained from monthly orders.

Results: A total of 59 patients participated in this study. The mean saliva pH decrease in all patients was -1.35±0.7. In comparing saliva pH with numerous patient characteristics, the statistical significance of obesity, loss of teeth related to oral hygiene, diabetes, and blood flow rate were notable. The decrease in saliva pH was linked to periodontal inflammation and oral hygiene, impressively higher in patients with diabetes mellitus. The salivary pH tends to decrease during the hemodialysis session. Hence, oral hygiene and related dental health can also be dependent on hemodialysis qualities.

Conclusions: An excessive decrease in saliva pH during dialysis sessions may lead to poor oral hygiene, particularly in patients with Type II diabetes.

Keywords: Diabetic complications, low-flow dialysis, obesity, oral hygiene, saliva pH, tooth loss

ÖZ

Amaç: Tükürük, oral asiditeyi önemli ölçüde dengeleyen bir vücut sıvısıdır. Dikkat çekici şekilde, tükürük pH'sı aynı zamanda hemodiyaliz hastalarında labil olabilen ağız hijyenini de düzenleyebilir. Bu nedenle çalışmamız, diyaliz seansında tükürük pH'sındaki değişiklikleri ve bunların ağız hijyenini nasıl etkilediğini araştırdı.

Gereç ve Yöntem: Bu yarı deneysel çalışma hemodiyaliz tedavisi alan hastalarla yapılmıştır. Hemodiyaliz seansının başındaki ve sonundaki uyarılmamış haldeki tükürük örneklerini bir iç hastalıkları uzmanı aldı, ve oral değerlendirmeler, hastaların tükürük durumu yönünden kör olan bir diş hekimi tarafından yapıldı. Laboratuvar sonuçları ise aylık takiplerden alındı.

Bulgular: Bu çalışmaya toplamda 59 hasta katıldı. Tüm hastalarda ortalama tükürük pH düşüşü -1,35±0,7 idi. Tükürük pH'sı önemli hasta özellikleriyle karşılaştırıldığında, obezite, ağız hijyeni ile ilişkili diş kaybı, diyabet ve kan akış hızının istatistiksel anlamlılıkları dikkat çekiciydi. Tükürük pH'ındaki düşüş, DM'li hastalarda belirgin şekilde daha yüksek olan periodontal inflamasyon ve ağız hijyeni ile bağlantılıydı. Tükürük pH'sı hemodiyaliz seansı süresince düşme eğilimindedir. Bundan dolayı, ağız hijyeni ve ilgili diş sağlığı hemodiyaliz kalitesine de bağlı olabilir.

Sonuç: Diyaliz seansları süresince tükürük pH'sında aşırı bir düşüş, özellikle Tip II diyabetli hastalarda kötü ağız hijyenine yol açabilir.

Anahtar Kelimeler: Diş kaybı, diyabetik komplikasyonlar, obezite, oral hijyen, yavaş-akım diyaliz, tükürük pH'sı

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INTRODUCTION

Saliva is a highly informative body fluid consisting of the interstitial fluid around the salivary gland ducts. Due to the various contents such as water, electrolytes, proteins, and enzymes, saliva acidification (saliva pH) is highly variable. Unstimulated saliva can have a pH as low as 5.6, and its stimulated form can rise to 7.6, though saliva's average pH is 6.4±0.65 (1). Depending on the need, the content and amount of saliva secreted is 0.5 – 2 liters per day (2).

The saliva types are not always the same, either. Unstimulated saliva form represents basal release and is found 14 hours a day in the mouth (3). It covers the mouth tissue and makes a protective border. Stimulation of the salivary glands, such as the initial biting of food and a particular scent, causes an increase in saliva flow rate (SFR) and production. However, stimulated saliva lasts only 2 hours a day in the mouth and is more related to digestive functions (3). In addition, protein, sodium, chloride, and bicarbonate levels also increase in the stimulated state (4). Further, parotid saliva demonstrates seasonal characteristics, notably a decrease in the summer (5). There is also a significant relationship between body posture and saliva secretion, with the greatest occurring when standing. This circumstance is related to blood pressure (6). Moreover, salivary secretion activity is at its lowest level in the geriatric population (7). The practical features such as easier, without preparation and non-invasive sampling have saliva tested in many comorbidity studies (8). Accordingly, the chronic kidney disease (CKD), in which fluid volume is extremely important, is also included in these researches (9).

In hemodialysis (HD), which usually takes 4 hours, there may be instant fluid and electrolyte changes between body-fluid compartments [10]. Therefore, changes in saliva content are also likely. Here, saliva buffering systems, prominently bicarbonate, try to normalize drops in saliva pH (9-11). As the lowest tolerable saliva pH is 5.5, dental demineralization is inevitable below this level (12). In this case, dental caries, periodontal diseases, oral hygiene impairment, and related dental loss should be expected (13). Nevertheless, a high incidence of periodontitis was reported in CKD patients, particularly in those with diabetes mellitus (DM) (14).

Many studies on saliva have researched dental and related oral care in CKD patients. Poor oral hygiene, particularly in HD patients, may be related to the disease progression or the contribution of HD complications. This study thus aimed to investigate how oral and dental health is affected by the change in salivary pH during HD.

MATERIAL AND METHOD

This quasi-experimental study was conducted in a university nephrology clinic between 2019 and 2020. Study approval was obtained from the university ethics committee, and informed consent forms were received from all participating patients prior to the study. Fifty-nine of 68 patients registered in the dialysis center were included in our study. The patients had HD sessions three days a week for 4 hours using one of three HD access modes (arteriovenous fistula, permanent catheter, and graft). Patients hospitalized for other causes started HD within the last three months, had clinical diagnoses about infection, had abnormal vital signs, had a history of taking drugs that interact with the saliva (autonomous effects), or were satiated were excluded from the study. Patients' demographic features, HD session periods, and dialysis efficacy evaluations such as urea reduction ratio, blood biochemistry, HD fluid and dynamics [blood flow rate (BFR), dialysate electrolytes] as ordered for the previous month were recorded. On the sampling day, the patients were provided with the same position and meals during HD sessions. At the initial sampling, all patients were hungry, and there was no saliva-stimulating food or beverage on the menu. The study design was summarized in **Figure 1**.

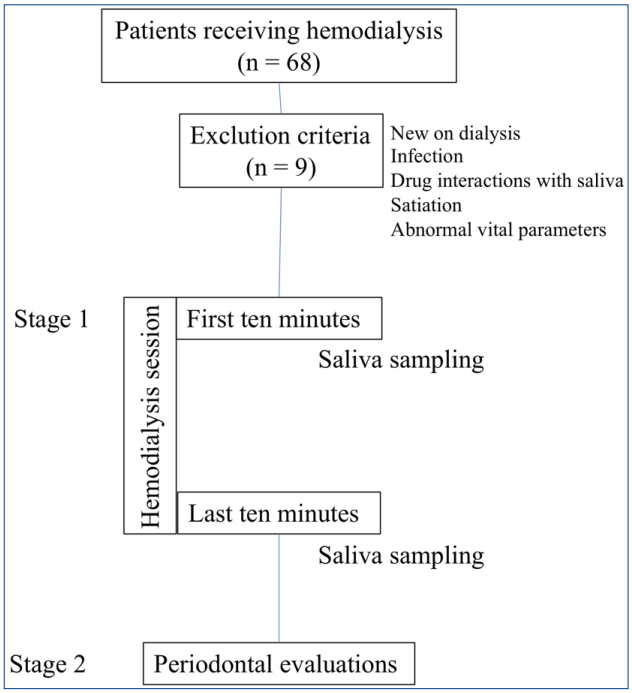

Figure 1. Study design & sampling definitions.

To measure saliva pH, we used pH indicator strips (Merck KgaA, 64271 Darmstadt, Germany) with a sensitivity of 0.25 degrees, a color scale of 0–14, and four color blocks. We mainly chose indicator strips rather than electronic tools due to the low saliva we intended to gather (15). Saliva samples taken from each patient without stimulation within the first 10 minutes of the current

HD session were collected in 10 ml plastic containers. There was no foam or mucus in the saliva samples. Each sample was then dropped onto a pH indicator strip with a 1 ml disposable Pasteur pipette, after which we waited 5 seconds for the reaction to take place. We compared the results to the color scale on the strips' box and noted the color-matched pH value. Then, the patients were allowed to eat their meals. Approximately 2.5 hours, when basal saliva was again achieved, we repeated the same procedure in the last 10 minutes of the ongoing HD session.

Finally, an expert dentist who was unaware of the patients' status carried out an oral hygiene examination. Community periodontal index (CPI) was used in dental evaluations, and the results were divided into sextants (16). Accordingly; Code "0" indicates healthy periodontium without pathologic changes; Code "1" indicates bleeding on gentle probing; Code "2" indicates calculus deposition; Code "3" indicates probing depth of 4 to 5 mm; Code "4" indicates probing depth 6 mm or more profound, and Code "X" indicates three or more teeth missing.

Statistical analysis: Statistical analyses were performed using SPSS ver. 22 for Windows (SPSS Inc., Chicago, IL, USA). Continuous variables were given as mean±SD, and categorical variables were specified as frequency counts and percentages. The Pearson test was chosen for correlations between standard distribution data, while the Spearman test evaluated heterogenic data. A chi-square test was preferred for categorized data. A repeated-measures analysis of variance test was performed for repeated categorical data. The Mann-Whitney U-test and Kruskal Wallis test were chosen for subgroup evaluations due to the decrease in groups. For all tests, $p < 0.05$ was considered statistically significant.

RESULTS

Our study was initiated with 59 total patients receiving HD. The patients' mean age was 57.74, and 29 were female. Almost all patients had functional dialysis adequacy, and their age distribution, HD time, and laboratory values were homogeneous (Table 1). More than half of the patients still produced acceptable urine (> 200 ml/day). Forty of the patients evaluated for oral hygiene had at least one caries. Fifteen (37.5%) of those had a total dental prosthesis. The average end-dialysis pH of patients with total tooth loss was 6.23±0.62, while the average pH decrease during HD session was -1.4±0.68. In addition, only 9 (15.25%) of the patients had good oral hygiene (no restoration and no teeth loss). Moreover, only two of these (22.2%) had DM. Additional values are summarized in **Table 1**. In dental evaluations, the total number of patients with CPI value >3 was 43 (73%). Other dental evaluations are given in detail in **Table 2**.

Table 1. Demographics and baseline characteristics of patients receiving hemodialysis

Personal characteristics	
Age (year)	57.74±15.25
BMI* (%)	24.99±5.47
DM‡, n (%)	14 (23.7%)
Daily brushing, n (%)	12 (20.3%)
Smoking, n (%)	3 (5%)
HD‡ (year)	4.38 ±4.64
Urine presence n (%)	20 (34%)
Weight Difference (kg)	1.79±0.96
Dialysis Access	**(n)**
Catheter	27
AVF§	29
Graft	3
Dialysis Period	
Daylight	24
Afternoon	25
Evening	10
Laborotary results	
Urea (mg/dL)	112.81 35.77
Creatinine (mg/dL)	7.01±2.08
Hb*§ (g/dL)	11.39±1.59
Albumin (g/dL)	3.48±0.36
T.protein(g/dL)	6.71±0.71
Na (mEq/L)	137.66±3.43
K (mmol/L)	4.51±0.69
ALT (U/L)	11.54±5.51
Ca (mg/dL)	8.75±0.77
P (mg/dL)	4.85 1.45
LDL (mg/dL)	111.03±59.04
HDL (mg/dL)	42.03±12.34
Triglyseride(mg/dL)	153.42 ±69.48
Tot. koll (mg/dL)	184.71±67.61
Uric acide (mg/dL)	5.72±1.12
HCO3 (mmol/L)	22.58±4.58
Ferritine (ng/mL)	397.07±233.59
(Ca X P)†*	44.23±12.72
URR††	74±5.75
KT/v†‡	1.58±0.25
Dialyzate specifications	
DFR†§ (ml/m)	322.20 24.42
Dialysate Ca+2 (mg/dL)	1.46±0.24
Dialysate K+ (mmol/L)	2.48±0.67
Dialysate HCO3 (mmol/L)	2.60±1.69
Salivary results	
Saliva pH	
First sampling	7.82±0.86
Second sampling	6.48±0.79
Total pH decrease	-1.35±0.70

Data are the median (INQ), n (%), or n/N (%); Standart deviation; *,Body Mass Index; †,Diabetes Mellitus; ‡,Hemodialysis; §,Arteriovenous fistüle; *§,Hemoglobine; †*,Calcium-phosphorus ratio; ††,Urea reduction ratio; †‡,(Dialyzer clerance of urea) x (Dialysis time / volüme distribution of urea); †§,Dialysate Flow Rate.

