



Selçuk Tıp Dergisi

Selcuk Medical Journal

Yıl: 2024 Cilt: 40 Sayı:1

ISSN: 1017-6616 e-ISSN: 2149-8059





Baş Editör/Editor-in-Chief

Pembe OLTULU, MD, Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya/Türkiye

Yardımcı Editörler/Associate Editors

Ahmet Buğrul, MD, Adıyaman Besni Devlet Hastanesi, Adıyaman, Türkiye
Cengiz Kadiyoran, MD, Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya/Türkiye
Mehmet Giray Sönmez, MD, Necmettin Erbakan Üniversitesi, Tıp Fakültesi Konya/Türkiye
Selman Belviranlı, MD, Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya/Türkiye
Sinan Demircioğlu, MD, Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya/Türkiye

Editöryal Kurul Üyeleri/ Editorial Board members

Ahmet Tekin, MD, Kütahya Sağlık Bilimleri Üniversitesi, Kütahya, Türkiye
Amor Khachemoune, MD, FAAD, FACMS, State University of New York, Brooklyn, NY, USA
Bilsev İnce, MD, Özel Plastik Cerrahi Kliniği, İzmir, Türkiye
Earl Stephenson Jr, MD, DDS, FACS, Prima Center for Plastic Surgery, Duluth, GA, USA
Genevieve M. Crane, MD, University of Rochester Medical Center, Rochester, NY, USA
Khin Soe, MD, BDS, MDS, DSc, University of Dental Medicine, Mandalay, Myanmar
Phillip Pirgousis, MD, College of Medicine, University of Florida, Jacksonville, USA
Pin-Keng Shih MD, China Medical University Hospital, China
Raimundo Geronimo Jr, MD, Federal University of Piauí, Teresina, Piauí, Brazil
Refik Oltulu, MD, FEBO, Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Sevgi Keles, MD, PhD, Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Sunil Swami, MD, S.R.T.R. Government Medical College and Hospital, Ambajogai, Maharashtra, India
Steven D Wexner, MD, PhD (Hon), FACS, FRCS, FRCS(ED), FRCSI (Hon), Cleveland Clinic, Weston, Florida, USA
Talal Chatila, MD, Boston Children's Hospital, Harvard University, Brookline, MA, USA
Vijay Shankar, MD, Adichunchanagiri Institute of Medical Sciences,
Rajiv Gandhi University of Health Sciences, BG Nagara, Karnataka, India

Biyoistatistik Editörleri/Statistical Editors

Mehmet Uyar, MD, Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Mehmet Sinan İyisoy, Biyoistatistik Uzm. Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya,
Türkiye

Dil Editörleri/Language Editors

Rojda Ersönmez, MD, Adıyaman Besni Devlet Hastanesi, Adıyaman, Türkiye
Meriç Erden, MD, Cambridgeshire and Peterborough NHS Foundation Trust, Cambridge, England, UK
Sümeyye Tanır Özer, MD, Staten Island University, New York, NY, USA

Uluslararası Danışma Kurulu /International Advisory Board

Ahmet Topal, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Aida Sarac, MD; Sarajevo University, Bosnia and Herzegovina
Ali Mübin Aral, MD; Vodovotz lab. University of Pittsburgh, USA
Bahadır Feyzioğlu, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Can Öztürk, MD; Roswell Park Comprehensive Cancer Center Buffalo, New York, USA
Fatema Al Hajeri, MD; Corniche Hospital, Abu Dhabi, United Arab Emirates
Faruk Uğuz, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Habibah Abdul Hamid, MD; Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Selangor, Malaysia
Hasan Energin, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye



Uluslararası Danışma Kurulu /International Advisory Board

- Hiroyuki Takamaru, MD,Ph.D;** National Cancer Center Hospital, Endoscopy Division, Tokyo, Japan
Hürkan Kerimoğlu, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Hüseyin Ataseven, MD; Anatolia Hospital, Antalya Türkiye
I. Emre Gorgun, MD,FACS; Cleveland Clinic, Digestive Disease Institute, Cleveland, Ohio, USA
Koichiro Mori, MD; MIE University, Edobashi Tsu City, Japan
Laura Orsolini, MD; University of Hertfordshire Hatfield, UK
Mehmet Akif Düzenli, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Mehmet Mesut Pişkin, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Monzer Hamze, MD; Faculty of Public Health, Lebanese University, Mont-Liban, Lebanon
Munise Daye, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Mustafa Büyükmumcu, MD; Bezmialem Vakıf Üniversitesi, Tıp Fakültesi, İstanbul Türkiye
Mustafa Özer, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Sandeep Grover, MD; Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, India
Selim Kutlu, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Sertaç Yazıcı, MD; Hacettepe Üniversitesi. Tıp Fakültesi Ankara, Türkiye
Syed Mehmood Ali, MD; Shaikh Zayed Hospital, Lahore, Pakistan
Şafak Uygur, MD; Craniofacial Lab. University of Michigan, USA
Tevfik Küçükkartallar, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Zerrin Defne Dündar, MD; Necmettin Erbakan Üniversitesi Tıp Fakültesi, Konya, Türkiye
Zeynep Bayramoğlu, MD; Dokuz Eylül Üniversitesi Tıp Fakültesi, İzmir,Türkiye

Sahibi/ Owner

Necmettin Erbakan Üniversitesi Rektörlüğü

Yaka Mah. Yeni Meram Cad. Kasım Halife Sok. No: 11/1 (A Blok) No:
11 (B Blok),Posta Kodu: 42090 Meram / KONYA/TÜRKİYE
Telefon : 0332 221 05 00
E-posta : bilgi@erbakan.edu.tr

Editör asistanı ve sekreter/ Editor assistant and Secreteriat

İlkay Kurt

Tlf: +90 332 223 62 54
E-Mail: ilkaykurt@mevlanamedsci.org

Yayıncı, Grafik ve Kapak tasarım/Publisher, Graphic and Cover design

NEU Press

Yaka Mah. Yeni Meram Cad. Kasım Halife Sok. No: 11/1 (A Blok) ,Meram / KONYA/TÜRKİYE
Tlf : +90 332 221 0 575, Mobil Tlf: 0 532 262 48 46
E-Mail: bilgi@neuyayin.com

Kapak ve Logo Tasarım/Cover and Logo designer: Bünyamin Biçer

Selçuk Tıp Dergisi; ULAKBİM/TR ve EBSCO, Inter-national Citation Index ve Türkiye Atıf Dizini tarafından indekslenmektedir



This journal is a member of, and subscribes to the principles of, the Committee on Publication Ethics (COPE)
www.publicationethics.org

Yayın Türü / Publication Type: Ulusal/Uluslararası Süreli Yayın; National/International periodical

Yayın Periyodu / Publication Period:Yılda dört kez (Mart, Haziran, Eylül ve Aralık) yayınlanır; Published fourth-annual (March, June,September and December)

Baskı Tarihi / Print Date: Mart (March), 2024



YAZARLARA BİLGİ/YAZIM KURALLARI

Selçuk Tıp Dergisi (Selçuk Med J), Necmettin Erbakan Üniversitesi'nin bilimsel, bağımsız, hakemli, açık erişimli yayın organıdır. Tıp doktorları, araştırmacılar ve bilim adamlarından oluşan geniş bir kitleye hitap eden disiplinli bir dergidir. Temel amaç Tıp/Sağlık alanında, tanı ve tedavideki güncel gelişmelerin, cerrahi yenilikler ve bilim dünyasına katkıda bulunacak çalışmaların ulusal ve uluslararası literatürde paylaşımının sağlanmasıdır.

Selçuk Tıp Dergisi, tıp bilimine ve akademik çalışmalara katkısı olan, klinik ve deneysel çalışmaları, editöryal yazıları, klinik olgu bildirimlerini, teknik ve eğitici derlemeleri, orijinal görüntü raporlarını ve editöre mektupları yayımlar. Anket/mülakat çalışmaları; Editörün ilk değerlendirmesi sonucunda çok değerli bir katkı sunuyorsa değerlendirmeye alınabilir.

Dergi gönderim kurallarına ve dergi kapsamına uygun görülen, editöryal çalışmalar hariç tüm yazılar alanında uzman hakemlere bilimsel değerlendirme için gönderilir. En az iki hakem kararı aranır. Yayımlanan tüm makaleler çift taraflı kör akran değerlendirmesi sürecine tabidir. Uygunluğunu tartışılan çalışmalarda yardımcı editörler hakemlerin yorumlarını dikkate alarak kendi değerlendirmelerini eklerler. Gönderilen tüm yazılar için nihai karar Baş Editör'e aittir. Bütün makaleler için süreçlerin editör ve yayın kurulu tarafından en geç üç ay içerisinde sonuçlandırılması hedeflenir. Fakat elde olmayan gecikmelerden dolayı bu süre uzayabilir.

Yayın kurulu kararları ile belirlenen bazı konular hakkındaki yazılar, yayın kurulu üyelerinin tamamının incelemesine sunulur. İncelemeler sonucu oy çokluğuna ulaşan çalışmalar dergideki süreçleri devam edecektir. Yayın kurulu kararları dergi web sitesinde yayınlanmaktadır.

Yayına kabul edilen yazıların her türlü yayın hakkı yazarlara ve Selçuk Tıp Dergisine aittir. Selçuk Tıp Dergisi, ilave olarak websitesinde bulunan telif hakları bildirim belgesinin de yazarlar tarafından onaylanarak imzalanmasını ve ıslak imzalı formun sisteme eklenmesini talep etmektedir. Dergi her yıl mart, haziran, eylül ve aralık aylarında olmak üzere dört sayı olarak yayımlanmaktadır. Derginin yayın dili İngilizcedir.

Gönderilen yazıların daha önce herhangi bir yerde/dergide yayınlanmamış olması ve yayın için başka bir dergiye gönderilmemiş olması gerekmektedir [Bilimsel kongrelerde sunulan sözlü bildiri ve posterler (özet ya da tam metin olabilir) bildirilmek kaydı ile hariçtir]. Dergide yayımlanan yazıların her türlü sorumluluğu (etik, bilimsel, yasal vb.) yazarlara aittir. Dergide yayımlanan yazılarda ifade edilen ifadeler veya görüşler yazarların görüşleri olup, editörlerin, yayın kurulu ve yayıncının görüşlerini yansıtmaz; editörler, yayın kurulu ve yayıncı, bu tür materyaller için herhangi bir sorumluluk veya yükümlülük kabul etmemektedir. Yazım kurallarına uygun olarak hazırlanmamış olan yazıların incelenmeye alınıp alınmaması Editör ve Editöryal Kurulun insiyatifindedir.

Tüm çalışmalarda etik kurul onayı ve bu onamın belgelendirilmesi gerekmektedir. Tüm çalışmalarda yazarların çalışmaya katkı düzeyi ve onayı bildirilmelidir. Çalışmada veri toplanması, deney aşaması, yazım ve dil düzenlemesi dahil olmak üzere herhangi bir aşamasında finansal çıkar çatışması olmadığı bildirilmelidir. Çalışmada varsa ticari sponsorluk bildirilmelidir. Selçuk Tıp Dergisi'nde intihal programı (iThenticate) kullanılmaktadır. Akademik atf sınırını aşan benzerlik taşıyan makaleler ve yayın kurallarına uygun olarak hazırlanmamış makaleler değerlendirmeye alınmayacaktır. Dergi intihal tarama raporunu yazardan talep edeceği gibi kendisi de tarama yapabilir.