Table 2: Dental properties of patients receiving hemodialysis.

	Diabetic (n=18)	Non-diabetic (n=41)	P value
Mean salivary pH	6.58±0.87	6.43±0.76	0.540
Saliva pH gap	-1 (-0.5, -2)	-1.5 (0, -3)	0.034*
Total lost teeth, n (%)	9 (50%)	6 (14.6%)	0.004*
Dental restoration count, n (%)	16 (88.8%)	10 (24.4%)	0.011*
Number of Daily brushing teeth, n (%)	2 (11.1%)	10 (24.4%)	0.243
Number of weekly brushing teeth, n (%)	7 (38.9%)	22 (53.6%)	0.564
Presence of calculus, n (%)	18 (100%)	41 (100%)	NA†
CPI*			
Category 0, n (%)	0 (0%)	0 (0%)	NA†
Category 1, n (%)	0 (0%)	0 (0%)	NA†
Category 2, n (%)	0 (0%)	16 (39%)	0.001*
Category 3, n (%)	2 (11.1%)	13 (31.7%)	0.094
Category 4, n (%)	6 (33.3%)	6 (14.6%)	0.100
Category 5, n (%)	10 (55.5%)	6 (14.6%)	0.001*

*P values are the comparison of diabetic and non-diabetic groups (Chi-Squared test or Mann Whitney U test); Data are the median (INQ), n (%), or n/N (%); P values less than 0.05 were considered statistically significant (two-tailed); *, Community periodontal index; †, Not applicable.

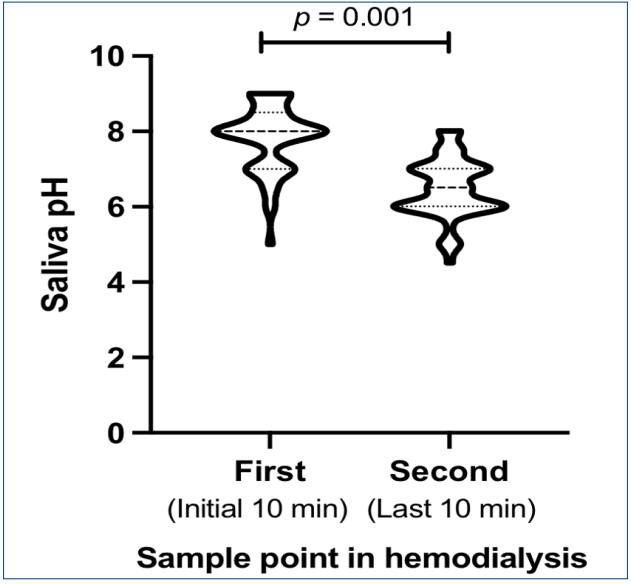

Figure 2: Saliva pH variations among the sampling periods taken in hemodialysis sessions.

The mean unstimulated saliva pH value was 7.82±0.86 at the beginning and 6.48 0.79 at the end of the dialysis session, respectively. The mean pH reduction between the two samplings was −1.35±0.7. This value was statistically significant for all patients (p=0.001). In evaluating the categorized facets that may affect saliva pH (age, gender, weight), we found no influential factor other than BFR and body mass index (BMI) ($p < 0.005$). However, the mean salivary pH at the beginning and end of HD were lower in geriatric patients (p=0.027, p=0.007). This decrease did not differ in two sequential samplings in diabetic patients; unlike, the pH decrease was higher in geriatric patients with DM (p=0.05).

In addition, in patients with a BMI > 25, the total saliva pH decrease per patient was significant (p=0.033, η2=0.07) (**Figure 3a**). In patients with higher BFS (> 350 ml/min), the pH gap value was again notable (p=0.040) (**Figure 3b**). Interestingly, the pH reduction negatively correlated with the calcium/ phosphorus ratio (p=0.044, r=-0.263). When the ratio was greater than 40, the pH drop was higher. However, an independent-samples T-test could not demonstrate any significance (p=0.071). There were negative correlations between end-dialysis pH decrease and age (p=0.023, r=-0.295), and oral hygiene impairment (p=0.001, r=-0.438). The negative correlation between oral hygiene impairment and the mean saliva pH was also statistically significant (p=0.018) (**Figure 3c**). In evaluating comorbidities, primarily involving patients with DM, a correlation between oral hygiene impairment and saliva pH decrease was more prominent in patients with DM (p=0.047, r=0.26). As shown in **Figure 3d**, this correlation was found significant as well (p=0.003, η2=0.14). There was also a significant statistical increase between the decrease in saliva pH and oral hygiene in diabetic patients (p=0.02, η2=0.08).

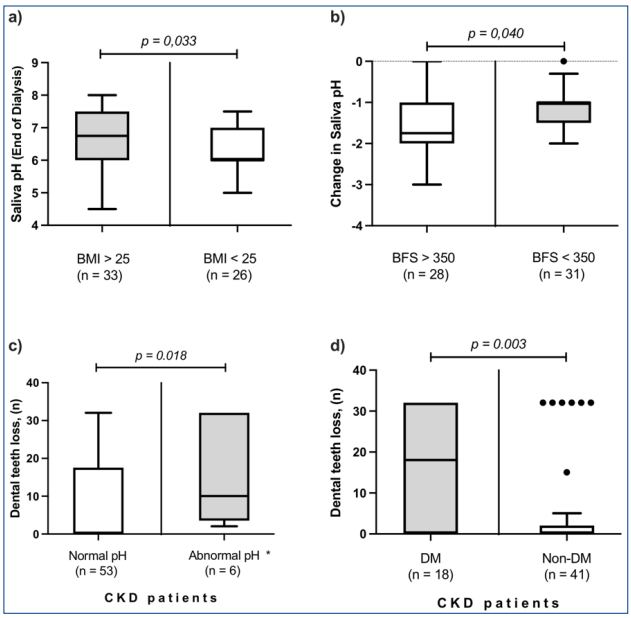

Figure 3: a) Obesity effect on the saliva pH decrease range at the end of the hemodialysis; **b)** Saliva pH variations according to the blood flow rate in hemodialysis; **c)** Saliva pH impact on the teeth loss count in hemodialysis patients; **d)** Teeth loss count in diabetic and non-diabetic CKD groups with marked saliva pH decrease.

*Abnormal pH was accepted as pH<5.75 or pH>7.01; BMI: body mass index, BFS: blood flow speed, CKD: chronic kidney disease, DM: diabetes mellitus

DISCUSSION

This prospective study evaluated saliva pH variation during an HD session. We found a significant pH reduction at the end of HD compared to the beginning. In addition, saliva pH results were more decreased in diabetic patients. Moreover, diabetic patients with high saliva pH reduction tended to have poor oral hygiene.

A study set out to determine the dental conditions and saliva characteristics of 60 patients receiving HD and found an increase in saliva pH at the end of HD (9). The researchers reported that SFR and buffering capacity decrease at the end of HD, whereas saliva pH increases. They linked the decrease in the buffering capacity to high urea in saliva samples. However, their samples also included stimulated saliva and were taken at the end of HD. SFR measurements may show higher pH values since the stimulated saliva activates the buffer system. Therefore, the pH values taken in the current study were likely to be buffered by induced bicarbonate.

A supportive study on urea's impact on the saliva pH revealed that the urea's high predilection for pH buffering leads to an increase in saliva pH (17). We thus planned the sampling periods based on basal saliva secretion, which is more critical for oral hygiene. Since our sampling timings included unstimulated saliva, bicarbonate, and even the subsequent urea buffer system would not be activated (3), we were able to get more objective results. There is a double-edged sword here. First, urea drops at the end of HD and cannot sufficiently buffer the saliva pH. Secondly, saliva pH may not increase enough as urea will not be adequate in saliva pH buffering. The absence of a decrease in salivary pH may be a shred of evidence that urea is still at a high level in the blood. That is, the evaluation of the effectiveness of urea dialysis may be considered.

In the study where the samplings were taken as pre and post-dialysis, a mean pH decrease of 0.15 after HD was noticed; however, this reduction was noted not statistically significant (18). In the current study, we were inspired by the evaluation of DM and the selection of two comparable sampling times. Moreover, we had the opportunity to evaluate the circadian saliva secretion, which was their limitation. Our study noticed that the circadian rhythm had no impact on the pH variation.

Dental tribulations and associated oral hygiene will deteriorate when the decreased saliva pH exceeds the demineralization threshold. This situation will predispose patients with DM, as noticed in HD patients. In the study conducted by Chuang et al., the status of saliva pH in diabetic and non-diabetic patients was evaluated, and an objective dental evaluation was performed (14). Accordingly, saliva pH was decreased in the diabetic CKD group. However, they declared that oral evaluations did not differ per HbA1c level. We found a similar pH decrease in our study; however, our saliva pH result was the difference between saliva samples taken twice (at the beginning and end of HD); that is, it reflected the decrease by individual rather than a group. In addition, the decrease in saliva pH was higher in those with poor personal oral hygiene (p=0.018). After our dental evaluations were made objectively, as in a similar study, we found that oral hygiene was not acceptable for diabetic patients. Moreover, in the samples taken at the beginning and the end of HD, the exposure rates were higher in diabetic patients, as oral hygiene will mainly be affected during the pH drop period.

The main weakness of our study was the absence of arterial blood gas samples taken simultaneously with saliva samples. In addition, blood pressure was measured only at the first sampling time. Therefore, we could not comprehensively reveal how the salivary pH is affected by the blood pressure variations during HD. Another liability was that we could not perform an HbA1c levels-based subgroup evaluation in patients with DM as some patients did not have recent HbA1c values. Similarly, the lack of synchronous biochemistry results limits our interpretations about the pH decrease.

CONCLUSION

Overall, this study aimed to evaluate the saliva pH alterations during HD session. We detected a marked reduction in saliva pH between the starting and end of HD. Obesity, DM, and BFR contributed the most to this reduction. Moreover, the relationship between decreased pH and oral hygiene due to periodontal inflammation was also interesting. In addition, the loss of oral hygiene was pronounced more in diabetic HD patients than in those with non-DM. Further studies must be conducted before fully considering saliva pH variation as a factor of oral hygiene in patients receiving HD.

ETHICAL DECLARATIONS

Ethics Committee Approval: Selcuk University Ethics Committee approved the study protocol (2019/381).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Karaoğlanoğlu S, Çolak KM. Tükürük akış hızı, pH ve tamponlama kapasitesi. Atatürk Üniv Diş Hek Fak Derg 2001; 11(2):59-62.
2. Mese H, Matsuo R. Salivary secretion, taste and hyposalivation. J Oral Rehabil 2007; 34(10):711-23.
3. Sreebny LM. Saliva in health and disease: an appraisal and update, Int Dent J 2000; 50(3):140-6.