Derginin yayın politikası ve süreçleri Uluslararası Medikal Dergisi Editörleri Komitesi (International Committee of Medical Journal Editors-**ICMJE**), Dünya Tıbbi Editörler Derneği (World Association of Medical Editors-**WAME**), Bilim Editörleri Konseyi (Council of Science Editors-**CSE**), Avrupa Birliği Derneği Bilim Editörleri (European Association of Science Editors-**EASE**) ve Yayın Etiği Komitesi (Committee on Publication Ethics-**COPE**) ve Ulusal Bilgi Standartları Örgütü (National Information Standards Organization-**NISO**) yönergelerini takip eder. Dergimiz 'Şeffaflık ve Akademik Yayıncılık En İyi Uygulamalar İlkelerine' (Principles of Transparency and Best Practice in Scholarly Publishing) ([doaj.org/bestpractice](https://www.doaj.org/bestpractice)) uygundur. Yayın Kurulu, dergimize gönderilen çalışmalar hakkındaki intihal, atf manipülasyonu ve veri sahteciliği iddia ve şüpheleri karşısında **COPE** kurallarına uygun olarak hareket edecektir.

Derginin Yayın Kurulu, itiraz ve şikâyet vakalarını, COPE rehberleri kapsamında işleme almaktadır. Yazarlar, itiraz ve şikâyetleri için doğrudan baş editör veya editör/yayın kurulu ile temasa geçebilirler. İhtiyaç duyulduğunda Yayın Kurulu'nun kendi içinde çözemediği konular için tarafsız bir temsilci atanacaktır. İtiraz ve şikâyetler için karar verme süreçlerinde nihai karar Baş Editör verecektir. Yayıncı ve editör gerektiğinde düzeltmeler, açıklamalar, geri çekilmeler ve özürler yayınlamaya her zaman hazırdır.

Selçuk Tıp Dergisi ile ilgili tüm yazışmalar, makale gönderme, makalenin takibi, danışman raporları, düzeltmelerin yapılıp yüklenmesi, kabul yazısı gönderimi ve diğer tüm makale ile ilgili formların yüklenmesi <https://www.selcukmedj.org> sayfasından yapılacaktır. Bu site üzerinden yüklenecek makaleler için kurallar aşağıda belirtilmiştir.

Selçuk Tıp Dergisi, ücretsiz, açık erişim politikası benimsemektedir. Bu bağlamda dergide yayınlanan tüm yazılar <https://www.selcukmedj.org> adresinden erişime açık olup yazarlardan hiçbir ek ücret talep edilmeyecektir.

Yazarlık

Selçuk Tıp Dergisi'ne gönderilen çalışmalarda yazar olarak listelenen herkesin ICMJE (www.icmje.org) tarafından önerilen yazarlık koşullarını karşılaması gerekmektedir. ICMJE, yazarların aşağıdaki 4 koşulu karşılamasını önermektedir:

- Çalışmanın konseptine/tasarımına; ya da çalışma için verilerin toplanmasına, analiz edilmesine ve yorumlanmasına önemli katkı sağlamış olmak;
- Yazı taslağını hazırlamış ya da önemli fikrinsel içeriğin eleştirel incelemelerini yapmış olmak;
- Yazının yayından önceki son halini gözden geçirmiş ve onaylamış olmak;
- Çalışmanın herhangi bir bölümünün geçerliliği ve doğruluğuna ilişkin soruların uygun şekilde soruşturulduğunun ve çözümlendiğinin garantisini vermek amacıyla çalışmanın her yönünden sorumlu olmayı kabul etmek.

Yazar olarak belirtilen her kişi yazarlığın dört koşulunu karşılamalıdır ve bu dört koşulu karşılayan her kişi yazar olarak tanımlanmalıdır. Yazar olarak atanan tüm kişiler yazarlık için hak kazanmalı ve hak kazanan herkes listelenmelidir. Dört kriterin hepsini karşılamayan kişilere makalenin başlık sayfasında teşekkür edilmelidir. Finansman alımı, veri toplanması ya da araştırma grubunun genel gözetimi, kendi başlarına, yazarlığı haklı çıkarmaz. Bir ya da daha fazla yazar, çalışma başlangıcından yayınlanmış makaleye kadar, bütün olarak çalışmanın bütünlüğünün sorumluluğunu üstlenmelidir. Çok merkezli çalışmalarda yazarlık bir gruba atfedilir. Yazar olarak adlandırılan grubun tüm üyeleri, yukarıdaki yazarlık kriterlerini tam olarak karşılamalıdır. Bu kriterleri karşılamayan grup üyeleri, onayları ile birlikte listelenmelidir. Mali ve maddi destek de kabul edilmelidir.



Yazar Değişikliği Talepleri

Yazar listesindeki yazar isimlerinin eklenmesi, silinmesi veya yeniden düzenlenmesi ancak makale kabul edilmeden önce ve ancak dergi Editörü tarafından onaylandığı takdirde yapılabilir.

Böyle bir değişikliği talebi olursa Editör, sorumlu yazardan (a) yazar listesindeki değişikliğin nedeni ve (b) tüm yazarlardan eklemeyi kabul ettiklerine dair yazılı onay (e-posta), talep eder. Editör, yalnızca istisnai durumlarda, makale kabul edildikten sonra yazarların eklenmesini, silinmesini veya yeniden düzenlenmesini dikkate alacaktır.

Makale Yazımı

Orijinal araştırma makalesi kaleme alanlar, konuyu özgün bir şekilde ve nesnel bir tartışma ile ele almalıdır. Makale, başkalarının çalışmayı tekrarlamasına izin vermek için yeterli ayrıntı ve referansları içermelidir. Hileli veya bilerek yanlış beyanlar etik dışı davranış teşkil eder ve kabul edilemez.

Özgünlük

Yazar makalenin orijinal olduğu, daha önce başka bir yerde yayınlanmadığı ve başka bir yerde, başka bir dilde yayınlanmak üzere değerlendirmede olmadığı konusunda teminat sağlamalıdır. Makale yazımının yapay zekâ sistemleri kullanılarak yapıldığı çalışmalar kabul edilmemektedir. Yapay zekâ sistemleri, sadece yazıların dil düzenlemeleri için kullanılabilir.

Orijinal Kaynak Kullanımı ve Atıf Yapma

Yazarlar, tamamen özgün eserler yazdıklarından ve başkalarının eserlerini veya sözlerini kullanmışlarsa, bunun uygun şekilde alıntılanmış olduğundan emin olmalıdır. Üçüncü taraflarla konuşma, yazışma veya tartışmalarda olduğu gibi özel olarak elde edilen bilgiler, kaynağın açık ve yazılı izni olmadan kullanılmamalıdır.

Veri Erişimi ve Muhafazası

Yazarlardan, editör incelemesi için makalelerini destekleyen araştırma verilerini sağlamaları ve/veya derginin açık veri gereksinimlerine uymaları istenebilir. Yazarlar, mümkünse, bu tür verilere kamu erişimi sağlamaya ve bu tür verileri yayınladıktan sonra makul bir süre boyunca saklamaya hazır olmalıdır. Dergimiz, araştırma verilerinin TUBITAK'ın Aperta Portalı'na yüklenmesini tavsiye etmektedir.

Çoklu ve Eşzamanlı Yayın

Bir yazar aynı çalışmayı içeren makalesini birden fazla dergisinde yayımlamamalıdır. Aynı makalenin aynı anda birden fazla dergiye gönderilmesi etik dışı davranıştır. Bir yazar, özet şeklinde yayınlanmış olması dışında, daha önce yayınlanmış bir makaleyi başka bir dergide değerlendirilmek üzere sunmamalıdır.

Anket ve Mülakata Dayanan Çalışmaların Yayını ve Etik Kurul Onamları

Etik kurul izni gerektiren, tüm bilim dallarında yapılan araştırmalar için (etik kurul onayı alınmış olmalı, bu onay makalede belirtilmeli ve belgelendirilmelidir. Etik kurul izni gerektiren araştırmalarda, izinle ilgili bilgilere (kurul adı, tarih ve sayı no) yöntem bölümünde, ayrıca makalenin ilk/son sayfalarından birinde; olgu sunumlarında, bilgilendirilmiş gönüllü olur/onam formunun imzalandığına dair bilgiye makalede yer verilmelidir. Anket çalışmaları ve mülakata dayanan çalışmaların etik kurul onam belgeleri alınmış olmalı ve makale yüklenirken dergi sistemine eklenmelidir.

Çıkar Çatışması

Kişinin yaptığı işte çelişkiye düşmesine yol açacak, objektifliğini önemli oranda bozabilecek veya herhangi bir kişi ya da kuruluş lehine adil olmayan avantaj sağlayabilecek herhangi finansal ya da diğer tür çıkarlardır. Araştırmanın yürütülmesi ve makalenin hazırlanması sürecinde alınan tüm mali destek kaynakları ve sponsorların çalışmadaki rolü açıklanmalıdır. Finansman kaynağı yoksa bu da belirtilmelidir. Açıklanması gereken olası çıkar çatışması örnekleri arasında danışmanlıklar, maaş alımı, hibeler yer alır. Potansiyel çıkar çatışmaları mümkün olan en erken aşamada açıklanmalıdır.

Hata Bildirimi

Bir yazar yayınlanmış çalışmasında önemli bir hata veya yanlışlık fark ettiğinde, derhal dergiye bildirimde bulunmalıdır. Editör tarafından gerekli görüldüğü takdirde makaleyi geri çekmek veya düzeltmek için iş birliği yapmak da yazarın yükümlülüğüdür. Editör veya yayıncı, yayınlanan bir çalışmanın hata içerdiğini üçüncü bir şahıstan öğrenirse, yazarın konu hakkında editöre bilgi vermek de dahil olmak üzere editörle iş birliği yapması yazarın yükümlülüğüdür.

Görüntü Bütünlüğü

Bir görüntüde belirli bir özelliği geliştirmek, karartmak, taşımak, kaldırmak veya eklemek kabul edilemez. Yazarlar, dergi tarafından uygulanan grafik görseller için belirlenen politikaya uymalıdır.

Düzeltilme ve Yayından Geri Çekme Talepleri

Selçuk Tıp Dergisi tarafından yayımlanan makaleler nihai versiyondur. Bu nedenle yayımlandıktan sonra düzeltme talepleri, Yayın Kurulu tarafından COPE yönergelerine göre değerlendirilir. Yayından geri çekme talepleri, makale kabulünden önce yapılmalıdır ve Editör Kurulu onayına tabidir. Makale kabulü sonrasında henüz yayınlanmadan önce bir geri çekme talebi olursa, gerekçesi ile birlikte baş editöre mail yolu ile ulaştırılmalıdır. Gerekçeler editör kurulu toplantısında değerlendirilerek nihai karar verilecek ve yazara mail yolu ile bildirilecektir. **Yayın aşamasına alınmış bir makalenin geri çekme talep başvuruları dikkate alınmayacaktır.** Yayımlanmadan önce çalışmasını geri çekme talebinde bulunmak isteyen yazar (lar), Geri çekme formunu doldurarak her bir yazarın ıslak imzası ile imzalanmış ve taratılmış halini editor@selcukmedj.org.tr adresi üzerinden e-posta aracılığıyla Baş Editör ve Editör kuruluna iletmekle yükümlüdür. Geri çekme formuna web sitemizin indirmeler sayfasından ulaşabilirsiniz(<https://www.selcukmedj.org/tr-tr/indirmeler/>). Editör Kurulu geri çekme bildirimini inceleyerek en geç 15 gün içerisinde dönüş sağlar.

Yazar isimleri, bağlantıları, makale başlıkları, özetler, anahtar kelimeler, herhangi bir bilgi yanlış ve dijital nesne tanımlayıcılardaki [digital object identifier (DOI)] yazım hataları, bir "erratum" ile düzeltilebilir.

Makale Değerlendirme Süreci

Dergiye gönderilen makalelerin hızlı bir şekilde değerlendirilmesi ve yayınlanması hedeflenmiştir. Tüm makaleler çift kör hakem değerlendirme sürecine tabidir. Makaleler, içerik, özgünlük, alandaki önem, istatistiksel analizin uygunluğu ve sonuçların çıkarılması için alanında uzman hakemler tarafından gözden geçirilecektir. En az iki hakem kararı aranacaktır. Hakemler arasında tutarsızlıklar olması durumunda, makale üçüncü ya da dördüncü bir hakeme gönderilebilecektir. Hakem kararları yardımcı editörler tarafından değerlendirilerek değerlendirme sonuçları baş editöre gönderilecektir. Gönderilen makalelerin kabulüne ilişkin nihai karar, baş editöre aittir.



Hakemler tarafından bildirilen ve yazarlar için faydalı oldukları değerlendirilen yorum ve değerlendirmeler yazarlara gönderilir. Hakemler tarafından yapılan talimat, itiraz ve talepler kesinlikle yerine getirilmelidir. Hakem(ler)e cevap dosyası ayrıca bir Word belgesi halinde oluşturulmalıdır. Yazının gözden geçirilmiş şekliyle yazarlar, bu dosyada, hakemlerin taleplerine uygun olarak atılan her adımı açık ve net bir şekilde belirtmelidir. Yazar açıklama notları, hakemlerin değerlendirme sırasına göre numaralandırılmış olarak listelenmelidir. Ayrıca makale içerisinde de gerekli değişiklikleri yapmalı ve bunları makale içerisinde belirterek (boyayarak), revize edilmiş makale ve hakem önerilerine verilmiş yanıtları içeren formlar <https://www.selcukmedj.org> adresinden titizlikle yüklenmelidir.

Yazıların Gönderilmesi

Yazarlar Yayın Hakları Bildirim Formunu sisteme yüklemelidir. Tüm yazışmalar sorumlu yazara gönderilecektir. İlgili sorumlu yazarın, tüm diğer yazışmalar için bir e-posta adresi bildirilmelidir. Yazarlar makalelerinin alındığından kendisine verilen numara ile haberdar edilirler. Bildirilen makale numarası yapılan tüm yazışmalarda kullanılmalıdır. Yazarlara beyan edilir ki; editör ofisinin ilk değerlendirmesi sonucu okuyucunun menfaatinde dönük olarak makalelerin içeriği dolayısıyla makalesi geri iade edilebilir. Bu hızlı reddetme süreci, yazarın başka bir yerde makalesini yayınlanmasına olanak sağlar.

Selçuk Tıp Dergisi'ne makale gönderilmesi, tüm yazarların, derginin yayın politikalarını ve yayın etiğini okuduğu ve kabul ettiği anlamına gelir. Makale gönderimi ve ilgili diğer tüm işlemler <https://www.selcukmedj.org> adresinden online olarak yapılacaktır.

Yazıların Hazırlanması

Yazarların, materyallerini göndermeden önce aşağıdaki kuralları okumaları ve makalelerini bu kurallara uygun halde sisteme yüklemeleri gerekmektedir:

Genel yazı biçimi: Tüm makaleler, her tarafta 2,5 cm genişliğinde kenar boşlukları bulunan standart A4 boyutunda bir word dosyası kullanılarak yazılmalı, kaynaklar, resim şekil ya da tablolar metinde geçiş sırasına göre numaralandırılmalıdır. Metin, sol hizalı ve heceli satır sonları olmayan 12 puntolu bir fontta çift boşluk kullanılmalı ve Times New Roman karakterinde yazılmalıdır. Kelimeler arasında ve cümle noktası sonrasında tek boşluk bırakmaya özen gösterilmelidir. Paragraf için sol girintiyi sekme tuşu ile bir kez tıklayarak ayarlanmalıdır. Ölçüm birimleri için Uluslararası Birimler Sistemi (SI) kullanılmalıdır. Makalenin tüm sayfaları sayfa sonunda numaralandırılmalıdır. Tüm yazılar yazım kurallarına uymalı, noktalama işaretlerine uygun olmalıdır.

Tüm makalelerde; Kapak sayfası, Ön yazı (cover letter), makale dosyası, Etik kurul onay Belgesi (kurumdan alınan), intihal analiz raporu, Şekiller ve Resimler, Telif Hakları Devir Formu, ve gerekli ise hasta onam formu ayrı dosyalar olarak yüklenmelidir.

Kaynaklar makale dosyasında, makale biter bitmez değil ayrı bir sayfada başlamalıdır. Tablolar, tablo açıklamaları, resim/şekiller ve resim/şekil açıklamaları ayrıca makale ana dosyasına kaynakların ardından ayrı bir sayfada eklenmelidir. Tablo/Resim/şekil açıklamaları; Tablo/Resim/şekillerin hemen altlarında olmalıdır.

Makale bölümleri hakkında

1-Kapak Sayfası: Makalenin İngilizce tam başlığı ve 50'den fazla karakter içermeyen kısa bir başlık, tüm yazarların açık şekilde adları ve soyadları, ORCID numaraları, kurumları, sorumlu yazar ismi iş veya cep telefonu, e-posta ve yazışma adresi belirtilmelidir. Makale daha önce tebliğ olarak sunulmuş ise tebliğ yeri ve tarihi belirtilmelidir. Yazarlar ve kurumları hakkındaki bilgiler başlık sayfası haricinde ana metinde (materyal bölümü dahil), tablolarda, şekillerde ve video dokümanlarında yer almamalıdır. Herhangi bir hibe ya da diğer destek kaynaklarının detayları, makalenin hazırlanmasına katkıda bulunan ancak yazarlık kriterlerini karşılamayan bireylere teşekkür bölümü de kapak sayfasına eklenmelidir.

2-Ana makale dosyası; Ana makale dosyası, yazar isimleri ve kurumları gibi bilgiler içermemelidir. Ana makale dosyası:

1. Başlık, 2. Özet ve Anahtar Kelimeler, 3. Makale ana metni, 4. Kaynaklar, 5. Tablolar ve açıklamaları, 6. Resim ve Şekil açıklamaları ile birlikte resim ve şekiller, 7. Alt yazılar şeklinde dizilmelidir.

Başlık: Makale Word dosyasında en baş kısımda makalenin yazım dilinde tek uzun başlığı yer almalıdır.

Özet: Editöre Mektup haricinde tüm yazılar özet içermelidir. Orijinal araştırma makalelerinin özetleri Amaç, Gereçler ve Yöntem, Bulgular ve Sonuç alt başlıklarını içermelidir. Özetler; kaynak, şekil veya tablo numarası içermemelidir. Sözcük sayısı ve özellikler için Tablo 1'deki veriler dikkate alınmalıdır.

Anahtar sözcükler: Özelerin sonunda en az üç ile en fazla beş anahtar sözcük bildirilmelidir. Anahtar sözcükler kısaltmalar olmaksızın tam olarak listelenmeli birbirinden virgül ya da noktalı virgül kullanılarak ayrılmalıdır. Anahtar kelimeler, "Tıbbi Konu Başlıklarına (MESH)" uygun olmalıdır (Bakınız: www.nlm.nih.gov/mesh/MBrowser.html).

Kısaltmalar: Özetlerde ve başlıklarda kısaltmalar kullanılmamalıdır. Makalede kullanılacak kısaltmalar, mümkünse ulusal veya uluslararası kabul görmüş olmalı, ilk kullanıldığında metin içinde tanımlanmalı ve parantez içinde yazılmalıdır. Daha sonra metin boyunca o kısaltma kullanılmalıdır. Yaygın olarak kabul edilen kısaltmalar ve kullanım için lütfen "Bilimsel Stil ve Biçim"e bakınız. (<https://www.scientificstyleandformat.org/Home.html>). Ana metinde Bir ticari markalı ilaç, ürün, donanım veya yazılım programı ana metinde yer aldığında, ürün bilgisi, ürünün adını, ürünün imalatçısını ve şirket ile şirket merkezinin bulunduğu ülkeyi aşağıdaki biçimde parantez içinde verilmelidir: "Discovery St PET / CT tarayıcı (General Electric, Milwaukee, WI, ABD).

Makale ana metni:

Giriş: Konuyu ve çalışmanın amacını açıklayacak spesifik bilgilere yer verilir.

Gereçler ve Yöntem: Çalışmanın gerçekleştirildiği yer, zaman ve çalışmanın planlanması ile kullanılan elemanlar ve yöntemler bildirilmelidir. Verilerin derlenmesi, hasta ve bireylerin özellikleri, deneysel çalışmanın özellikleri ve istatistiksel metotlar detaylı olarak açıklanmalıdır. Çalışmaya alınanlar ve çalışmayı yürütmek için kullanılan tüm yöntemler ayrıntılı olarak açıklanmalıdır. Kullanılan yeni veya modifiye yöntemler ayrıntılı olarak açıklanmalı kaynak belirtilmelidir. İlaçların ve kimyasal ajanların dozları, konsantrasyonları, verilme yolları ve süresi belirtilmelidir. Elde edilen verileri özetlemek ve önerilen hipotezi test etmek için kullanılan tüm istatistiksel yöntemlerin kısa bir raporu, istatistiksel olarak anlamlı farklılık için belirlenen p değeri ölçütleri de dahil olmak üzere bir alt başlık altında sunulmalıdır. Yapılan istatistiksel değerlendirme ayrıntılı olarak açıklanmalıdır. Olabildiğince standart istatistiksel yöntemler kullanılmalıdır. Nadiren kullanılmış veya yeni istatistiksel yöntemler kullanılmışsa konuya ilişkin ilgili referanslar belirtilmelidir. Gerekirse, olağandışı, karmaşık veya yeni istatistiksel yöntemlerle ilgili daha ayrıntılı açıklamalar, çevrimiçi ek veri olarak okuyucular için ayrı dosyalarda verilmelidir.

Bulgular: Elde edilen veriler istatistiksel sonuçları ile beraber ayrıntılı olarak verilmelidir. Bulgular şekiller ve tablolar ile desteklenmelidir. Rakam ve tablolarda verilen bilgilerin gerekli olmadıkça metinde tekrarlanmamasına özen gösterilmelidir.

Tartışma: Çalışmanın sonuçları literatür verileri ile karşılaştırılarak değerlendirilmeli, yerel ve/veya uluslararası kaynaklarla desteklenmelidir. Yazıyla alakasız veya gereksiz genel bilgiler eklenmemeli, yazının amacına uygun yeterli uzunlukta olmalıdır.

Kaynaklar: Kaynaklar ayrı bir sayfaya yazılmalıdır. Kaynaklar Vancouver sistemine uygun olarak belirtilmelidir. Buna göre, kaynak numaraları cümle sonuna nokta konmadan () içinde verilmeli, nokta daha sonra konulmalıdır. Kaynak yazar isimleri cümle içinde kullanılıyorsa ismin geçtiği ilk yerden sonra () içinde kaynak verilmelidir. Birden fazla kaynak numarası veriliyorsa arasına ",", ikiden daha fazla ardışık kaynak numarası veriliyorsa rakamları arasına "-" konmalıdır [ör. (1,2), (1-4)] gibi. Yazar sayısı 3 ve daha azsa tüm yazarların ismi olmalı, 3'dan daha fazla ise ilk3 yazar yazılıp diğerleri için et al. kullanılmalıdır. Kaynaklar metindeki kullanım sırasına göre numaralandırılıp listelenmelidir. Atfı doğruluğu, yazarın sorumluluğundadır. Kaynaklar orijinal yazım, aksan, noktalama vb. ile tam olarak uyumlu olmalıdır. Metin içindeki tüm kaynaklar belirtilmelidir. Kaynak listesinde mükerrer yazım yapılmamalıdır. Farklı yayın türleri için kaynak stilleri aşağıdaki örneklerde sunulmuştur:



Araştırma Makalesi:

- Kocakaşık A, Yücel AF, Arıkan S. Karına nazif delici kesici alet yaralanmalarında rutin abdominal eksplorasyon yönteminin retrospektif analizi. Van Tıp Dergisi 2006;13(3):90-6.
- Vikse BE, Aasard K, Bostad L, et al. Clinical prognostic factors in biopsyproven benign nephrosclerosis. Nephrol Dial Transplant 2003; 18:517-23.