4. Edgar WM. Saliva: its secretion, composition and functions. Br Dent J 1992;172(8):305-12.
5. de Almeida Pdel V, Gregio AM, Machado MA, de Lima AA, Azevedo LR. Saliva composition and functions: a comprehensive review. J Contemp Dent Pract 2008;9(3):72-80.
6. Roth G.I, Calmes R. Oral Biology. The C.V. Mosby Company, St Louis 1981;209-28.
7. Navazesh M, Mulligan RA, Kipnis V, Denny PA, Denny PC. Comparison of whole saliva flow rates and mucin concentrations in healthy Caucasian young and aged adults. J Dent Res 1992;71(6):1275-8.
8. Malamud D. Saliva as a diagnostic fluid. Dent Clin North Am 2010;55(1):159-78.
9. Shetty P, Hegde MN, Eraly SM. Evaluation of salivary parameters and dental status in adult hemodialysis patients in an indian population. J. Clin. Exp. Dent 2018;10(5):419-24.
10. Daugirdas JT. Hemodialysis Treatment Time: As Important as it Seems? Semin Dial 2017;30(2):93-8.
11. Dawes C, Pedersen AM, Villa A, et al. The functions of human saliva: A review sponsored by the World Workshop on Oral Medicine VI. Arch Oral Biol 2015;60(6):863-74.
12. Anderson P, Hector MP, Rampersad MA. Critical pH in resting and stimulated whole saliva in groups of children and adults. Int J Paediatr Dent 2011;11(4):266-73.
13. Koppolu P, Sirisha S, Penala S, et al. Correlation of blood and salivary ph levels in healthy, gingivitis, and periodontitis patients before and after non-surgical periodontal therapy. Diagnostics (Basel) 2022;12(1):97.
14. Chuang SF, Sung JM, Kuo SC, Huang JJ, Lee SY. Oral and dental manifestations in diabetic and nondiabetic uremic patients receiving hemodialysis. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2005;99(6):689-95.
15. Metheny NA, Gunn EM, Rubbelke CS, Quillen TF, Ezekiel UR, Meert KL. Effect of pH Test-Strip Characteristics on Accuracy of Readings. Crit Care Nurse 2017;37(3):50-8.
16. Pilot T, Miyazaki H. Global results: 15 years of CPITN epidemiology. Int Dent J 1994;44(5 Suppl 1):553-60.
17. Chen W, Laiho S, Vaittinen O, et al. Biochemical pathways of breath ammonia (NH3) generation in patients with end-stage renal disease undergoing hemodialysis. J Breath Res 2016;10(3):036011.
18. Khanum N, Mysore-Shivalingu M, Basappa S, Patil A, Kanwar S. Evaluation of changes in salivary composition in renal failure patients before and after hemodialysis. J Clin Exp Dent 2017;9(11):e1340-e45.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Evaluation of SARS-CoV-2 Total Antibodies After Two Doses of Coronavac in Healthcare Workers: Retrospective and Observational Study

Sağlık Çalışanlarında İki Doz Coronavac Aşısı Sonrası SARS-CoV-2 Antikorlarının Değerlendirilmesi: Retrospektif ve Gözlemsel Çalışma

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ABSTRACT

Objevtive: During the pandemic process, physical distance, quarantine and isolation measures have been effective in limiting the number of infected people in the short term. However, special drugs and vaccines are required to be effective in the treatment and protection of COVID-19. In our study, it was aimed to compare antibody levels after inactivated Coronavac vaccine.

Material and Method: Our study included those who received two doses of CoronaVac vaccine from our hospital's healthcare workers. Blood antibody levels measured four weeks after the second dose of vaccine were compared according to age, gender, and units studied. Our study is a retrospective and observational study.

Results: A total of 491 healthcare employees were included in the study. Although no significant relations were detected between the total antibody levels, age, and gender, the antibody levels were significantly higher in those who had COVID-19 infection ($P < 0.001$). When the antibody levels of healthcare workers with COVID 19 infection are compared according to the units studied; the antibody levels of those working in risky units were statistically significantly higher than those working in these units. ($P < 0.001$)

Conclusions: The findings in our study showed that natural immunity supported by vaccination is more valuable than acquired immunity in terms of COVID-19.

Keywords: Antibody level, CoronaVac, healthcare workers, immunization, vaccination

ÖZ

Amaç: Pandemi sürecinde fiziksel mesafe, karantina ve izolasyon önlemleri kısa vadede enfekte olan insan sayısını sınırlamada etkili olmuştur. Ancak COVID 19 tedavi ve korunmasında etkili olacak özel ilaç ve aşılar gerekmektedir. Çalışmamızda inaktif Coronavac aşısı sonrası antikor düzeylerinin karşılaştırılması amaçlanmıştır.

Gereç ve Yöntem: Çalışmamıza hastanemizin sağlık çalışanlarından iki doz CoronaVac aşısı olanlar dahil edildi. İkinci aşı dozundan dört hafta sonra ölçülen kan antikor seviyeleri yaş, cinsiyet ve çalışılan ünitelere göre karşılaştırıldı. Çalışmamız retrospektif ve gözlemsel bir çalışmadır

Bulgular: Çalışmaya toplam 491 sağlık çalışanı dahil edildi. Toplam antikor seviyeleri, yaş ve cinsiyet arasında anlamlı bir ilişki saptanmamasına rağmen, COVID-19 enfeksiyonu olanlarda antikor seviyeleri anlamlı olarak daha yüksekti ($P < 0.001$). COVID 19 enfeksiyonu olan sağlık çalışanlarının antikor düzeyleri çalışılan birimlere göre karşılaştırıldığında; riskli birimlerde çalışanların antikor düzeyleri, bu birimlerde çalışmayanlardan istatistiksel olarak anlamlı derecede yüksekti. ($P < 0,001$)

Sonuç: Çalışmamızda elde edilen bulgular, COVID-19 açısından aşı ile desteklenen doğal bağışıklığın kazanılmış bağışıklıktan daha değerli olduğunu göstermiştir.

Anahtar Kelimeler: Antikor düzeyi, aşılama, CoronaVac, immunizasyon, sağlık çalışanları

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INTRODUCTION

The ongoing coronavirus disease 2019 (COVID-19) pandemic, which was caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), has caused high morbidity and mortality on a global scale. More than 497 million cases were detected worldwide from the onset of the pandemic to April 2022, and 6182000 people were lost (1). More than 6 million cases were detected in our country, and more than 98000 deaths were reported (2). The World Health Organization (WHO) has reported that healthcare employees, the elderly (> 60 years old), and those with underlying health problems are especially at high risk (1,3,4). Specific therapeutic agents and vaccines are needed urgently to decrease the burden of the disease and stop the spread of COVID-19 throughout the community (5).

There are currently more than 394 COVID-19 vaccine candidates under development worldwide, and 153 of these are at different stages of clinical trials by using different platforms (6). There are 12 vaccines with completed Phase 3, and they are currently in use. CoronaVac vaccine that was produced by the Sinovac Company, which is the first vaccine applied in our country among these vaccines, is an inactive vaccine, which has passed into Phase 4 (6). After the Phase 3 works, risk groups for COVID-19 vaccination were identified by the Ministry of Health of the Republic of Turkey. In this respect, according to the risk of exposure to the disease, risks of severe and transmission of the disease, and the risk groups, healthcare employees were vaccinated firstly.

Spike (S) and Nucleocapsid (N) proteins are the major antigenic structures in COVID-19 infection. The The antibodies against the Receptor-Binding Domain of the S (RBD-S) protein are more specific and have the feature of being neutralizing antibodies. Typically, seroconversion develops in the first 3 weeks (7-9). Although current serological tests are used as indicators of previous or ongoing infection, they do not assess the neutralizing ability of antibodies directly. However, it was shown that high immunoglobulin G (IgG) antibody titers detected with enzyme-linked immunosorbent assay (ELISA) are positively correlated with neutralizing antibodies (9, 10).

In this study, we aimed to compare the antibody responses that occur after the administration of two doses of inactivated SARS-CoV-2 vaccine (CoronaVac) in healthcare workers according to age, gender, department and previous COVID-19 status.

MATERIAL AND METHOD

The healthcare employees who received the CoronaVac vaccine between January and February 2021 were included in this retrospective and observational study, which was conducted in Kırıkhan State Hospital. Healthcare employees who had two doses of CoronaVac and whose antibody levels were checked with COVID-19 ELISA Test at least four weeks after the second dose were included in the study. The ethical approval of the study was obtained from the Ethics Committee of Hatay Mustafa Kemal University (Ethics Committee Decision N° 03; dated June 05, 2021). Those who had one single CoronaVac vaccine dose and those who had the COVID-19 vaccine but did not have their antibody levels checked were excluded from the study. The age, gender, COVID-19 infection status of the participants, their working in a risky unit status (emergency service, pandemic service, pandemic intensive care unit, polymerase chain reaction (PCR) laboratory) were recorded retrospectively from the hospital records. All of the cases that had COVID-19 were PCR positive. The antibody levels were compared according to age ranges, gender, previous COVID-19 infection, and units worked at.

The Elecsys Anti-SARS-CoV-2 Electrochemiluminescence Immunoassay of Cobas Company was used in our study. The Elecsys Anti-SARS-CoV-2 is an immunoassay for qualitative in vitro detection of the antibodies (including IgG) of the SARS-CoV-2 in human serum and plasma. The Elecsys Anti-SARS-CoV-2 Test uses a recombinant protein that represents the N antigen in double antigen sandwich assay format supporting the detection of high-affinity antibodies of SARS-CoV-2. Blood samples were taken and treated with the reagents and microparticles in line with the manufacturer's procedures, and >1 COI was considered positive as the threshold value in the evaluation of the results.

Statistical Analysis

The analyzes were made with the IBM SPSS Package Program version 22.0 (IBM Corporation, Armonk, New York, United States). The statistical significance level was taken as $P < 0.05$. The continuous variables were expressed as median (min.-max.), and the categorical data were expressed as numbers and percentages. The normality analyzes were performed with the Kolmogorov-Smirnov Goodness of Fit Test in the intergroup analysis of the continuous variables. Since the continuous variables were not found to be suitable for normal distribution, the Kruskal Wallis Test was used for the analyzes of more than two groups; and the Mann Whitney U test was used for the analysis of two groups. The categorical data were expressed as numbers and percentages. The McNemar test was used for the comparison of the categorical data between the dependent groups.

RESULTS

The results of the healthcare employees who received two CoronaVac vaccine doses and whose antibody levels were checked with the COVID-19 ELISA Test four weeks after the 2nd vaccine were evaluated in our study. There are a total of 625 healthcare employees in our hospital. A

total of 491 healthcare employees were included in the present study after 28 people were excluded because they had one single dose of the vaccine, and 106 people were excluded because they did not have antibody tests. The comparison of the total antibody levels according to the demographic data, units worked at, and COVID-19 infection status of the participants is shown in **Table 1**.

Table 1. Comparison of the antibody levels according to age, gender, and coronavirus disease 2019 (COVID-19) transmission status

	n; %	COVID-19 vaccine antibody level Median (min.-max.)	P
Age (years)			0.123*
18-30 years of age	175 (35.6)	35.13 (1.05-219.70)	
31-40 years of age	149 (30.4)	19.06 (1.03-211.10)	
41-64 years of age	167 (34.0)	41.91 (1.07-224.10)	
Gender			0.597**
Female	242 (49.3)	31.79 (1.19-224.10)	
Male	249 (50.7)	32.56 (1.03-211.70)	
Past COVID-19 infection			< 0.001**
Yes	105 (21.4)	81.54 (1.28-211.10)	
No	386 (78.6)	23.13 (1.03-224.10)	
Total	491 (100.0)	32.38 (1.03-224.10)	

*Kruskal Wallis Test; **Mann Whitney U Test. min.-max. = minimum-maximum.

A total of 35.6% of the healthcare employees who were examined in the scope of the present study were between the ages of 18-30, 34.0% were between the ages of 41-64, 50.7% were men, and 21.4% had COVID-19. According to our findings, no significant relations were detected between the total antibody levels, age, and gender, and the antibody level was significantly higher in those who had the COVID-19 infection (P < 0.001).