Tek Yazarlı Kitaplar:

- Danovitch GM. Handbook of Kidney Transplantation. Boston: Little, Brown and Company (Inc.), 1996: 323-8.

Kitap Bölümü:

- Soysal Z, Albek E, Eke M. Fetüs hakları. Soysal Z, Çakalır C, ed. Adli Tıp, Cilt III, İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi Yayınları, İstanbul, 1999:1635-50.
- Davison AM, Cameron JS, Grünfeld JP, et al. Mesengiocapillary glomerulonephritis In: Williams G, ed. Oxford Textbook of Clinical Nephrology. New York: Oxford University Press, 1998: 591- 613.

Baskıdan önce çevrim içi olarak yayımlanan dergi makalesi:

- Doğan GM, Sığircı A, Akay A, Uğuralp S, Güvenç MN. A Rare Malignancy in an Adolescent: Desmoplastic Small Round Cell Tumor. Türkiye Klinikleri J Case Rep. 10.5336/caserep.2020-77722. Published online: 31 December 2020.
- Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging. Diagn Interv Radiol. 2016 Feb 24. doi: 10.5152/dir.2016.15323. [Epub ahead of print].

Toplantı Raporları:

- Bengissou S, Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. pp.1561-5.

Bilimsel veya Teknik Rapor:

- Cusick M, Chew EY, Hoogwerf B, Agrón E, Wu L, Lindley A, et al. Early Treatment Diabetic Retinopathy Study Research Group. Risk factors for renal replacement therapy in the Early Treatment Diabetic Retinopathy Study (ETDRS), Early Treatment Diabetic Retinopathy Study Kidney Int: 2004. Report No: 26.

Tez:

- Kaplan SI. Post-hospital home health care: elderly access and utilization (dissertation). St Louis (MO): Washington Univ; 1995.

Web sayfası ve Sosyal Medya araçları: Yazar. Başlık. Erişim linki: URL. Erişim tarihi ve yılı

3-Tablolar ve açıklamaları: Tablolar, ana makale metnine dahil edilmelidir, kaynak listesinden sonra sunulmalı ve ayrı bir sayfada olmalıdır. Ana metinde yer alan sıraya göre numaralandırılmalıdır. Her bir tablonun üzerine açıklayıcı bir başlık konulmalıdır. Tabloda kullanılan kısaltmalar, tablonun altında dipnotlarla tanımlanmalıdır (ana metin içerisinde tanımlanmış olsa bile). Tablolar kolay okunması için açık bir şekilde düzenlenmelidir. Tablolarda sunulan veriler, ana metinde sunulan verilerin tekrarı olmamalı, ancak ana metni desteklemelidir.

4-Şekil ve Resimler: Şekil, grafik ve resimler makale gönderim sistemi aracılığıyla ayrı dosyalar (TIFF veya JPEG formatında) halinde yüklenmeli ilaveten ana makale dosyasında ayrı bir sayfada tablolardan sonra ana metin içinde de gösterilmelidir. Sisteme ayrı olarak yüklenmeyen sadece makale içerisinde geçen resimler kabul edilmeyecektir. Şekil ve resimler mutlaka isimlendirilmeli ve numaralandırılmalı, metin içinde sıralamaya dikkat edilerek belirtilmelidir. Ana metine eklenecek resim, şekil ve grafik altına açıklamaları da eklenmelidir. Resimler minimum 300 dots per inch (dpi) çözünürlüğünde ve net olmalıdır. Şekil ve resim altlarında kısaltmalar kullanılmış ise, kısaltmaların açılımı alfabetik sıraya göre alt yazının altında belirtilmelidir. Mikroskopik resimlerde büyütme oranı ve tekniği açıklanmalıdır. Yayın kurulu, yazının özünü değiştirmeden gerekli gördüğü değişiklikleri yapabilir. Şekil alt birimleri olduğunda, alt birimler tek bir görüntü oluşturmak için birleştirilebilir. Şekiller, alt birimleri göstermek için işaretlenmeli ve her birinin açıklamaları (a, b, c, vb.) yazılmalıdır. Şekilleri desteklemek için kalın ve ince oklar, ok uçları, yıldızlar, yıldız işaretleri ve benzer işaretler kullanılabilir. Makale içeriği gibi şekiller de kör olmalıdır. Bir birey ya da kurumu tanımlayabilecek resimlerdeki olası bilgiler anonimleştirilmelidir. Hasta fotoğrafı paylaşımlarında kimliğin birebir tanınmamasına özen göstermeli, hastalığı belirlemeye yetecek yeterlilikte görüntü paylaşılmalıdır. Hastanın kimliğini açık eden resim paylaşımları için, hastanın resminin paylaşımına izin verdiği onam formu şarttır.

Tablo 1. Makale türlerine göre sınırlamalar

Makale türü	Sözcük sınırı	Özet sınırı	Kaynak sınırı	Tablo sınırı	Şekil sınırı
Araştırma makalesi	3500	300	50	6	6
Derleme	5000	300	80	6	10
Olgu sunumu	1500	200	15	3	5
Editöre mektup	1000	Özet yok	8	Tablo içermez	Şekil içermez
Editöryal	1000	Özet yok	20	3	3
Orijinal görüntü raporu	200	Özet yok	5	1	3

Makale Türleri

Selçuk Tıp Dergisi'nde aşağıda kısaca açıklanan makale türleri yayınlamaktadır:

Araştırma Makaleleri: Orijinal araştırmalara dayanan yeni sonuçlar sağlayan en önemli makale türüdür. Orijinal makalelerin ana metni Giriş, Yöntemler, Bulgular, Tartışma, Sonuç ve Kaynaklar alt başlıklarıyla yapılandırılmalıdır. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız. İstatistiksel analiz genellikle sonuçları desteklemek için gereklidir. İstatistiksel analizler uluslararası istatistik raporlama standartlarına uygun olarak yapılmalıdır (Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributors to medical journals. Br Med J 1983;7:1489-93). İstatistiksel analizler hakkında bilgi Materyaller ve Yöntemler bölümünde ayrı bir alt başlık ile sağlanmalı ve süreç boyunca kullanılan istatistiksel yazılım belirtilmelidir. Birimler Uluslararası Birimler Sistemine (SI) uygun olarak hazırlanmalıdır. Makalenin kısıtlıllıkları, sakıncalar ve eksik yönler, sonuç paragrafından önce Tartışma bölümünde belirtilmelidir.

Derleme Makaleleri: Yeterli sayıda bilimsel makaleyi tarayıp, konuyu bugünkü bilgi ve teknoloji düzeyinde özetleyen, değerlendirme yapan ve bulguları karşılaştırarak yorumlayan yazılar olmalıdır. Temel ve uygulamalı bilim alanlarında tüm gelişmeleri ile birlikte son bilimsel çalışmalarındaki teknik ve uygulamalar değerlendirilir. Belirli bir alan hakkında kapsamlı bilgi sahibi olan ve bilimsel geçmişi yüksek atıf potansiyeli olan yazarlar tarafından hazırlanan derlemeler dergimiz tarafından kabul edilecektir. Bu yazarlardan makale kabul şekli davet yöntemiyle de olabilir. Ana metin Giriş, Klinik ve Araştırma Sonuçları ve Sonuç bölümlerini içermelidir. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Olgu Sunumları: Tanı ve tedavide zorluk teşkil eden, yeni tedaviler sunan veya literatürde yer almayan bilgileri ortaya koyan nadir olgu veya durumlar hakkında eğitici olgu sunumları dergimizde yayınlanmak için kabul edilir. Olgu sunumu, Giriş, Olgu Sunumu ve Tartışma ve Sonuç alt başlıklarını içermelidir.



İlginç ve sıra dışı resimler değerlendirme sürecinde bir avantajdır. Hasta tanımlayıcı resimlerde hasta kimliği açık ediliyorsa resmin paylaşımına izin veren hasta onamı mutlaka olmalıdır. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Editöre Mektuplar: Bu yazı türü, daha önce yayınlanmış bir makalenin önemli kısımlarını, gözden kaçan yönlerini veya eksik kısımlarını tartışır. Derginin dikkatini çekebilecek konular başta olmak üzere, okuyucuların dikkatini çekebilecek konular hakkında makaleler, özellikle eğitici konularda Editöre Mektup şeklinde sunulabilir. Okuyucular, yayınlanmış yazılar hakkındaki yorumlarını Editöre Mektup olarak da sunabilirler. Özet, Anahtar Sözcükler ve Tablolar, Şekiller, Görüntüler ve diğer medya eklenmemelidir. Metin alt başlıkları içermemelidir. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Editöryal: Tıbbın herhangi bir alanında bir görüşün açıklandığı ya da başkalarının görüşlerinin yayınlandığı, kısa makalelerdir. Normal bir dergi makalesine göre daha yaratıcı yazabilme olanağı sağlar. Dergide yakın zamanda yayınlanmış bir makale tartışılabilir, Tarihi materyal, Halk sağlığına dair konular, Sağlık politikaları, Tıp Eğitimi ve Tıpta teknolojik gelişmeler hakkındaki yazılar bu bölümde değerlendirilebilir. Tam bir derleme olamayacak bir konuda kısa derleme bu başlık altında değerlendirilebilir. Dergi editörü; okuyuculara kişisel mesaj iletmek, aynı sayıdaki bir makale ile ilgili yorum yapmak, okuyucunun dikkatini yeni gelişmelere çekmek isterse bu bölüme yazabilir. Bilimsel makalelerin tipik yazım bölümlerini içermez. Temel mesaj bir cümlede özetlenebilir. Bu cümleyi editöryali yazmaya başlamadan belirlemek yazımı kolaylaştırır. Bu mesaj konusunda okuyucuyu ikna etmek için mantıklı bir tartışma yürütmelidir. Şekiller, Görüntüler ve diğer medya eklenebilir. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Orijinal Görüntü Raporu: Tıbbın her alanına ait ilgi çekici, tanımlayıcı veya eğitici görüntüler (ilustrasyon ya da Fotoğraf) birkaç satırlık açıklayıcı metin ve referanslarla birlikte bu bölümde değerlendirmeye sunulabilir. Makale uzunluğu 200 kelimeyi geçmemelidir. Özet, tartışma veya sonuca gerek yoktur ancak kısa bir başlık eklenmelidir. Sözcük sayısı ve özellikler için lütfen Tablo 1'e bakınız.

Hakem Raporu Sonrasında Değerlendirme

Yazarlar hakem raporunda belirtilen düzeltme istenen konuları maddelendirerek bir cevap olarak kendilerine ayrılan cevap bölümüne yazmalıdırlar ve hakem (ler)e cevap başlıklı ek bir dosya şeklinde <https://www.selcukmedj.org> adresinden yüklenmelidir. Ayrıca makale içerisinde de gerekli değişiklikleri yapmalı ve bunları makale içerisinde belirterek (boyayarak) online olarak tekrar gönderilmelidir.