A total of 105 healthcare workers, 98 of whom before vaccinated, who participated in our study, had COVID 19 infection. Twenty-four of those who were vaccinated before and who had COVID 19 infection worked in units at risk for COVID-19. Among those who had COVID-19 infection before vaccination, 50 people had the infection less than one month before the vaccination, 42 people had it 60 days before the vaccination, and six people had it three-six months before. Only seven people had COVID-19 infection after the vaccination. It was found that these people had a COVID-19 infection in three-six months after the first dose of vaccine.

When the COVID-19 vaccine antibody levels were considered, it was found that the antibody levels of those working at risky units were higher than those not working at risky units, and the difference was close to a significant level (P = 0.082). The antibody levels of the healthcare employees working or not working at risky units who had COVID-19 infection were higher at statistically significant than those who did not have COVID-19 infection (P < 0.001) (**Table 2**).

Table 2. Comparison of the antibody levels according to the units worked at and coronavirus disease 2019 (COVID-19) infection status

	n; %	COVID-19 vaccine antibody level Median (min.-max.)	P
Working at a risky unit			0.082*
Yes	101 (20.6)	47.46 (1.19-219.70)	
No	390 (79.4)	30.30 (1.03-224.10)	
Total	491 (100.0)	32.38 (1.03-224.10)	
Those working at a risky unit			0.012*
Positive Covid infection	24 (23.8)	104.50 (1.64-205.60)	
Negative Covid infection	77 (76.2)	30.91 (1.19-219.70)	
Total	101 (100.0)	81.54 (1.28-211.10)	
Those not working at a risky unit			0.000042*
Positive Covid infection	81 (20.8)	75.96 (1.28-211.10)	
Negative Covid infection	309 (79.2)	21.60 (1.03-224.10)	
Total	390 (100.0)	30.30 (1.03-1.03	

*Mann Whitney U Test. min.-max. = minimum-maximum.

No statistically significant differences were detected in the comparison of those with and without COVID-19 infection according to the status of working at risky units (**Table 3**).

Table 3. The comparison of the antibody levels according to the units worked at and coronavirus disease 2019 (COVID-19) infection status

	n;%	COVID-19 vaccine antibody level Median (min.-max.)	P
Those with positive Covid infection			0.260*
Those working at a risky unit	24 (22.9)	104.51 (1.64-205.60)	
Those not working at a risky unit	81 (77.1)	75.96 (1.28-211.10)	
Total	105 (100.0)	81.54 (1.28-211.10)	
Those with negative Covid infection			0.230*
Those working at a risky unit	77 (19.9)	30.91 (1.19-219.70)	
Those not working at a risky unit	309 (80.1)	21.60 (1.03-224.10)	
Total	386 (100.0)		

*Mann Whitney U Test. min.-max. = minimum-maximum.

DISCUSSION

Detection of specific antibodies after active immunization in the COVID-19 pandemic; In addition to contributing to the vaccine development and approval processes, it is also important in the follow-up of the vaccinated people (11). It was also found that the total antibody levels of those who had COVID-19 infection were higher than those who did not (P < 0.001). Also, more than 70% of the 105 people infected with COVID-19 did not work in units at risk for COVID-19. When the antibody levels developed

after the COVID-19 vaccine, were considered, it was found that the antibody levels were higher in those working in the risky unit than in those who were not working in the risky unit, and the difference was close to significant (P = 0.082).

Inactivated virus vaccines, Nucleic Acid-Based Vaccines (mRNA and DNA vaccines), vector vaccines, and protein-based vaccines are the methods used commonly in COVID-19 vaccine works (6). A total of 12 vaccines among the COVID-19 vaccines, whose Phase 3 has been completed, can be examined under four headings. The part of the SARS-CoV-2 genome that encodes the Spike protein is inserted in the lipid nanoparticles with the mRNA molecule in the first mRNA vaccine group (12). In the second vector-based vaccines group, the SARS-CoV-2 Spike glycoprotein is immunogenic along with the non-replicative adenoviral vectors (13). The entire length of the SARS-CoV-2 Spike glycoprotein is used along with the matrix M adjuvant in recombinant protein-based vaccines (14). In the final group, which is the inactivated vaccines, inactivated viruses are used along with various adjuvants (15, 16). Twenty one of the 153 vaccine candidates examined in various clinical phases are inactivated virus vaccines (6).

When the efficacy rates were examined in a review that investigated COVID-19 vaccines in Phase 3 and advanced phases, RNA-based and protein-based vaccines stood out in terms of efficacy rates; but when safety, logistics, and storage conditions were evaluated, inactivated vaccines stood out (17). Inactivated vaccines are used widely for the prevention of respiratory diseases that emerged in previous years. Although there are early findings suggesting that inactivated vaccines developed in the COVID-19 pandemic have low efficacy when compared to mRNA vaccines, according to a WHO Guideline, they still provide protection at minimum 50% efficacy. In Phase 3 studies regarding the CoronaVac vaccine of the Sinovac Company, which were conducted in different countries, 91.25% efficacy rate was reported in our country, 65% in Indonesia, and 50.4% in Brazil (17). When these Phase 3 studies were examined, it was found that 12396 healthcare employees who were over the age of 18 participated in the Brazilian study. According to the antibody results that were measured 14 days after the two doses of the vaccine (0-14), it was detected that the vaccine was found to be effective at a rate of 50.4% to prevent asymptomatic-mild cases, 83.7% to prevent cases requiring treatment, and 100% to prevent hospitalization, severe, and fatal cases (18). In Phase 3 results in our country, a total of 7371 people were evaluated, which included 918 healthcare employees, and 6453 non-healthcare participants between the ages of 18-59. According to the antibody measurements that were made 14 days after the two doses of the vaccine, a 91.25% protection rate was detected (18).

In phase studies with CoronaVac and other inactivated vaccines at different dosages and doses, seroconversion was found to be over 90% (15, 16). In the phase 2 study of Che et al. with another inactivated SARS CoV-2 vaccine other than CoronaVac, both anti-S and anti-N proteins were measured separately. According to the data of the study, neutralizing antibody was induced by the vaccine in more than 90% of individuals in this adult population, and the resulting antibody response included anti-S and anti-N antibodies (19). The anti-N type antibodies were also measured in our study. The antibody levels of all healthcare employees who participated in our study were above the positive threshold value. When evaluated along with this phase study, it can be speculated that the seroconversion with neutralizing antibodies was 100%.

In the first study in the literature that evaluated the CoronaVac vaccine results in our country, the post-vaccination anti-spike IgG levels of 1072 healthcare employees were measured. Antibody rates was found to be higher in women than in men. In the present study, when the antibody levels of people who had and did not have COVID-19 before were compared, it was found that the antibody rates of those who had COVID-19 were 98.6%, and those who did not have it were 70.6% (20). In a study examining the antibody levels measured after the first and second dose vaccination of 276 healthcare workers, it was found that the mean antibody level obtained after the first dose of vaccination in people with COVID 19 infection was higher than the average antibody level obtained after the second dose of vaccination in people who did not have COVID-19 infection (21). Similarly, in the study of Özdemir et al., antibody titers in healthcare workers who had COVID-19 infection were higher than those who did not (22). In our study, the antibody levels of those who had COVID-19 were statistically significantly higher than the antibody rates of those who did not have COVID-19 ($P < 0.001$). The antibodies caused by natural immunity become detectable at high levels with one single dose of the vaccine. In our study, the antibody levels did not differ according to gender. In the study in which the anti-spike IgG levels were measured, it was found that the antibody response was higher in women. The fact that the antibody kit used in our study was not anti-spike may have caused this.

In the study that was conducted by Bayram et al., 213 of the 1072 healthcare employees were working at risky units which involved COVID-19 patients. No differences were detected in the antibody levels of these individuals when compared to those working at other units (20). In our study, the antibody levels of those who worked at risky units and those who worked at other units were close, which may indicate that the COVID-19 antibody levels are not associated with occupational exposure. However, the antibody levels of the healthcare employees who worked at risky units and those who had COVID-19 infection

were found to be statistically higher than those who did not in our study (P 0.012). It was found that, apart from occupational exposure, natural immunity significantly increases antibody levels as expected for COVID-19. In the study conducted by Bayram et al., antibody positivity was detected at a rate of 71.4% in people whose COVID-19 status was not known, which was considered to reflect community-acquired immunity as a result of unaware exposure in daily medical practice. When the antibody levels of those who had and did not have COVID-19 in our study were evaluated according to working at risky units status, no statistically significant differences were detected. It was observed in our study that occupational exposure and antibody levels of employees at risky units were not affected.

Our study had several limitations. First, it was a single-center study, and it was not sufficient to generalize the findings. Second, SARS-CoV-2 antibody levels were not tested in healthcare employees before the vaccinations. The antibody levels of asymptomatic COVID-19 cases or those who were not diagnosed with mild symptoms might have affected our results. However, the strengths of our study were that our data reflect the real-life data of the CoronaVac vaccine following Phase 3 studies. Also, the number of COVID-19 infections diagnosed after the vaccination decreased at significant levels, which shows the success of the CoronaVac vaccine in preventing the disease. We believe that our real-life data will contribute to the literature in terms of the protection of the CoronaVac vaccine.

Although social distancing, quarantine, and isolation measures in the COVID-19 pandemic are effective in limiting the number of people who are infected in the short term, vaccination studies must continue without slowing down to decrease the morbidity and mortality rates after the disease and to end the pandemic. When the side-effect profile, logistics, and storage conditions were considered, it was found that inactivated vaccines appear to be advantageous when compared to other mRNA, viral vector, and protein-based vaccines. Their effectiveness is adequate with Phase 3 studies and with the real-life data as in our study.

CONCLUSION

The findings of our study showed that natural immunity is more valuable than acquired immunity for COVID-19. However, it is necessary to provide herd immunity acquired by vaccination to avoid morbidity and mortality, which might occur with natural immunity. In addition, in COVID-19 infection; The level of antibody that provides protection or the duration of protection is not yet clear. Therefore, prospective studies are needed to determine how long the immunity provided by SARS-CoV-2 vaccines will continue..

ETHICAL DECLARATIONS

Ethics Committee Approval: The ethical approval of the study was obtained from the Ethics Committee of Hatay Mustafa Kemal University (Date: 05.06.2021, Decision No: 03).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

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REFERENCES

1. World Health Organization. WHO coronavirus disease(COVID-19) dashboard https://covid19.who.int/ [04.06.2021].
2. T.R. Ministry of Health General Coronavirus Table https://covid19.saglik.gov.tr/TR-66935/genel-koronavirus-tablosu.html [04.06.2021].
3. Flaxman S, Mishra S, Gandy A, et al. Estimating the effects of non-pharmaceutical interventions on COVID-19 in Europe. Nature. 2020;584(7820):257-61.
4. Sanche S, Lin YT, Xu C, Romero-Severson E, Hengartner N, Ke R. High contagiousness and rapid spread of severe acute respiratory syndrome coronavirus 2. Emerging infectious diseases. 2020;26(7):1470-7.
5. Zhang Y-J, Zeng G, Pan H-X, et al. Immunogenicity and safety of a SARS-CoV-2 inactivated vaccine in healthy adults aged 18-59 years: report of the randomized, double-blind, and placebo-controlled phase 2 clinical trial. medrxiv. 2020.
6. World Health Organization.Draft landscape of COVID-19 candidate vaccines https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines [04.06.2021].
7. Diagnostic testing for SARS-CoV-2. Interim guidance. https://www.who.int/publications/i/item/diagnostic-testing-for-sars-cov-2 [09/06/21].
8. Peeling RW, Wedderburn CJ, Garcia PJ, et al. Serology testing in the COVID-19 pandemic response. Lancet Infect Dis 2020.
9. S Kılıç, Şencan İ. Virological Diagnosis. 2021. p. 4-22.
10. Zhao J, Yuan Q, Wang H, et al. Antibody responses to SARS-CoV-2 in patients with novel coronavirus disease 2019. Clin Infect Dis 2020;71(16):2027-34.
11. Perkmann T, Perkmann-Nagele N, Koller T, et al. Anti-spike protein assays to determine SARS-CoV-2 antibody levels: a head-to-head comparison of five quantitative assays. Microbiol Spectrum. 2021;9(1):e00247-21.
12. Messengers of hope. Nat Biotechnol. 2021;39(1):1.
13. Logunov DY, Dolzhikova IV, Shcheblyakov DV, et al. Safety and efficacy of an rAd26 and rAd5 vector-based heterologous prime-boost COVID-19 vaccine: an interim analysis of a randomised controlled phase 3 trial in Russia. Lancet. 2021;397(10275):671-81.
14. Keech C, Albert G, Cho I, et al. Phase 1–2 trial of a SARS-CoV-2 recombinant spike protein nanoparticle vaccine. New Engl J Med 2020;383(24):2320-32.
15. Xia S, Duan K, Zhang Y, et al. Effect of an inactivated vaccine against SARS-CoV-2 on safety and immunogenicity outcomes: interim analysis of 2 randomized clinical trials. JAMA. 2020;324(10):951-60.