Son Kontrol

1. Yayın hakkı devir ve yazarlarla ilgili bildirilmesi gereken konular formu gereğince doldurulup imzalanmış,
2. Ana makale metni ve özetlerde gerekli kelime sayıları aşılmamış
3. Yeterli sayıda anahtar kelime eklenmiş,
4. Başlık uzun ve kısa başlık şeklinde yazılmış,
5. Kaynaklar kurallara uygun olarak yazılmış,
6. Tablo, resim ve şekillerde bütün kısaltmalar açıklanmış olmalıdır.

Online Yükleme Basamakları, <https://www.selcukmedj.org> sayfasında;

1. Makale türü *
2. Uzun Başlık *
3. Kısa başlık *
4. Özet*
5. Anahtar kelimeler *
6. Yüklenecek bölümler (Kapak sayfası, Ön yazı (cover letter), makale dosyası, Etik kurul onay Belgesi (kurumdan alınan), intihal analiz raporu, Şekiller ve Resimler, Telif Hakları Bildirim Formu ve gerekli ise hasta onam formu şeklinde tamamlanmalıdır.

Dergi Sahibi

Necmettin Erbakan Üniversitesi Rektörlüğü

Yayıncı

Necmettin Erbakan Üniversitesi yayınları (Neü Press)
Yaka Mah. Yeni Meram Cad. Kasım Halife Sok. No: 11/1 (A Blok)
Meram / KONYA/TÜRKİYE
Tlf : +90 332 221 0 575
Mobil Tlf: 0 532 262 48 46
E-Mail: bilgi@neuyayin.com

Baş Editör

Doç. Dr. Pembe Oltulu
Necmettin Erbakan Üniversitesi, Meram Tıp Fakültesi Patoloji
Anabilim Dalı, Konya/Türkiye
Tel: 0 332 223 72 87
E-posta: editor@selcukmedj.org, pembeoltulu@gmail.com

Sekreter ve yazı işleri müdürü

İlkay Kurt
E-posta: info@selcukmedj.org , ilkayyildiz13@gmail.com





INFORMATION FOR AUTHORS/Writing RULES

Selcuk Medical Journal is a scientific, independent, peer-reviewed, open access publication of Necmettin Erbakan University. It is a disciplinary journal that appeals to a wide audience of medical doctors, researchers and scientists. The main objective is to ensure that current developments in the field of medicine / health, diagnosis and treatment, surgical innovations and studies that will contribute to the world of science are shared in national and international literature.

Selcuk Medical Journal publishes clinical and experimental studies, editorials, short reports, clinical case reports, technical and educational reviews, original image reports with the latest developments in the field of medicine, visual questions of disease identification and letters to the editor that contribute to medical science and academic studies. In addition, reader questions and contributions regarding previously published articles and experimental studies are published briefly. All manuscripts, except for editorials, which are deemed appropriate for the journal submission rules and the scope of the journal, are sent to at least two reviewers who are experts in their fields for scientific evaluation. All published articles are subject to a double blind peer review process. For manuscripts whose suitability is discussed, associate editors add their own evaluations by taking into account the comments of the reviewers. The final decision for all submitted manuscripts belongs to the Editor-in-Chief. The editor and the editorial board aim to finalize the process for all manuscripts within three months. However, it may take longer due to unavoidable delays. Manuscripts on some topics determined by the editorial board are submitted to the review of all members of the editorial board. As a result of the reviews, the processes of the studies that reach the majority of votes will continue in the journal. Editorial board decisions are published on the journal website. All kinds of publication rights of the articles accepted for publication belong to the journal and authors. Authors are required to read and approve the copyright form while uploading their manuscripts to the online system of Selcuk Medical Journal. The journal is published in four issues each year in March, June, September and December. The publication language of the journal is English.

The submitted manuscripts must not have been previously published in any other place/journal and must not have been sent to another journal for publication [Oral presentations and posters (abstract or full text) presented at scientific congresses are excluded, provided that they are notified]. All kinds of responsibilities (ethical, scientific, legal, etc.) of the articles published in the journal belong to the authors. Statements or opinions expressed in the articles published in the journal are the views of the authors and do not reflect the views of the editors, editorial board and publisher; the editors, editorial board and publisher do not accept any responsibility or liability for such materials. It is at the discretion of the Editor and Editorial Board whether or not to review manuscripts that are not prepared in accordance with the spelling rules.

Ethics committee approval and documentation of this approval are required in all studies. In all studies, the level of contribution and approval of the authors to the study should be reported. It should be reported that there is no financial conflict of interest at any stage of the study, including data collection, experimental phase, writing and language editing. Commercial sponsorship, if any, should be reported. The plagiarism program (iThenticate) is used in Selcuk Medical Journal. Articles with similarities exceeding the academic citation limit and articles that are not prepared in accordance with the publication rules will not be reviewed. The publication policy and processes of the journal follow the guidelines of the International Committee of Medical Journal Editors (ICMJE), World Association of Medical Editors (WAME), Council of Science Editors (CSE), European Association of Science Editors (EASE), Committee on Publication Ethics (COPE) and National Information Standards Organization (NISO). Our journal complies with the 'Principles of Transparency and Best Practice in Scholarly Publishing' (doaj.org/bestpractice). The Editorial Board will act in accordance with COPE rules in the face of allegations and suspicions of plagiarism, citation manipulation, and data falsification.

The Editorial Board of the journal processes appeals and complaints in accordance with the COPE guidelines. Authors may contact the Editor-in-Chief or the Editorial Board directly with their appeals and complaints. When needed, an impartial representative will be appointed for issues that the Editorial Board cannot resolve internally. The Editor-in-Chief will make the final decision in the decision-making process for objections and complaints. The publisher and editor are always ready to publish corrections, clarifications, retractions and apologies when necessary.

All correspondence related to Selcuk Medical Journal, paper submission, follow-up of the article, consultant reports, uploading corrections, sending acceptance letter and uploading all other forms related to the article will be made from <https://www.selcukmedj.org>. The rules for the articles to be uploaded via this site are stated below. Selcuk Medical Journal adopts a free, open access policy. In this context, all articles published in the journal will be available at <https://www.selcukmedj.org> and no additional fee will be charged to the authors.

Authorship

All authors listed as authors on manuscripts submitted to the Selcuk Medical Journal must meet the authorship requirements recommended by ICMJE (www.icmje.org). ICMJE recommends that authors meet the following 4 conditions:

- To contribute significantly to the conception/design of the study; or to the collection, analysis and interpretation of data for the study;
- To draft the manuscript or critically review the content;
- To review and approve the final version of the manuscript before publication;
- To agree to take responsibility for all aspects of the work to ensure that questions about the validity and accuracy of any part of the work have been properly investigated and resolved.

Each person designated as an author must meet the four conditions for authorship, and each person who meets these four conditions must be identified as an author. All persons designated as authors must be eligible for authorship, and all eligible persons must be listed. Individuals who do not meet all four criteria should be acknowledged on the title page of the article. Receipt of funding, data collection or general oversight of the research group do not, in themselves, justify authorship. One or more authors should take responsibility for the integrity of the study as a whole, from study inception to the published article.

In multicenter studies, authorship is attributed to a group. All members of the group named as authors must fully meet the above criteria for authorship. Group members who do not meet these criteria should be listed in the acknowledgments along with their consent. Financial and material support must also be acknowledged. All statements and opinions made in the articles reflect the views of the author(s). Authors submitting articles to the journal are deemed to have read these statements and accept the responsibility. All content is the responsibility of the authors. All financial and legal responsibility for the copyrights of tables, figures and other visual materials protected by national and international laws belongs to the authors. Authors are responsible for any legal action taken against the journal related to their articles. To clarify scientific contributions and responsibilities and any conflict of interest (COI) issues related to the manuscript, all sections of the Author Contribution Form must be completed by the corresponding author and the ICMJE Declaration of Potential Conflicts of Interest Form must be completed online by all authors. Both forms should be included in the manuscript at the time of the original submission. Author names will be published as listed on the Copyright Transfer Form. To protect all parties involved, no changes in affiliation or name changes will be made at a later date.



Requests for Author Change

Addition, deletion or rearrangement of author names in the author list can only be made before the manuscript is accepted and only if approved by the Editor of the journal. If such a change is requested, the Editor will request from the responsible author (a) the reason for the change in the author list and (b) written confirmation (e-mail) from all authors that they agree to the addition. Only in exceptional cases will the Editor consider the addition, deletion or reorganization of authors after the article has been accepted.

Article Writing

Authors of original research papers should address the topic in an original way and with an objective discussion. The paper should include sufficient detail and references to allow others to replicate the work. Fraudulent or knowingly false statements constitute unethical behavior and are unacceptable.

Originality

The author must ensure that the article is original, has not been previously published elsewhere and is not under consideration for publication elsewhere, in another language.

Using Original Sources and Citation

Authors should ensure that they are writing entirely original work and, if they have used the work or words of others, that it is properly cited. Privately obtained information, such as in conversations, correspondence or discussions with third parties, should not be used without the express written permission of the source.

Data Access and Preservation

Authors may be asked to provide research data supporting their articles for editorial review and/or to comply with the journal's open data requirements. Authors should be prepared to provide public access to such data, if possible, and to retain such data for a reasonable period after publication. The journal recommends uploading research data to TUBITAK's Aperta Portal.

Multiple and Simultaneous Submission

An author should not publish the same research article in more than one journal. It is unethical to submit the same article to more than one journal at the same time. An author should not submit a previously published article for consideration in another journal, except in the form of an abstract.

Publication of Studies Based on Surveys and Interviews

For research in all disciplines that require ethics committee approval, ethics committee approval must be obtained, this approval must be stated and documented in the article. In researches requiring ethics committee approval, information about the approval (name of the committee, date and number) should be included in the method section, as well as on one of the first/last pages of the article; in case reports, information on the signing of the informed consent form should be included in the article.

Conflict of Interest

Any financial or other interest that may cause the person to be conflicted in his or her work, significantly impair his or her objectivity, or provide an unfair advantage in favor of any person or organization. All sources of financial support received during the conduct of the research and preparation of the manuscript and the role of sponsors in the study should be disclosed. If there is no source of funding, this should also be indicated. Examples of potential conflicts of interest that should be disclosed include consultancies, salaries, grants. Potential conflicts of interest should be disclosed at the earliest possible stage.

Error Notification

When an author discovers a significant error or inaccuracy in his/her published work, he/she should notify the journal immediately. It is also the author's obligation to withdraw the manuscript or to cooperate in correcting it if deemed necessary by the editor. If the editor or publisher learns from a third party that a published paper contains an error, it is the author's obligation to cooperate with the editor, including informing the editor about the matter.

Image Integrity

It is not acceptable to enhance, darken, move, remove or add a specific feature in an image. Authors must adhere to the policy for graphic images implemented by the journal.

Requests for Correction and Withdrawal

The articles published by Selcuk Medical Journal are the final version. Therefore, requests for correction after publication are evaluated by the Editorial Board according to COPE guidelines. Requests for withdrawal from publication must be made before the article is accepted and are subject to the approval of the Editorial Board. If a retraction request is made after acceptance of the manuscript and before publication, it should be sent to the editor-in-chief via e-mail with the justification. The justifications will be evaluated at the editorial board meeting and the final decision will be made and the author will be notified by e-mail. Retraction requests will not be considered for an article that has been submitted for publication. Author(s) who wish to withdraw their manuscript before publication are obliged to fill out the withdrawal form and send it to the Editor-in-Chief and Editorial Board via e-mail at editor@selcukmedj.org.tr, signed and scanned with the wet signature of each author. You can access the withdrawal form from the downloads page of our website (<https://www.selcukmedj.org/tr-tr/indirmeler/>). The Editorial Board will review the withdrawal notification and respond within 15 days. Author names, affiliations, article titles, abstracts, keywords, any factual errors and typos in digital object identifiers (DOIs) can be corrected with an erratum.

Article Review Process

It is aimed to rapidly evaluate and publish the articles submitted to the journal. All articles are subject to a double-blind peer review process. Manuscripts will be reviewed by at least two impartial reviewers for content, originality, significance in the field, appropriateness of statistical analysis, and conclusions. In case of discrepancies between the reviewers, the manuscript may be sent to a third or fourth reviewer. The decisions of the reviewers will be evaluated by the associate editors and the evaluation results will be sent to the editor-in-chief. The final decision regarding the acceptance of submitted manuscripts rests with the editor-in-chief.

Comments and evaluations reported by the reviewers and evaluated as useful for the authors are sent to the authors. Instructions, objections and requests made by the referees must be strictly followed. The response file to the referee(s) should also be created as a Word document. In the revised version of the manuscript, the authors should clearly and concisely indicate in this file each step taken in accordance with the reviewers' requests. The author's annotations should be listed and numbered in the order of the reviewers' evaluation. They should also make the necessary changes in the manuscript and indicate them in the manuscript (by coloring), and the revised manuscript and the forms containing the responses to the referees' suggestions should be uploaded meticulously at <https://www.selcukmedj.org>.



Submission of Manuscript

Authors must upload the Notification of Publication Rights Form to the system. All correspondence will be sent to the corresponding author. The corresponding author should be provided with an e-mail address for all other correspondence. Authors will be notified of the receipt of their manuscripts by the number given to them. The article number should be used in all correspondence. Authors are advised that, following an initial evaluation by the editorial office, the manuscript may be returned due to its content in the best interest of the reader. This rapid rejection process allows the author to publish the article elsewhere. Submission of an article to Selcuk Medical Journal implies that all authors have read and accepted the journal's editorial policies and publication ethics. Manuscript submission and all other related procedures will be done online at <https://www.selcukmedj.org>.

Preparation of Manuscripts

Authors are required to read the following rules before submitting their materials and upload their manuscripts in accordance with these rules:

General writing style: All manuscripts should be written in a standard A4 size word document with 2.5 cm wide margins on all sides, and references, figures or tables should be numbered in the order of their occurrence in the text. The text should be written in Times New Roman font with double spaces in a 12-point font without left-aligned and syllabic line breaks. Please leave a single space between words and after the sentence point. The left indent for the paragraph should be set by clicking once with the tab key. The International System of Units (SI) should be used for units of measurement. All pages of the article should be numbered at the end of the page. All articles should follow the spelling rules and punctuation marks should be appropriate.

In all articles; Cover page, cover letter, article file, Ethics committee approval document (obtained from the institution), iThenticate analysis report, Figures and Images, Copyright Transfer Form, and patient consent form, if necessary, should be uploaded as separate files. References should start on a separate page in the article file, not at the end of the article. Tables, table descriptions, images/figures and image/figure descriptions should also be added to the main article file on a separate page after the references. Table/Picture/figure descriptions should be immediately below the tables/pictures/figures.

About article sections

1-Cover Page: The full title of the article in English and a short title containing no more than 50 characters, the full names and surnames of all authors, ORCID numbers, institutions, name of the corresponding author, work or mobile phone number, e-mail and correspondence address should be indicated. If the article has been previously presented as a paper, the place and date of the paper should be indicated. Information about the authors and their institutions should not be included in the main text (including the materials and methods section), tables, figures and video documents, except on the title page. Details of any grants or other sources of support and acknowledgments to individuals who contributed to the preparation of the manuscript but do not meet the criteria for authorship should also be included on the cover page.

2-Main article file: The main file should not contain information such as author names and institutions. Main article file should contain:

1. Title, 2. Abstract and Keywords, 3. Main text of the article, 4. References, 5. Tables and their descriptions, 6. Figures and figures with their descriptions, 7. Subtitles.

Title: At the very beginning of the article in the Word file, there should be a single long title of the article in written language.

Abstract: All manuscripts, except for Letters to the Editor, should include an abstract. Abstracts of original research articles should include the subtitles Objective, Materials and Methods, Results and Conclusion. Abstracts should not include reference, figure or table numbers. The data in Table 1 should be considered for word count and specifications.

Keywords: A minimum of three and a maximum of five keywords should be included at the end of the abstract. Keywords should be listed in full without abbreviations and separated by commas or semicolons. Keywords should conform to the "Medical Subject Headings (MESH)" (see: www.nlm.nih.gov/mesh/MBrowser.html).

Abbreviations: Abbreviations should not be used in abstracts and titles. The abbreviations to be used in the article should be nationally or internationally recognized, if possible, and should be defined in the text and written in parentheses when first used. Then that abbreviation should be used throughout the text. For commonly accepted abbreviations and usage, please refer to "Scientific Style and Format" (<https://www.scientificstyleandformat.org/Home.html>). When a trademarked drug, product, hardware or software program is included in the main text, the product information should include the name of the product, the manufacturer of the product, and the company and country of headquarters in parentheses in the following format: "Discovery St PET / CT scanner (General Electric, Milwaukee, WI, USA).

Main text of the article:

Introduction; includes specific information to explain the topic and the purpose of the study.

Materials and Methods: The place, time and planning of the study and the elements and methods used should be reported. Data collection, characteristics of patients and individuals, characteristics of the experimental study and statistical methods should be explained in detail. The recruitment and all methods used to conduct the study should be described in detail. New or modified methods used should be described in detail and the source should be indicated. Doses, concentrations, routes and duration of administration of drugs and chemical agents should be specified. A brief report of all statistical methods used to summarize the data obtained and test the proposed hypothesis should be presented under a subheading, including the p-value criteria for statistically significant difference. The statistical evaluation performed should be described in detail. Standard statistical methods should be used whenever possible. If rarely used or new statistical methods are used, relevant references should be cited. If necessary, more detailed descriptions of unusual, complex or new statistical methods should be provided in separate files for readers as online supplementary data.

Findings: The data obtained should be given in detail with statistical results. Findings should be supported with figures and tables. Please do not repeat the information given in figures and tables in the text.

Discussion: The results of the study should be evaluated by comparing them with the literature and should be supported by local and/or international references. General information that is irrelevant or unnecessary should not be added and should be of sufficient length for the purpose of the article.

References: References should be written on a separate page. References should be cited according to the Vancouver system. Accordingly, reference numbers should be given in () without a full stop at the end of the sentence, and the full stop should be placed afterwards. If the names of the source authors are used in a sentence, the reference should be given in () after the first mention of the name. If more than one source number is given, "," should be placed between them, and if more than two consecutive source numbers are given, "-" should be placed between the numbers [e.g. (1,2), (1-4), etc.]. References should be numbered and listed in the order in which they are used in the text. Citation accuracy is the responsibility of the author. References must exactly match the original spelling, accent, punctuation, etc. All references in the text must be cited. There should be no duplicate spelling in the reference list. Reference styles for different types of publications are presented in the examples below:

Research Paper:

- Kocakuşak A, Yücel AF, Arıkan S. Karına nazif delici kesici alet yaralanmalarında rutin abdominal eksplorasyon yönteminin retrospektif analizi. Van Tıp Dergisi 2006;13(3):90-6.
- Vikse BE, Asard K, Bostad L, et al. Clinical prognostic factors in biopsyproven benign nephrosclerosis. Nephrol Dial Transplant 2003;18:517-23.



Single Author Books:

- Danovitch GM. Handbook of Kidney Transplantation. Boston: Little, Brown and Company (Inc.), 1996: 323-8.

Book Chapter:

- Soysal Z, Albek E, Eke M. Fetüs hakları. Soysal Z, Çakalır C, ed. Adli Tıp, Cilt III, İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi Yayınları, İstanbul, 1999:1635-50.
- Davison AM, Cameron JS, Grünfeld JP, et al. Oxford Textbook of Clinical Nephrology. In: Williams G, ed. Mesengiocapillary glomerulonephritis. New York: Oxford University Press, 1998: 591- 613.

Journal article published online ahead of print:

- Doğan GM, Sığircı A, Akyay A, Uğuralp S, Güvenç MN. A Rare Malignancy in an Adolescent: Desmoplastic Small Round Cell Tumor. Türkiye Klinikleri J Case Rep. 10.5336/caserep.2020-77722. Published online: 31 December 2020.
- Cai L, Yeh BM, Westphalen AC, Roberts JP, Wang ZJ. Adult living donor liver imaging. Diagn Interv Radiol. 2016 Feb 24;doi: 10.5152/dir.2016.15323. [Epub ahead of print].

Meeting Reports:

- Bengissson S, Sothemin BG. Enforcement of data protection, privacy and security in medical informatics. In: Lun KC, Degoulet P, Piemme TE, Rienhoff O, editors. MEDINFO 92. Proceedings of the 7th World Congress on Medical Informatics; 1992 Sept 6-10; Geneva, Switzerland. Amsterdam: North-Holland; 1992. pp.1561-5.

Scientific or Technical Report:

- Cusick M, Chew EY, Hoogwerf B, Agrón E, Wu L, Lindley A, et al. Early Treatment Diabetic Retinopathy Study Research Group. Risk factors for renal replacement therapy in the Early Treatment Diabetic Retinopathy Study (ETDRS), Early Treatment Diabetic Retinopathy Study Kidney Int: 2004. Report No: 26.

Thesis:

- Kaplan SI. Post-hospital home health care: elderly access and utilization (dissertation). St Louis (MO): Washington Univ; 1995.

Website and Social Media Channels: Author. Title. Website: URL. Date and year

3-Tables and their descriptions: Tables should be included in the text of the main article, presented after the list of references and on a separate page. They should be numbered according to the order in the main text. A descriptive title should be placed above each table. Abbreviations used in the table should be defined in footnotes below the table (even if defined in the main text). Tables should be clearly organized for easy reading. The data presented in the tables should not repeat data presented in the main text, but should support the main text.

4-Figures and Images: Figures, graphics and images should be uploaded as separate files (TIFF or JPEG format) through the manuscript submission system and should also be shown in the main text after the tables on a separate page in the main file. Images that are not uploaded separately to the system and only included in the article will not be accepted. Figures and illustrations must be named and numbered, and must be cited in the text, paying attention to their order. Descriptions should be added under the pictures, figures and graphics to be added to the main text. Images should be clear with a minimum resolution of 300 dots per inch (dpi). If abbreviations are used in the captions of figures and images, the abbreviations should be indicated below the caption in alphabetical order. For microscopic images, the magnification ratio and technique should be explained. The editorial board may make changes it deems necessary without changing the essence of the manuscript. When figures have subunits, the subunits may be combined to form a single image. Figures should be labeled to indicate the subunits and descriptions (a, b, c, etc.) should be written for each. Thick and thin arrows, arrowheads, stars, asterisks and similar markings can be used to support figures. Like the content of the article, the figures should be blind. Possible information in images that could identify an individual or institution should be anonymized.

When sharing patient photos, ensure that the identity is not recognized one-to-one, and images sufficient to identify the disease should be shared. For sharing images that reveal the patient's identity, a consent form in which the patient authorizes the sharing of the image is necessary.