16. Zhang Y, Zeng G, Pan H, et al. Safety, tolerability, and immunogenicity of an inactivated SARS-CoV-2 vaccine in healthy adults aged 18–59 years: a randomised, double-blind, placebo-controlled, phase 1/2 clinical trial. Lancet Infect Dis 2021;21(2):181-92.
17. Funk CD, Laferrière C, Ardakani A. Target product profile analysis of COVID-19 vaccines in phase III clinical trials and beyond: an early 2021 perspective. Viruses. 2021;13(3):418.
18. Sinovac Announces Phase III Results of Its COVID-19 Vaccine. Available on: https://www.businesswire.com/news/home/20210205005496/en/ [accessed 08.06.2021].
19. Che Y, Liu X, Pu Y, et al. Randomized, Double-Blinded, Placebo-Controlled Phase 2 Trial of an Inactivated Severe Acute Respiratory Syndrome Coronavirus 2 Vaccine in Healthy Adults. Clin Infect Dis. 2021;73(11):e3949-e3955.
20. Bayram A, Demirbakan H, Karadeniz PG, Erdoğan M, Koçer I. Quantitation of antibodies against SARS-CoV-2 spike protein after two doses of CoronaVac in health care workers. J Med Virol 2021.
21. Özgür D TE. COVID-19 enfeksiyonu geçiren ve geçirmeyen sağlık çalışanlarında iki doz inaktive SARS-CoV-2 aşısı sonrası antikor yanıtı: Prospektif gözlemsel çalışma. Mikrobiyol Bul. 2022;56(1):36-48.
22. Özkan Özdemir H TS, Coşkuner SA, Demir S. SARS-CoV-2 seropositivity level in a cohort of Turkish health care professionals after COVID-19 vaccine (CoronaVac) and assessment of factors affecting the antibody response. FLORA. 2022; 27(1)::142-50.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Investigation of Post-COVID-19 Patients' Chronic Symptoms and Clinical Findings

COVID-19 Sonrası Hastaların Kronik Semptom ve Klinik Bulgularının İncelenmesi

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ABSTRACT

Background: The objective of this study was to assess whether multiple relevant symptoms recover following the onset of symptoms in hospitalized and nonhospitalized patients with COVID-19.

Material and Method: In this study, the data of 14 patients who applied to Ankara Polatlı Duatepe State Hospital between May 01, 2020, and May 05, 2021, were confirmed COVID-19 and were hospitalized in the COVID-19 service for 5 to 20 days, and the data of COVID-19 patients 86 stayed at home were analyzed. 79 female and 21 male patients and mean age was 48.65±14.926 (20-82) years were included in the study. Demographic, clinical, radiological, and laboratory records of the patients were reviewed retrospectively.

Results: Of those who had the disease, 42 were mild, 33 were moderate, 14 were severe, and 11 were extremely severe. Of the post-COVID-19 patients who had the disease, 14 had therapy in the hospital and 86 patients had therapy at home. Symptoms seen in post-COVID-19 patients were muscle pain, cough, shortness of breath, loss of taste and smell, fever, nausea, hoarseness, and hair loss, and their frequencies were 70, 60, 51, 51, 49, 46, 40, and 31, respectively. While 34% had one or two symptoms and 56% had three or more.

Conclusion: In hospitalized and nonhospitalized patients with confirmed or suspected COVID-19, multiple symptoms are present, about 5 days after symptoms onset. These suggest the presence of a "post-COVID-19 syndrome", and highlight the unmet healthcare needs in a subgroup of patients with "mild" or "severe" COVID-19.

Keywords: Post-COVID-19 symptoms, CRP, COVID-19

ÖZ

Amaç: Bu çalışmanın amacı, COVID-19'lu hastanede yatan ve hastaneye yatırılmayan hastalarda semptomların başlamasını takiben birden fazla ilgili semptomun iyileşip iyileşmediğini değerlendirmektir.

Gereç ve Yöntem: Bu çalışmada 01 Mayıs 2020 - 05 Mayıs 2021 tarihleri arasında Ankara Polatlı Duatepe Devlet Hastanesi'ne başvuran ve COVID-19 servisinde 5 ila 20 gün yatarak tedavi gören 14 hastanın verileri ve evde kalan 86 COVID-19 hastalarının verileri analiz edildi. Çalışmaya yaş ortalaması 48.65±14.926 (20-82) yıl olan 79 kadın, 21 erkek hasta dahil edildi. Hastaların demografik, klinik, radyolojik ve laboratuvar kayıtları geriye dönük olarak incelendi.

Bulgular: Hastalığı olanların 42'si hafif, 33'ü orta, 14'ü şiddetli ve 11'i aşırı şiddetli idi. COVID-19 sonrası hastalığa yakalanan hastalardan 14'ü hastanede, 86'sı ise evde tedavi gördü. COVID-19 sonrası hastalarda görülen semptomlar kas ağrısı, öksürük, nefes darlığı, tat ve koku kaybı, ateş, bulantı, ses kısıklığı ve saç dökülmesi olup, sıklıkları sırasıyla, 70, 60, 51, 51, 49, 46, 40 ve 31 idi. %34'ünde bir veya iki semptom varken, %56'sında üç veya daha fazla semptom vardı.

Sonuç: COVID-19'u doğrulanmış veya şüphelenilen hastanede yatan ve hastaneye yatırılmayan hastalarda, semptomların başlamasından yaklaşık 5 gün sonra birden fazla semptom mevcuttur. Bunlar, bir "COVID-19 sonrası sendromunun" varlığını düşündürür ve "hafif" veya "şiddetli" COVID-19'lu bir hasta alt grubunda karşılanmamış sağlık hizmeti ihtiyaçlarını vurgular.

Anahtar Kelimeler: COVID-19 sonrası semptomlar, CRP, COVID-19

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INTRODUCTION

Confirmed COVID-19 case number and death due to coronavirus disease 2019 (COVID-19) should be uptade and referance should be given for example by 22 July 2022, there have been 565.207.160 confirmed cases of COVID-19, including 6.373.739 deaths reported to WHO (1). The clinical spectrum of SARS-CoV-2 infection is wide, encompassing asymptomatic infection, fever, fatigue, myalgias, mild upper respiratory tract illness, severe life-threatening viral pneumonia requiring admission to hospital, and death (2). Physicians are observing persisting symptoms and unexpected, substantial organ dysfunction after SARS-CoV-2 infection in an increasing number of patients who have recovered, as previously observed in the SARS outbreak (3). However, COVID-19 is a new disease and uncertainty remains regarding the possible long-term health sequelae. This is particularly relevant for patients with severe symptoms, including those who required mechanical ventilation during their hospital stay, for whom long-term complications and incomplete recovery after discharge would be expected. Unfortunately, few reports exist on the clinical picture of the aftermath of COVID-19. Instead of aftermath of COVID-19, post-COVID-19 can be used.

Multiple symptoms like fever, cough, fatigue, dyspnoea, headache, diarrhea, nausea, and vomiting, have been reported during the hospital stay (4, 5). About 60 days after the onset of the first COVID-19 symptom, only 13% of the previously hospitalized COVID-19 patients were completely free of any COVID-19-related symptom, while 32% had one or two symptoms and 55% had three or more (6). Next to the hospitalized patients with "severe" coronavirus disease 2019 (COVID-19), millions of people have most probably been infected with SARS-CoV-2 without formal COVID-19 testing and/or medical treatment in the hospital (7, 8). Indeed, COVID-19 testing capacity was not available for patients who initially were considered to have mild signs and symptoms. These patients are classified as having "mild" COVID-19 as they only require home care and the infection is expected to resolve (9). Then again, patients with the so-called "mild" COVID-19 may still complain about persistent symptoms, even weeks after the onset of symptoms. To date, however, only anecdotal evidence is available (6).

This study assessed whether or not multiple relevant symptoms recovered following the onset of symptoms in hospitalized and nonhospitalized patients with COVID-19.

MATERIAL AND METHOD

This study is a retrospective cohort study conducted with patients who had post-COVID-19 symptoms. All patients who applied to Polatlı Duatepe State Hospital with suspected COVID-19 disease between May 01, 2020, and May 05, 2021, and were infected with laboratory-confirmed SARS-COV-2 were included in the study. How did laboratory–corfirmed SARS-COV-2 case idenditfy should be explained for example SARS-CoV-2 real-time reverse-transcription-polymerase chain reaction (rRT-PCR) test positive cases identified as laboratory-confirmed cases. This study was approved by the Siirt University Non-Interventional Clinical Research Ethics Committee (No: 2021/02.01). The data of 100 patients confirmed with post-COVID-19 were studied. The COVID-19 patients participating in the study did not have any additional diseases defined. Demographic, clinical characteristics, and laboratory findings of the patients were obtained from hospital information system records. All data were checked by physicians who are experts in internal medicine and infectious diseases and clinical microbiology. The time from onset of illness to hospitalization was also recorded. All patients participating in this study were laboratory-confirmed COVID-19 patients, and the diagnostic criteria for COVID-19 were based on the positive rRT-PCR tests results.

White blood cell (WBC), lymphocyte (LY), monocyte (MO), neutrophil (NE), eosinophil (EO), basophil (BA), platelet (PLT), urea, creatinine, total and direct bilirubin, alanine transaminase (ALT), aspartate transaminase (AST), sodium (Na), potassium (K), calcium (Ca), C-reactive protein (CRP), and thyroid stimulating hormone (TSH) were determined for each patient. All medical laboratory data were measured by the clinical laboratory of Polatlı Duatepe State Hospital.

Throat-swab specimens obtained from the upper respiratory tract of patients at admission were stored in a viral-transport medium. Total RNA was extracted within 2 hours using the respiratory sample RNA isolation kit. SARS-CoV-2 was examined by rRT-PCR as described previously.

All COVID-19 patients met the following criteria: (a) Epidemiology history, (b) Fever or other respiratory symptoms, (c) Typical CT image abnormities of viral pneumonia, and (d) Positive result of rRT-PCR for SARS-CoV-2 RNA. Furthermore, CT imaging scores were used to quantify the pathological changes in COVID-19 patients.

Post-COVID-19; COVID-19 symptoms in patients with diagnosed defined as a longer duration. Syndromes; fever, cough, shortness of breath, loss of taste and odor, hair loss, nausea, muscle pain, and hoarseness (10-12).