Table 1. Limitations according to article types

Article Types	Word limitation of article	Word limitation of abstract	Limitation of references	Limitation of Tables	Limitation of Figures
Research Article	3500	300	50	6	6
Review	5000	300	80	6	10
Case Presentations	1500	200	15	3	5
Letters to the Editor	1000	(-)	8	(-)	(-)
Editorial	1000	(-)	20	3	3
Original Image Report	200	(-)	5	1	3

Article Types

Selçuk Medical Journal publishes the types of articles briefly described below:

Research Articles: This is the most important type of article that provides new results based on original research. The main text of original articles should be structured with the subheadings Introduction, Methods, Results, Discussion, Conclusion and References. Please refer to Table 1 for word count and specifications. Statistical analysis is often necessary to support conclusions. Statistical analyses should be performed in accordance with international statistical reporting standards (Altman DG, Gore SM, Gardner MJ, Pocock SJ. Statistical guidelines for contributors to medical journals. Br Med J 1983;7;1489-93). Information on statistical analyses should be provided under a separate subheading in the Materials and Methods section and the statistical software used throughout the process should be indicated. Units should be prepared in accordance with the International System of Units (SI). Limitations, drawbacks and shortcomings of the article should be stated in the Discussion section before the conclusion paragraph.

Review Articles: Review articles should be articles that review a sufficient number of scientific articles, summarize the subject at the current level of knowledge and technology, evaluate and interpret the findings by comparing them. Techniques and applications in the latest scientific studies with all the developments in basic and applied sciences are evaluated. Reviews prepared by authors who have extensive knowledge of a particular field and have a scientific background with high citation potential will be accepted by our journal. Acceptance of manuscripts from these authors can also be by invitation. The main text should include Introduction, Clinical and Research Results and Conclusion. Please see Table 1 for word count and specifications.

Case Presentations: Educational case reports on rare cases or conditions that pose difficulties in diagnosis and treatment, offer new treatments or reveal information not included in the literature are accepted for publication in our journal. The case report should include the subheadings Introduction, Case Presentation and Discussion and Conclusion. Interesting and unusual pictures are an advantage in the evaluation process.



If patient identity is disclosed in patient-identifying pictures, patient consent must be provided to share the picture. Please see Table 1 for word count and specifications.

Letter to the Editor: This type of article discusses important parts, overlooked aspects or missing parts of a previously published article. Articles on topics that may attract the attention of the journal, especially on topics that may attract the attention of readers, especially on educational topics, can be submitted in the form of Letters to the Editor. Readers can also submit their comments on published articles as a Letter to the Editor. Abstract, Keywords and Tables, Figures, Images and other media should not be included. The text should not include subheadings. Please see Table 1 for word count and specifications.

Editorial: These are short articles in which an opinion is expressed or the opinions of others are published in any field of medicine. It provides the opportunity to write more creatively than a normal journal article. An article recently published in the journal can be discussed, historical material, public health issues, health policies, medical education and technological developments in medicine can be evaluated in this section. A short review on a subject that cannot be a complete review can be evaluated under this heading. Journal editor; If he/she wants to convey a personal message to the readers, comment on an article in the same issue, or draw the reader's attention to new developments, he/she can write in this section. It does not contain the typical writing sections of scientific articles. The basic message should be summarized in one sentence. Determining this sentence before starting to write the editorial makes writing easier. He/she must make a logical argument to convince the reader of this message. Shapes, Images and other media can be added. Please see Table 1 for word count and specifications.

Original Image Report: Interesting, descriptive or educational images (illustration or photography) from any field of medicine can be submitted for evaluation in this section, along with a few lines of explanatory text and references. Article length should not exceed 200 words. A summary, discussion, or conclusion is not required, but a brief title should be included. Please see Table 1 for word count and specifications.

Evaluation After Referee Report

Authors should itemize the issues for correction in the referee's report and write them as a reply to the referee(s) in the reply section allocated to them and upload it as an additional file titled reply to the referee(s) at <https://www.selcukmedj.org>. They should also make the necessary changes in the manuscript and indicate them in the manuscript (by coloring) and resubmit online.

Final Control

1. The form for transfer of publication rights and matters to be notified about authors has been duly completed and signed,
2. Required word counts are not exceeded in the main article text and abstracts
3. Enough keywords have been added,
4. The title is written as long and short title,
5. References are written in accordance with the rules,
6. All abbreviations in tables, pictures and figures should be explained.

Online Uploading Steps

via <https://www.selcukmedj.org> website;

1. Article type *
2. Long Title *
3. Short title *
4. Summary*
5. Keywords*
6. The required sections to be uploaded (Cover page, Cover letter, manuscript file, document of Ethics committee approval (obtained from the institution), identicate analysis report, Figures and Images, Copyright Form, and patient consent form if necessary.

Owner of Journal

Rectorate of Necmettin Erbakan University

Publisher

Necmettin Erbakan University Press (NEU Press)
Yaka Mah. Yeni Meram Cad. Kasım Halife Sok. No: 11/1 (A Blok)
Meram / KONYA/TÜRKİYE
Tif : +90 332 221 0 575
Mobil Tif: 0 532 262 48 46
E-Mail: bilgi@neuyayin.com

Editor-in-Chief

Pembe Oltulu, MD, Associate Professor at Pathology
Necmettin Erbakan University, Meram Medical Faculty
Department of Pathology, Konya, Türkiye
Tel: 0 332 223 72 87
Email: editor@selcukmedj.org, pembeoltulu@gmail.com

Secretary and Asistant of the Editor

İlkay Kurt

Email: E-posta: info@selcukmedj.org , ilkayildiz13@gmail.com





İÇİNDEKİLER/CONTENTS

Araştırma Makalesi / Research Article

- 1. Extensive Ultrasonic Liposuction in Gynecomastia: An Alternative Approach without Surgical Gland Excision**
Jinekomastride Geniş Alanda Ultrasonik Liposuction: Cerrahi olarak Gland Çıkarmadan Alternatif Yaklaşım
Atilla Adnan Eyuboglu, Mustafa Tonguc Isken.....1-7
- 2. Does Sertraline Affect Contraction in Endothelium Damaged Aorta?**
Sertralin, Endotel Hasarlı Aortta Kontraksiyonu Etkiler Mi?
Z. Isik Solak Gormus, Cahit Burkay Eker, Hatice Solak, Raviye Ozen Koca, Faik Ozdengul.....8-15
- 3. Early And Mid-Term Radiological Results of Isolated Pembersal Procedure in Cases of Developmental Dislocation of The Hip**
Gelişimsel Kalça Çıkığı Olgularında İzole Pembersal Prosedürünün Erken ve Orta Dönem Radyolojik Sonuçları
Alim Can Baymurat, Ferid Abdulaliyev, Asim Ahmadov, Elsad Osmanli, Nusret Ok, Orkun Gul, Sacit Turanli.....16-21
- 4. Evaluation of Attitudes and Knowledge Levels of Medical Faculty Students about Probiotics**
Tıp Fakültesi Öğrencilerinin Probiyotikler Hakkındaki Tutum ve Bilgi Düzeylerinin Değerlendirilmesi
Fatma Goksin Cihan, Nur Demirbas, Nazan Karaoglu, Ruhusen Kutlu.....22-28
- 5. Monocyte/High-Density Lipoprotein Ratio: An Indicator of Oxidative Stress and Disease Severity in Lichen Planus Patients**
Monosit/Yüksek Yoğunluklu Lipoprotein Oranı: Liken Planus Hastalarında Oksidatif Stres ve Hastalık Şiddetinin Bir Göstergesi
Selami Aykut Temiz, Munise Daye.....29-33
- 6. Intra- and Inter-Rater Reliability of Magnetic Resonance Imaging Measurements of Supraspinatus Muscle Thickness, Acromiohumeral Distance, and Coracohumeral Distance in Patients with Shoulder Pain**
Omuz Ağrısı Olan Hastalarda Supraspinatus Kas Kalınlığı, Akromiohumeral Mesafe ve Korakohumeral Mesafenin Manyetik Rezonans Görüntüleme Ölçümlerinin Değerlendiriciler İçi ve Değerlendiriciler Arası Güvenilirliği
Burak Tayyip Dede, Muhammed Oguz, Berat Bulut, Fatih Bagcier, Mustafa Turgut Yildizgoren, Ebru Aytekin.....34-38
- 7. Is Being an Emergency Service Professional a Risk Factor for Violence in Healthcare?**
Acil Servis Çalışanı Olmak Sağlıkta Şiddet için Bir Risk Faktörü müdür?
Ali Avcı, Muhammet Rasit Ozer, Mehmet Emre Ay.....39-44

Olgu Sunumu / Case Report

- 8. A Rare Case of Multicentric Reticulohistiocytosis in An Elderly Male Patient**
Yaşlı Erkek Hastada Nadir Bir Multisentrik Retikülohistiyositoz Vakası
Rafael Everton Assunção Ribeiro da Costa, Gustavo Hugo de Souza Faria, Maria Júlia Andrade Pereira Soares, Maria Clara Amorim Silva, Raimundo Gerônimo da Silva Júnior.....45-48

Saygıdeğer Okurlar;**Mart 2024**

2024 yılı itibari ile, sayın rektörümüz Prof. Dr. Cem Zorlu hocamın tevdi etmiş olduğu bu değerli görevi, yıllardır Selçuk Tıp Dergimizin Baş Editörlüğünü başarı ile sürdürmüş olan Prof. Dr. Bilsev İnce hocamızdan devraldım. Kendisine yapmış olduğu kıymetli katkı ve hizmetlerden dolayı teşekkürü borç bilirim.

Görevi devraldığımız üç aylık kısa süre zarfında, bir yandan sistemimize yüklenen makalelerin işlemlerini titizlikle tamamlarken, diğer yandan da yapılması gereken işler listesini ivedilikle yürürlüğe koyduk. Dergi yayın kuruluna yeni ve başarılı isimler ekledik, web-site'mizi yeniledik, tüm dergi bilgilendirme yazılarını güncelledik, dergi makale yükleme sistemimizi ve tüm arşivimizi DİJİDER bilimsel makale yükleme platformuna taşıdık, makale formatımızı ve başlık dosyalarımızı yeniledik, dergi kapağımızı yenilikçi bir formda tasarlayarak anlamlı bir logo oluşturduk. İlâveten 2024 itibari ile tamamen ingilizce yayın formatına geçmeyi hedeflemekteyiz. İngilizce web-sitemiz ve diğer bazı eksiklikler tamamlandıktan sonra çok yakında bu hedefe tam ve eksiksiz biçimde ulaşacağımızı düşünüyoruz. Ancak öncü olarak bu sayımızda tüm makalelerimizi ingilizce yayın dilinde yayınladık. Amacımız dergimizin ve makalelerimizin uluslararası görünürlüğünü ve okunurluğunu artırarak Selçuk Tıp Dergi'mizin bilimsel dergicilikteki yerini en üst seviyelere taşımaktır.

Selçuk Tıp dergimiz, 1984 yılından bu yana yayın hayatına devam eden kadim bir tıp dergisidir. Ülkemizin sarsıntılı zamanlar geçirdiği 2016-2017 yıllarında dergimiz de çeşitli sıkıntılara maruz kalmış ancak yetenekli editörlerimizin çaba ve gayretleri ile tüm zorlukları aşmayı başarmıştır. Bugün itibari ile uluslararası güçlü yayın kurulu ve yayınladığı değerli çalışmalarla yayın hayatına başarılı bir şekilde devam etmektedir.

Yayın politikamızı; uluslararası standartlarda yayıncılık, bilimsellik, özen ve kalite üzerine kuruludur. Kırkıncı yılımızda, Mart 2024 sayımızda da, çalışmalarının yayınlanması için dergimizi tercih eden değerli yazarlarımızın makalelerini titiz bir hakemlik süreci ve editoryal değerlendirmeler ardından yayın sürecine aldık. Yayında olan sayımızda; 7 araştırma makalesi ve bir olgu sunumu bulunuyor. Bu sayımızda, ülkemizin çeşitli bölgelerinden makaleler yanısıra denizaşırı ülkelerden de makale yayınlayan bir dergi olarak ulusal ve uluslararası niteliğimizi bir kez daha kanıtlamış bulunuyoruz. Keyifle okuyacağımızı ümit ediyoruz.