Statistical Analysis

For the statistical evaluation of the results obtained, SPSS (Statistical Package for Social Sciences, Chicago, Illinois, USA) 22.0 package program was used. In the evaluation of the results, descriptive values were expressed as number (n), percentage (%), mean, and prevalence value Standard deviation (SD). Student t-test and chi-square test were used to compare categorical variables. $p<0.05$ were considered statistically significant.

RESULTS

In this study, out of 100 post-COVID-19 patients sampled for the diagnosis of laboratory findings were female, 79 (79%) were 21 (21%) male, and the mean age was 48.65±14.926 (20-82) years (**Table 1**).

Table 1. The demographic evaluation and post-COVID-19 grade

Female/Male	79/21
Age (years)	48.65±14.926
Strong	14
Severe	11
Middle	33
Mild	42
Hospital	14
House	86

In our study, the CRP and TSH were found to be higher than the reference ranges (**Table 2**). In our study, the hemogram parameters unchange comparase to the reference ranges (**Table 3**).

Table 2. Laboratory parameters (mean±SD)

Parameters	Post-COVID-19 (n= 100)	Reference range
Urea (mg/dL)	30.823±13.756	17-43
Creatinine (mg/dL)	0.678±0.198	0.67-1.17
TBil (mg/dL)	0.605±0.295	0.3-1.2
DBil (mg/dL)	0.111±0.049	0-0.2
ALT (U/L)	23.578±17.029	0-50
AST (U/L)	20.905±8.334	0-50
Na (mmol/L)	138.797±2.417	136-146
K (mmol/L)	4.484±0.345	3.5-5.1
Ca (mg/dL)	9.533±0.328	8.8-10.6
CRP (mg/dL)	0.655±1.692	0-0.5
TSH (mIU/L)	2.262±2.678	0.4-4

T Bil-Total bilirubine, D Bil-Direct bilirubine, ALT-Alanine transaminase, AST-Aspartate transaminase, Sodium-Na, Potassium-K, Calcium-Ca, CRP-C-reactive protein, TSH-Tiroit stimulating hormone

Table 3. Hemogram parameters (mean±SD)

Parameters	Post-COVID-19 (n= 100)	Reference range
WBC 10^3/mL	6.612±1.766	4-10
LY 10^3/mL	2.166±0.668	1-5
MO 10^3/mL	0.445±0.129	0.2-1.5
NE 10^3/mL	3.796±1.302	2-8
EO 10^3/mL	0.168±0.107	0-0.7
BA 10^3/mL	0.034±0.029	0-0.25
PLT 10^3/µL	258.989±66.259	150-500

WBC-White blood cell, LY-Lymphocyte, MO-Monocyte, NE-Neutrophil, EO-Eosinophil, BA-Basophil, PLT-Platelet

Of those who had the disease, 42 were mild, 33 were moderate, 14 were severe, and 11 were extremely severe. Of the post-COVID-19 patients who had the disease, 14 had it in the hospital and 86 had it at home Table 1. Symptoms seen in post-COVID-19 patients were muscle pain, cough, shortness of breath, loss of taste and smell, fever, nausea, hoarseness, and hair loss, and their frequencies were 70, 60, 51, 51, 49, 46, 40, and 31, respectively **Table 4**. While 34% had one or two symptoms and 56% had three or more.

Table 4. COVID-19 syndromes

Syndromes	Existent n (%)	Absent n (%)
Fever	49 (49%)	51 (51%)
Cough	60 (60%)	40 (40%)
Shortness of breath	51 (51%)	49 (49%)
Loss of taste and odor	51 (51%)	49 (49%)
Hair loss	31 (31%)	69 (69%)
Nausea	46 (46%)	54 (54%)
Muscle pain	70 (70%)	30 (30%)
Hoarseness	40 (40%)	60 (60%)

DISCUSSION

Since the pandemic continues, there are limited data on clinical and prognostic factors in patients with COVID-19. COVID-19 is a highly infectious respiratory disease that leads to decreased respiratory, physical, and psychological function in affected patients (13). Patients' symptoms widely vary; from asymptomatic to severe (14). As COVID-19 is highly infectious, the patients are isolated in order to limit the spread of SARS-CoV-2. This leads to a significant reduction in social interactions, as a consequence of which the patients feel lonely and isolated (15). The mechanism causing pneumonia is particularly complex. It seems that the infection can elicit an excessive immune response in the host. COVID19 in some cases elicits a response generally known as a 'cytokine storm' (16).

In some cases, moreover, patients suffer from an extensive lung tissue inflammation. The main cytokine in this 'storm' is interleukin 6 (IL-6). IL-6 is produced by activated leukocytes and acts on a large number of cells and tissues. IL-6 assists in B cell differentiation. Many patients remain to lie in the intensive care unit for a longer period of time. Patients often remain in one position for several hours, which may lead, due to critical illness, to dysphagia, muscle weakness, myopathy, and neuropathy, as well as to reduced mobility (17) due to muscle weakness. It may also result in walking problems potentially affecting patients' daily activities. In the post-infection period, patients may experience persistent pulmonary, musculoskeletal, neurological, cardiac, and psychological problems (18).

In our study, we demonstrated that the serum CRP and TSH levels were higher than the reference ranges.

While many studies have shown the onset of subacute thyroiditis (SAT) after certain infections, including COVID-19, few studies have demonstrated the relationship between COVID-19 and over the hypothyroidism (19).

Chen et al. demonstrated that TSH lower than the normal range was present in 56% (28/50) of the patients with COVID-19. The levels of TSH and serum total triiodothyronine (TT3) of the patients with COVID-19 were significantly lower than those of the healthy control

group and non-COVID-19 pneumonia patients. The more severe the COVID-19, the lower the TSH and TT3 levels were, with statistical significance. The degree of the decreases in TSH and TT3 levels was positively correlated with the severity of the disease. The total thyroxine (TT4) level of the patients with COVID-19 was not significantly different from the control group. All the patients did not receive thyroid hormone replacement therapy. After recovery, no significant differences in TSH, TT3, TT4, free triiodothyronine (fT3), and free thyroxine (fT4) levels were found between the COVID-19 and control groups (20).

Huang et al. found that fatigue or muscle weakness, sleep difficulties, and anxiety or depression were common, even 6 months after symptom onset. Huang et al. also found that being a woman and severity of illness were risk factors for persistent psychological symptoms (21). Female SARS survivors had higher stress levels and higher levels of depression and anxiety (22). In a 3-month follow-up survey of 538 COVID-19 patients, it was found that physical decline or fatigue, post-activity polypnoea, and alopecia were more common in women than in men. The underlying mechanism of the psychiatric consequences of COVID-19 is likely to be multifactorial and might include the direct effects of viral infection, the immunological response, corticosteroid therapy, ICU stay, social isolation, and stigma (23).

In our study, we demonstrated that of those who had the disease, 42 were mild, 33 were moderate, 14 were severe, and 11 were extremely severe. Of the post-COVID-19 patients who had the disease, 14 had it in the hospital and 86 had it at home. Symptoms seen in post-COVID-19 patients were muscle pain, cough, shortness of breath, loss of taste and smell, fever, nausea, hoarseness, and hair loss, and their frequencies were 70, 60, 51, 51, 49, 46, 40, and 31, respectively. While 34% had one or two symptoms and 56% had three or more.

CONCLUSION

As a result, In previously hospitalized and nonhospitalized patients with confirmed or suspected COVID-19, multiple symptoms are present about 5 days after symptoms onset. This suggests the presence of a "post-COVID-19 syndrome" and highlights the unmet healthcare needs in a subgroup of patients with "mild" or "severe" COVID-19. Further studies are required for randomized clinical trials may help confirm in confirming the results and hypotheses.

ETHICAL DECLARATIONS

Ethics Committee Approval: This study was approved by the Siirt University Non-Interventional Clinical Research Ethics Committee (No: 2021/02.01).

Informed Consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. World Health Organization. WHO Coronavirus (COVID-19) Dashboard 2022. Available Online: https://covid19.who.int/. WHO
2. Zhou F, Yu T, Du R, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. Lancet 2020; 395: 1054-62.
3. Zhang P, Li J, Liu H, et al. Long-term bone and lung consequences associated with hospital-acquired severe acute respiratory syndrome: a 15-year follow-up from a prospective cohort study. Bone Res 2020; 8: 8.
4. Li LQ, Huang T, Wang YQ, et al. COVID-19 patients' clinical characteristics, discharge rate, and fatality rate of meta-analysis. J Med Virol 2020; 92: 577-83.
5. Guan WJ, Ni ZY, Hu Y, et al. Clinical characteristics of coronavirus disease 2019 in China. N Engl J Med 2020; 382: 1708-20.
6. Carfì A, Bernabei R, Landi F, et al. Persistent symptoms in patients after acute COVID-19. JAMA 2020; 324: 603-5.
7. Li R, Pei S, Chen B, et al. Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV-2). Science 2020; 368: 489-93.
8. Stringhini S, Wisniak A, Piumatti G, et al. Seroprevalence of anti-SARS-CoV-2 IgG antibodies in Geneva, Switzerland (SEROCoV-POP): a population-based study. Lancet 2020; 396: 313-19.
9. Gandhi RT, Lynch JB, Del Rio C. Mild or moderate COVID-19. N Engl J Med 2020; 383: 1757-66.
10. Baig AM. Chronic COVID Syndrome: Need for an Appropriate Medical Terminology for Long-COVID and COVID Long-Haulers. J Med Virol 2021; 93: 2555-6
11. Greenhalgh T, Knight M, A'Court C, Buxton M, Husain L. Management of post-acute COVID-19 in primary care. BMJ 2020; 370:m3026.
12. Guan WJ, Ni ZY, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. N Engl J Med 2020; 382: 1708-20.
13. Hatala R. Proposal for complementary targeted public health antiepidemic measures during the pandemics of COVID-19. Bratisl Med J 2020; 121 (7): 459-61.
14. Zhu Y, Wang Z, Zhou Y, et al. Summary of respiratory rehabilitation and physical therapy guidelines for patients with COVID-19 based on recommendations of World Confederation for Physical Therapy and National Association of Physical Therapy. J Phys Ther Sci 2020; 32 (8): 545-9.
15. Liska D, Poljak J. Possibilities of rehabilitation in corona virus disease (COVID-19). Rehabilitacia 2020; 57 (2): 78-90.
16. Yormaz B, Ergun D, Tulek B, et al. The evaluation of prognostic value of acute phase reactants in the COVID-19. Bratisl Med J 2020; 121 (9): 628-33.
17. Smondack P, Gravier F-É, Prieur G, et al. [Physiotherapy and COVID-19. From intensive care unit to home care-An overview of international guidelines]. Rev Mal Respir 2020; 10.
18. Barker-Davies RM, O'Sullivan O, Senaratne KPP, et al. The Stanford Hall consensus statement for post-COVID-19 rehabilitation. Br J Sports Med 2020; 54 (16): 949-59.
19. Dworakowska D, Morley S, Mulholland N, Grossman AB. COVID-19-related thyroiditis: A novel disease entity? Clin Endocrinol 2021; 95: 369-77.

20. Chen M, Zhou W, Xu W. Thyroid function analysis in 50 patients with COVID-19: A retrospective study. Thyroid 2021; thy.2020.0363
21. Chaolin Huang, Lixue Huang, Yeming Wang, Xia Li, Lili Ren, Xiaoying Gu, Liang Kang. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. Lancet 2021; 16397(10270): 220-32.
22. Lee AM, Wong JG, McAlonan GM, et al. Stress and psychological distress among SARS survivors 1 year after the outbreak. Can J Psychiatry 2007; 52: 233-40.
23. Rogers JP, Chesney E, Oliver D, et al. Psychiatric and neuropsychiatric presentations associated with severe coronavirus infections: a systematic review and meta-analysis with comparison.to the COVID-19 pandemic. Lancet Psychiatry 2020; 7: 611-27.

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Ağrı Konusunda Hemşirelik Alanındaki Yayınların Bibliyometrik Analiz Yöntemi İle İncelenmesi

Analysis of Publications on Pain in The Field of Nursing by Bibliometric Analysis Method

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ÖZ

Giriş: Bu çalışmada, hemşirelik ana konularından olan ağrı konusunda bilimsel üretkenliği değerlendirmeyi amaçladık.

Gereç ve Yöntem: Bibliyometrik analiz şeklinde planlanan çalışmada; Scopus bibliyometrik veri tabanında İngilizce dilinde tarama yapıldı. Başlık kısmında "Pain" ve "Nurse"kelimesini içeren hemşirelik alanında yayınlanmış bilimsel literatüre ulaşıldı. Yayınlar; yapıldıkları kurum, yazar, yayın yılı, atıf sayısı ve yayınlandıkları dergi açısından değerlendirildi.

Bulgular: Araştırma bulguları incelendiğinde, 255311 eserin 15449'u (%6,05) hemşirelik alanında yayınlanmıştı. Yayınların çoğunluğu (11585 tanesi) araştırma makalesi (n=11585, %74,98) ve derleme (n=1695,%10,97) türünde idi. Yıllar içerisinde bu konuda yapılan yayın sayısında artış saptandı. Makalelerin 14128 (%91,44)'i İngilizce dilinde yazılmıştı. Fransızca, İspanyolca, Almanca ve Portekizce de hâkim olan yayın dilleri olduğu görüldü. Bu konuda en üretken ülkeler ABD (n=6020, %38,96), İngiltere (n=1403, %9,08) ve Kanada (n=765, %4,95) idi. Türkiye'den yapılan yayınlar 8. sırada idi (Tablo 1). Pain Management Nursing (n=483), Journal of Clinical Nursing (n=387), Journal of Advanced Nursing (n=304), Journal of Pain and Symptom Management (n=288) ve Nursing Standard Royal College of Nursing (n=198) dergileri bu konuda en fazla yayınların yayınlandığı dergilerdi.

Sonuç: Dünya genelinde hemşirelik alanında ağrı konulu makale ve atıf sayısının artmış olduğu saptandı. Konunun güncel olması anlamına gelen bu durum, bu konuda çalışma yapmayı planlayanlara ilham verebilir.

Anahtar kelimeler: Hemşire, ağrı, bibliyometrik analiz

ABSTRACT

Aim: The study was conducted to evaluate the scientific productivity about pain subject in nursing.

Material and Method: In the bibliometric analysis study, the Scopus database was searched in English. The scientific literature published in the field of nursing containing the word "Pain" in the title was reached. The publications were evaluated in terms of the institution, author, publication year, subject, number of citations and the journal in which they were published.

Results: Out of a total of 255311 publications, 15449 (6.05%) were published in the field of nursing. The majority of publications (11585) were articles [n=11585, 74.98%] and reviews [n=1695, 10.97%]. It was determined that there has been an increase in the number of publications on this subject over the years (Graph 1). 14128 (91.44%) of them were written in English. The most productive countries in this regard were USA [n=6020, 38.96%], England [n=1403, 9.08%] and Canada [n=765, 4.95%]. Publications from Turkey were in the 8th place regarding to publications number. Pain Management Nursing (n=483), Journal of Clinical Nursing (n=387), Journal of Advanced Nursing (n=304), Journal of Pain and Symptom Management (n=288) ve Nursing Standard Royal College of Nursing (n=198) were the journals in which the most publications were published on this subject.

Conclusion: It has been determined that the number of articles and citations on pain in the nursing branch has increased worldwide. This situation, which means that the subject is current and important, can guide scientists who plan to work on this subject.

Keywords: Nurse, Pain, Bibliometric Analysis

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GİRİŞ

Ağrı kavramı insanlık tarihi ile başlayan ve herkes tarafından farklı nedenlerle deneyimlenen bir bulgudur. Farklı şekillerde tanımlanmakla birlikte en fazla kabul gören tanım, Uluslararası Ağrı Araştırmaları Derneği (International Association for the Study of Pain - IASP) tarafından yapılmıştır. Buna göre ağrı, vücudun belli bir bölgesinden kaynaklanan, doku harabiyetine bağlı olan ya da olmayan, kişinin geçmişteki deneyimleriyle ilişkili, hoş olmayan emosyonel bir duyumdur (1-3). Latince ağrı, zarar ya da zedelenme anlamındadır. Son yıllarda ağrı, sadece bir belirti olarak değil, aynı zamanda hastalık olarak da kabul edilmektedir. Ağrıya dönük çok sayıda literatür çalışması olmasına rağmen, günümüzde hala hastaların sağlık personelinden en fazla yardım talebinde bulunduğu konular arasındadır (4-6).

Ağrının giderilmesinde birinci derecen hekimler sorumlu olsa da, ağrının izlenmesi, giderilmesi ve hastanın mevcut ağrı ile başa çıkmasının öğretilmesi hemşirelerin sorumluluk alanı içindedir. İyi bir ağrı bakımı ve tedavisi için, doğru tanımlanması, ağrı mekanizmasının iyi bilinmesi, ağrının sınıflandırılması, ağrının farmakolojik ve farmakolojik olmayan yöntemlerle etkili ve istenen sürede giderilmesi için hemşirelerin ağrı konusunda yeterli bilgiye sahip olmaları gerektirmektedir (1,2,4).

Ağrı, çok boyutlu ve karmaşık bir kavram olması nedeniyle, nörofizyolojik, psikolojik, kültürel, inanç, biyokimyasal, ruhsal ve bedensel yapı, ağrıya dayanma gücü ya da güçsüzlüğü ve çevresel faktörler (soğuk, sıcak, hava kirliliği vb.), durumlarla doğrudan ya da dolaylı olarak etkilenmektedir. Özellikle bedensel yapı, kültürel değerler, dini tutum ve yaklaşımlar, hastanın ağrıyla başa çıkma gücünü, hemşirenin ağrıya yaklaşımını etkiler (7-10).

Literatür bakımından oldukça zengin olan ağrı konusu hala önemli bir sağlık sorunu olmaya devam etmektedir. Bu durum, ağrıya ilişkin çalışmaların yeniden gözden geçirilmesi, yayın konuları bakımından analiz edilmesi ve eksik ya da yetersiz konuların tespit edilerek dikkatlerin o noktaya çekilmesini gerektirmektedir.

Ağrıyla ilgili çalışmaları gözden geçirmek için kullanılan yöntemlerden biri de bibliyometrik analiz çalışmalardır. Son zamanlarda sayı ve nitelik bakımından artış gösteren bibliyometrik çalışmalar, bir konuda yapılan bilimsel çalışmaların bazı yönlerden analiz edilmesi, sayı, basıldığı dergi, atıf durumu, o alanda en fazla yayın yapan yazar, hangi konuların çalışıldığı, hangi konuların çalışılması gerektiği ile ilgili bilgiler veren bir araştırma ve analiz etme yöntemidir (11-14). Bibliyometri kavram olarak incelendiğinde, bilimsel nitelikteki makale, kitap, dergi gibi çalışmaların matematiksel ve istatistiksel tekniklerle incelenmesi, ilişkilerin belirlenmesi anlamındadır (13-17).

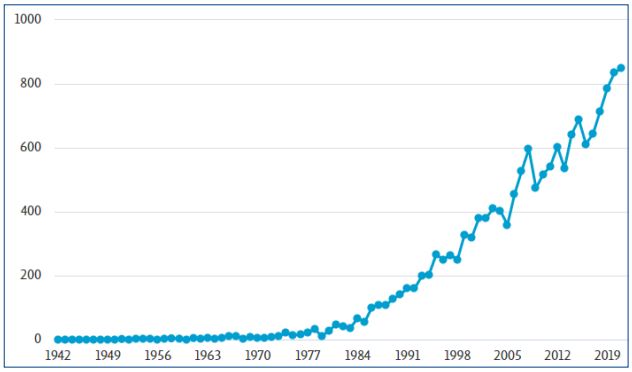
Ağrı ortadan kaldırılmadığı zaman kişinin günlük yaşamsal aktivitelerini yapmasını engelleyen tıbbi bir durumdur. Hasta haklarından biri olan bu kavramın yönetiminde hemşireler vazgeçilmez bir role sahiptir. Hemşirelik bakım planlarında da yer alan bu kavram hakkında, hemşirelerin yeterli bilgi ve uygulama becerisine sahip olması gerekmektedir. Bu çalışmada, hemşirelik ana konularından olan ağrı konusunda bilimsel üretkenliğin değerlendirilmesi amaçlandı (2,6,7).

GEREÇ VE YÖNTEM

Bibliyometrik analiz tipinde olarak gerçekleştirilen çalışmada; Scopus bibliyometrik veri tabanında İngilizce dilinde tarama yapıldı. Başlık kısmında "Pain" "Nurse" ve "Pain and Nurse" sözcükleri kullanıldı. Bu yöntemle hemşirelik alanında yayınlanmış ağrı konulu bilimsel literatüre ulaşıldı. Bulunan yayınlar, yapıldıkları kurum, yayın dili, yayınlandıkları ülkeler, yayınların en fazla olduğu dergiler, yazar, yayın yılı, yayının aldığı atıf sayısı ve yayınlandıkları dergi açısından analiz edildi. Çalışmada Helsinki Deklarasyonu ilkelerine (2013) uyuldu. Çalışma, insan ve hayvan araştırması olmadığından etik kurul izni alınmadı.

BULGULAR

Araştırma bulguları incelendiğinde, ağrı konusunda yapılan toplam 255311 eserin 15449'u (%6,05) hemşirelik alanında yapılmış yayınlar olarak bulundu. Yayınların 11585 tanesi makale (%74,98) ve 1695 tanesi (%10,98) derleme türünde idi. Yıllar içerisinde bu konuda yapılan yayın sayısında artış saptandı (**Grafik 1**).



Grafik 1. Yıllara Göre Yayın Sayısı

Yayınların, 14128 (%91,44)'i İngilizce dilinde yazılmıştı. Fransızca, İspanyolca, Almanca ve Portekizce de hâkim olan yayın dilleri olarak bulundu. Bu konuda en üretken ülkeler ABD [n=6020, %38,96], İngiltere [n=1403, %9,08] ve Kanada [n=765, %4,95] idi. Türkiye'den yapılan yayınlar 8. sırada idi (**Tablo 1**).

Table 1. Ülkelere Göre Yayın Sayısı	
Ülkeler	**n**
ABD	6020
İngiltere	1403
Kanada	765
Avustralya	592
Fransa	476
İspanya	381
Brezilya	358
Türkiye	351
Almanya	340
İsviçre	317

Atıf alma durumuna göre incelendiğinde, en az 2000 tanesi hiç atıf almayan, dört tanesi binden, 8 tanesi 500'den, 33 tanesi 250'den, 297 tanesi 100'den fazla atıf almış olarak tespit edildi.

Kaliforniya Üniversitesi, San Francisco (n=197), Sao Paulo Üniversitesi (n=145), Toronto Üniversitesi (n=1359), Washington Üniversitesi (n=129) ve Iowa Üniversitesi (n=121) bu konuda öncü beş üniversite olduğu görüldü (**Tablo 2**).

Tablo 2: Üniversitelere Göre Yayın Sayısı	
Universiteler	**n**
San Francisco	197
Sao Paulo Üniversitesi	145
Toronto Üniversitesi	135
Washington Üniversitesi	129
Iowa Üniversitesi	121

Yazar analizi incelendiğinde, Miaskowski, C (94 yayın), McCaffery, M (83 yayın), Bruera, E. (74 yayın), D'Arcy, Y (72 yayın), Ferrell, B.R (59 yayın), Mercadante, S (51 yayın) ve Pasero, C (50 yayın) bu konuda en üretken yazarlar olduğu tesbit edildi.

Pain Management Nursing (n=483), Journal of Clinical Nursing (n=387), Journal of Advanced Nursing (n=304), Journal of Pain and Symptom Management (n=288) ve Nursing Standard Royal College of Nursing (n=198) dergileri bu konuda en fazla yayınların yayınlandığı dergiler olarak tesbit edildi (**Tablo 3**).

Tablo 3: Dergilere Göre Yayın Sayısı	
Dergiler	**n**
Pain Management Nursing	483
Journal of Clinical Nursing	387
Journal of Advanced Nursing	304
Journal of Pain and Symptom Management	288
Nursing Standard Royal College of Nursing	198

TARTIŞMA

Araştırmada, ağrı ile ilgili hemşirelik alanında yayınlanan makaleler çeşitli kriterler göz önüne alınarak incelenmiştir. İncelenen makalelerde, ağrı konulu toplam makale sayısı, yıllara göre yayın sayısı, yayın dili, en fazla makalenin yayınlandığı ülke, en fazla makalenin yayınlandığı dergiler, maddi destek alan yayınlar, en fazla yayın yapan yazarlar, en fazla yayın yapan üniversiteler ve en fazla atıf alan yayınlar incelenmiştir. Elde edilen veriler incelendiğinde, yıllara göre yayın sayısında artış olduğu gözlenmektedir. Hemşirelik alanında yapılan ağrı çalışmalarında özellikle 1970'li yıllardan sonra yayın sayısı bakımından artış olduğu, ancak esas artışın 2005 yılından sonra başladığı, 2015'li yıllardan sonra ise doruğa ulaştığı gözlenmektedir (**Grafik 1**). Bu artışın nedeni olarak, dünya genelinde bilgiye erişimin kolaylaşması, hemşirelik alanında bilimsel zeminin güçlenmesi, hemşirelikte bilimsel çalışma olanaklarının arttırılması, hemşirelik mesleğinde yaşanan gelişmeler, hemşirelik hizmetlerinde bilimsel verilere ihtiyaç duyulması ve elde edilen bilimsel verilerin hasta bakımına yansıtılmaya çalışılması gösterilebilir.

Analizler incelendiğinde, ağrı konusunda yapılan toplam 255311 eser olduğu bulundu. Bu eserlerin, 15449'u (%6,05) hemşirelik alanında yapılmış yayınlar olarak bulundu. Yayın türü incelendiğinde ise 811585 tanesi özgün makale (%74,98) olarak tesbit edilirken, derleme yayın sayısı 1695, (%10,98) türünde idi. Tıp, diş hekimliği, eczacılık, hemşirelik gibi sağlık alanları başta olmak üzere çok sayıda disiplini ilgilendiren ve multidisipliner yaklaşım gerektiren ağrı konusunda hemşirelerin yaptığı yayın oranı yüzdesi 0.06'dır. Hemşirelik mesleğinin doğası içinde yer alan ve hemşireliğin sorumluluk alanında önde gelen konulardan biri olan ağrı ile ilgili hemşirelik çalışmalarının arttırılması ve klinik uygulamalara yansıtılması kaliteli hasta bakımında önem arz etmektedir.

Araştırma verileri dil bakımından incelendiğinde, İngilizcenin ilk sırada yer aldığı görülmüştür. İngilizce olarak yayınlanan eser sayısı 14128 (%91,44)'i olarak bulunmuştur. İngilizce'yi sırasıyla, Fransızca, İspanyolca, Almanca ve Portekizce takip etmektedir.

Dünya çapında yapılan sıralamada ABD ilk sırada gelmektedir. Çalışmada, en üretken ülkeler ABD 6020 (%38,96), İngiltere 1403 (%9,08) ve Kanada 765 (%4,95) olarak bulunmuştur (Tablo 1). Bu ülkeleri, Avustralya 592, Fransa 476, İspanya 381, Brezilya 358, Türkiye 351, Almanya 340 ve İsviçre 317 takip etmektedir. Ülkemiz, 8. sırada yer almaktadır. Sıralama bakımında ülkemiz hemşireliğinin ağrı konusunda üretkenliği ve başarısı yüksek olarak yorumlanabilir.

Araştırma verileri, finansal destek alan bu yayınların, 13393 (%13,30)'ü %50'sinden fazlası ABD kaynaklı kurumlar tarafından fonlanmıştı. ABD bünyesinde en fazla fon sağlayan kurumlar, Ulusal Sağlık Enstitüleri (National Institutes of Health-NIH) (745 yayın) ve ABD Sağlık ve İnsan Hizmetleri Departmanı (U.S.A Department of Health and Human Services - HHS) (704 yayın) olarak bulundu.

Araştırma verileri, atıf alma durumuna göre incelendiğinde, yayınların en az 2000 tanesinin hiç atıf almadığı görüldü. Yayınların dört tanesinin binden fazla yayın aldığı

tespit edildi. Yayınlardan 8 tanesi 500'den fazla, 33 tanesi 250'den fazla, 297 tanesi 100'den fazla atıf almış olarak tespit edildi. Atıf alma sayısı 500'den fazla olan yayınların, güncel, araştırmaya dönük, deneysel ve hasta bakımına yansıyan türden olduğu düşünülmektedir.

Çalışmada, üniversiteler, ağrı temalı yayın bakımından incelendi. Ağrıya dönük, hemşirelik alanında yapılan ağrı araştırmalarında, San Francisco Üniversitesi 197, Sao Paulo Üniversitesi 145, Toronto Üniversitesi 1359, Washington Üniversitesi 129 ve Iowa Üniversitesi 121 çalışma sayıları ile bu konuda öncü beş üniversite olduğu görüldü (**Tablo 2**).

Yazar analizi incelendiğinde, Onkoloji alanında yapılan ağrı çalışmaları ile Miaskowski C'nin 94 yayın ile ilk sırada olduğu görülmektedir. Ağrı yönetimi konularında yaptığı yayınlarla ikinci sırada yer alan McCaffery, M 83 yayın yaptığı tespit edilirken, Bruera, E. 74 yayın, D'Arcy, Y 72 yayın, Ferrell, B.R 59 yayın, Mercadante, S 51 yayın ve Pasero, C 50 yayın ile dünya çapında bu konuda en üretken yazarlar olarak bulundu.

Çalışma verileri ağrı konusunda en fazla yayın yayınlayan dergiler de analiz edildi. Dergi bakımından ilk sırada Pain Management Nursing dergisi yaptığı toplam 483 yayın ile sırada gelmektedir. Ayrıca, Journal of Clinical Nursing 387, Journal of Advanced Nursing 304, Journal of Pain and Symptom Management 288 ve Nursing Standard Royal College of Nursing Great Britain 1987 198 dergileri bu konuda en fazla yayınların yayınlandığı dergiler olarak tespit edildi (**Tablo 3**).

Dünya genelinde hemşirelik alanında ağrı konulu makale ve atıf sayısının artmış olduğu saptandı. Konunun güncel olması anlamına gelen bu durum, bu konuda çalışma yapmayı planlayanlara ilham verebilir. Ancak ağrı konusu, hala insanların çok sık yakındıkları konular arsında yer almaktadır. Yaşlılar, çocuklar, kronik hastalığı olan bireyler başta olmak üzere hemen hemen her birey ağrıyı deneyimlemektedir (13). Zaman zaman sağlık bakım hizmeti veren sağlık personellerinin ağrıyı giderme konusunda zorlandığı, ağrıyı hemen gideremediği ve bakım verdiği bireylerin en fazla yardım talebinde bulunduğu dikkat çekmektedir.

Sonuç olarak, incelenen makalelerde dikkate alınan kriterlerin genişletilerek yapılması, (yıllara göre araştırılan konu alanı, araştırma yöntemi, araştırmalarda kullanılan örneklem türleri, yayın türü, veri toplama aracı, veri analiz yöntemleri, yazar sayısı, yazarların unvanları, yazarların bulunduğu kurum ve yıllara göre makalede kullanılan yerli-yabancı kaynak sayısı) önerilmektedir.

ETİK BEYANLAR

Etik Kurul Onayı: Çalışmada 2013 yılında revize edilen Helsinki Deklarasyonu'na uygun davranıldı. İnsan ve hayvan araştırması olmadığından etik kurul izni gerekmemektedir.

Hakem Değerlendirme Süreci: Harici çift kör hakem değerlendirmesi.

Çıkar Çatışması Durumu: Yazarlar bu çalışmada herhangi bir çıkara dayalı ilişki olmadığını beyan etmişlerdir.

Finansal Destek: Yazarlar bu çalışmada finansal destek almadıklarını beyan etmişlerdir.

Yazar Katkıları: Yazarların tümü; makalenin tasarımına, yürütülmesine, analizine katıldığını ve son sürümünü onayladıklarını beyan etmişlerdir.

KAYNAKLAR

1. Yağcı Ü, Saygın M. Ağrı fizyopatolojisi. Süleyman Demirel Üniversitesi Tıp Fakültesi Derg 2019;26(2):209-20.
2. Velioğlu SK. Ağrı anatomisi: ağrı yolakları, beyin sapı ve beyin. Türk Klinikleri Derg Nöroloji 2017;10(4):329-35.
3. Kabuk A, Şendir M, Filinte G. The effect of reflexology massage and passive music therapy intervention before burn dressing on pain, anxiety level and sleep quality. Burns https://doi.org/10.1016/j.burns.2021.10.012
4. Rodney AR, David RB. Tıbbi Fizyoloji (Ed. Ağar E.). İstanbul, Türkiye, İstanbul Tıp Kitapevi, 2017;61-7.
5. Çelik ÖA, Şengün İŞ. Nöropatik ağrının fizyopatolojisi. Türk Klinikleri Derg Nöroloji 2017;10(4):378-84
6. Erdemir DS, Şenturan L. The effect of position support during orthopedic surgery on postoperative pain: a randomized controlled trial. Pain Manag Nurs 2020;21:549-55.
7. Çelik ÖA, Şengün İŞ. Nöropatik Ağrının Fizyopatolojisi Türk Klinikleri Derg Nöroloji 2017;10(4):378-84.
8. Öntürk H, Dindar Demiray EK, Alkan S. Network analysis of nursing publications in the COVID-19 era. J Clin Med Kaz 2021;18(4):27-31.
9. Akkaşoğlu S, Akyol C, Ulama Ş, Zengin B. Tarım turizmine yönelik hazırlanan lisansüstü tezlerin bibliyometrik analizi. J Tourism Gastro Stud 2019;7(2):1193-1218
10. Alkan S, Yılmaz M, Uyar C, Dindar Demiray EK. Bibliometric analysis of scientific research on Crimean-Congo hemorrhagic fever in Turkey. D J Med Sci 2021;7(2):97-102.
11. Ocak Ö. A bibliometric analysis of the 50 most cited articles on Parkinson's disease. Ann Clin Anal Med 2021;12(9):975-9
12. Abidin Polat Z, Saraçoğlu A, Duman H. Harita Dergisi'nin Bibliyometrik Analizi. Harita Derg 2019;85 (161):46-56
13. Kapucu S, Ünver G. Pain And Frailty in Elderly Females with Osteoporosis. Turk J Geriatr 2017;20(4):306-14.
14. Depren Ö, Kartal MF, Depren SK. Borsalarda oynaklık üzerine yayınlanmış akademik çalışmaların bibliyometrik analizi. Bankacılık ve Sermaye Piyasası Araştırmaları Derg -BSPAD 2018;6:1-15
15. Alkan S, Dindar Demiray EK, Yıldız E, Özlü C. Analysis of scientific publications on Acinetobacter bacteremia. Infect Dis Clin Microbiol 2021;4(1), 39-44.
16. Zeren D, Kaya N. Dijital Pazarlama. Ulusal yazının bibliyometrik analizi. Çağ Üniversitesi Sosyal Bilimler Derg 2020;17 (1), 35-52.