Her sayımızda olduğu gibi bu sayımızda da makaleleri için dergimizi tercih eden yazarlarımıza, sürecin en önemli kahramanları olan hakemlerimiz ve editör kurulumuza, yazı işlerimize ve destekleri için Necmettin Erbakan Üniversitesi Bilimsel Yayınlar koordünlüğümüze çok teşekkür ederim.

Selam ve saygılarımla...

Doç.Dr.Pembe Oltulu
Baş Editör



Extensive Ultrasonic Liposuction in Gynecomastia: An Alternative Approach without Surgical Gland Excision

Jinekomastide Geniş Alanda Ultrasonik Liposuction: Cerrahi olarak Gland Çıkarmadan Alternatif Yaklaşım

Atilla Adnan Eyuboglu¹, Mustafa Tonguc Isken²

¹Arel University Faculty of Medicine, Bahcelievler Memorial Hospital, Department of Plastic and Reconstructive Surgery, Istanbul, Türkiye
²Bahcesehir University Faculty of Medicine, Bahcelievler Memorial Hospital, Department of Plastic and Reconstructive Surgery, Istanbul, Türkiye

ÖZET

Amaç: Göğüs duvarı üzerinde yapılan cilt ve gland çıkarma işlemler genellikle hastaların tolere etmesi zor olan belirgin izlere sebep olabilmektedir. Cerrahi olarak gland çıkarmadan geniş alanda ultrasonik liposuction yaklaşımını tanımlamaktır. Ayrıca yöntemin komplikasyonları azaltma ve kozmetik sonuçları iyileştirme konusundaki etkinliğini araştırdık.

Gereçler ve Yöntem: Rohrich II ve III evre jinekomasti hastalar cilt kalitesine göre değerlendirildi. Kriterleri karşılayan 46 hastaya Şubat 2021 ile Nisan 2023 tarihleri arasında kıdemli yazar tarafından ultrasonik liposuction uygulandı. Bu hastalar, standart liposuction ile birlikte periareolar mastopeksi ve gland eksizyonunu uygulanan 58 hasta ile karşılaştırıldı.

Bulgular: Çalışmada geniş alanda ultrasonik liposuction uygulanan hastaların %8.7'lik bir komplikasyon oranına sahip olduğunu buldu. Toplam hastalardan sadece bir tanesinde seroma komplikasyonu yaşadı ve hastaların üçünde residual meme dokusu/ptoz gözlemlendi. Hastaların hiçbirinde revizyon cerrahisi gerekmedi. Buna karşılık, periareolar mastopeksi ve gland çıkarmayı içeren kontrol grubunun komplikasyon oranı daha yüksekti (%10.3).

Sonuç: Yara kontraksiyonu için plastik cerrahinin temel prensiplerini kullandık. Yara iyileşme mekanizmalarını geniş bir yüzeye dağıtarak, göğüs duvarında belirgin bir iz oluşturmadan cerrahiye göre daha iyi kozmetik sonuçlar elde ettik.

Anahtar Kelimeler: Geniş Alanda Liposuction, Jinekomasti Cerrahisi, Meme Pitozu, Ultrasonik Liposuction, Vaser Liposuction

ABSTRACT

Aim: Skin and gland removals made on the chest wall may result in noticeable scars that can be challenging for patients to tolerate. This study aimed to define an extensive ultrasonic liposuction approach without surgical excision for gynecomastia. We also investigated its effectiveness in reducing complications and improving cosmetic outcomes.

Materials and Methods: Gynecomastia patients with Rohrich grades II and III were evaluated according to skin quality. 46 patients who met these criteria underwent ultrasonic liposuction performed by the senior author between February 2021 and April 2023. These patients were compared with 58 who underwent surgery using suction-assisted liposuction combined with peri areolar mastopexy and glandular excision.

Results: Our study found that patients who underwent extensive ultrasonic liposuction had a complication rate of 8.7%. Of the total number of patients, only one experienced a seroma complication, and three experienced residual breast tissue/ptosis. None of the patients required revision surgery. In comparison, the control group that underwent peri-areolar mastopexy and glandular excision had a higher complication rate (10.3%).

Conclusion: We used the basic principles of plastic surgery for wound contraction. Distributing the wound healing mechanisms to a broad surface allowed us to achieve better cosmetics without forming a noticeable scar on the chest wall.

Keywords: Breast Ptosis, Extensive Liposuction, Gynecomastia Surgery, Ultrasonic Liposuction, Vaser Liposuction

Geliş Tarihi/Received: 3 Ocak/January 2024 **Kabul Tarihi/Accepted:** 15 Mart/March 2024 **Yayın Tarihi/Published Online:** 25 Mart/March 2024

Sorumlu Yazar/Corresponding Author: Atilla Adnan Eyuboglu, Arel University Faculty of Medicine, Bahcelievler Memorial Hospital, Department of Plastic and Reconstructive Surgery, Istanbul, Türkiye
e-mail: atillaeyuboglu@yahoo.com

Atf yapmak için/ Cite this article as: Eyuboglu AA, Isken MT. Extensive Ultrasonic Liposuction in Gynecomastia: An Alternative Approach without Surgical Gland Excision. Selcuk Med J 2024;40(1): 1-7

Disclosure: Author has not a financial interest in any of the products, devices, or drugs mentioned in this article. The research was not sponsored by an outside organization. Author has agreed to allow full access to the primary data and to allow the journal to review the data if requested.

"This article is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0)"



INTRODUCTION

Gynecomastia refers to the non-cancerous enlargement of male breast tissue, resulting from an upsurge in both fatty and glandular elements within the breast. The progression of gynecomastia generally occurs in two stages: florid and fibrous phases, which typically become evident after a year. Once the periductal tissue and surrounding stroma undergo fibrosis and hyalinization, the process becomes irreversible, rendering glandular hypertrophy resistant to medical interventions (1). In this phase, glandular tissues do not respond to medical treatment (2). In such instances, surgical intervention is generally regarded as the standard approach (3). Back in 1973, Simon et al. introduced a clinical classification system for gynecomastia levels that still maintains wide usage today (4).

Gynecomastia surgery necessitates a meticulous tripartite evaluation encompassing the dimensions of glandular hypertrophy, adipose tissue excess, and dermal redundancy (5). A spectrum of surgical modalities exists to address these facets (6). Diverse liposuction methodologies combined with reduction mammoplasty and Nipple Areolar Complex (NAC) repositioning facilitated by varied scar and pedicle strategies are widely covered in the literature (7, 8). Regardless of the fibrous histological component, liposuction and ultrasound-assisted liposuction (UAL) manifest as potential surgical alternatives (9, 10). Ultrasound-assisted liposuction (UAL), which is an alternative to conventional liposuction (CL) methods, uses ultrasonic sound waves to break up the oil and aspirate the tissue in liquid form (11).

Within the ambit of minimally invasive interventions, procedures such as liposuction-assisted minimal incision surgery have garnered favor due to their propensity for diminished postoperative complications, expedited convalescence, and enhanced aesthetic outcomes (10). It is noteworthy that cases featuring pronounced skin redundancy may not yield optimal results through such minimally invasive techniques. Gynecomastia surgery encompasses both immediate and delayed complications. In the early phase, potential issues encompass hematoma, seroma, infections, and necrosis of the nipple. After surgery, delayed complications may manifest as persisting breast tissue, hypertrophic scarring or keloids, sensory numbness, asymmetry, and variations

in contour like overcorrection or undercorrection. Notably, patients grappling with moderate to extensive gynecomastia coupled with compromised skin elasticity are more susceptible to encountering contour irregularities, transverse peri-areolar wrinkles, and prolonged discernible scars. As a result, numerous plastic surgeons are actively engaged in devising innovative techniques aimed at effectively addressing severe gynecomastia while minimizing visible scarring. It has been previously reported that complications such as bleeding, bruising, and fluctuations on the surface of the skin are less common in UAL than in CL procedures (12).

This study focused on individuals diagnosed with Rohrich grade II and III gynecomastia. The surgical approach was commenced using ultrasonic liposuction, followed by suction-assisted liposuction. The main goal of this study was to evaluate the effectiveness of the liposuction-only technique in reducing complications and improving cosmetic results.

MATERIALS AND METHODS

Prior to the procedure, each patient underwent a comprehensive physical consultation aimed at delineating the morphological classification of the gland and identifying the optimal surgical strategy. Thorough medical records were procured for all participants, encompassing preoperative laboratory assessments with complete blood counts and coagulation parameters. Furthermore, an endocrinological profile was meticulously conducted to eliminate any underlying hormonal irregularities, culminating in the exclusion of three participants from the study. Moreover, a definitive physical consultation and ultrasonography were utilized to observe the glandular structures, and patients were selected as candidates if their breast glands were smaller than 3x3cm. Patients who had a larger breast gland were considered candidates for surgical gland excision. Meanwhile, patients were screened for any potential neoplastic processes, which resulted in the exclusion of one participant from the study.

Patients presenting with Rohrich grade IIA, IIB, and III gynecomastia were systematically assessed with meticulous consideration given to their skin quality (Table 1). The distinction between glandular and adipose tissues was ascertained using the pinch test methodology as outlined by Rohrich et al. (9)

Table 1. Classification of breast hypertrophy and ptosis by Rohrich¹⁴

Grade*	Classification of breast hypertrophy and ptosis
Grade I	Minimal hypertrophy (< 250 g of breast tissue) without ptosis
I A	Primary glandular
I B	Primary fibrous
Grade II	Moderate hypertrophy (250-500 g of breast tissue) without ptosis
II A	Primary glandular
II B	Primary fibrous
Grade III	Severe hypertrophy (>500 g of breast tissue) with grade I ptosis
	Glandular or fibrous
Grade IV	Severe hypertrophy (>500 g of breast tissue) with grade II or III ptosis
	Glandular or fibrous

* 14. Rohrich RJ, Ha R-Y, Kenkel J-M, et al. Classification and management of gynaecomastia: defining the role of ultrasound-assisted liposuction. *Plast Reconstr Surg* 2003; 111:909-923.

Table 2. Extensive ultrasonic liposuction algorithm for gynecomastia treatment. Suction assisted liposuction + ultrasonic liposuction was used for 46 patients.

Rohrich Grade ¹⁴	Procedure	Number of Patients
I A	Suction assisted liposuction	
I B	Suction assisted liposuction +/- Ultrasonic liposuction	
II A	Suction assisted liposuction + Ultrasonic liposuction	16
II B	Suction assisted liposuction + Ultrasonic liposuction	18
III	Suction assisted liposuction + Ultrasonic liposuction	12
IV	Gland Excision or Free NAC* or Inferior pedicle method	

* Free NAC

The patients were divided into two groups: conventional liposuction and ultrasonically assisted liposuction (UAL), and randomization was applied to this division.

Approval from the Local Ethics Committee (Number: AU-MB#113) was secured, and patients provided written informed consent through a formal consent form. Following the conclusive elimination of ineligible cases, a total of 46 patients meeting the stipulated criteria underwent surgery with the supervision of the senior author during the period spanning February 2021 and April 2023 (Table 2). Comprehensive photographic documentation was conducted from five distinct angles, and subsequent evaluations occurred on the 7th day, 1st, 6th, 12th months postoperatively.

Surgical Procedure

All patients underwent ultrasonic liposuction without any surgical breast tissue removal under general anesthesia. The chest wall, lateral thoracic wall, and upper abdominal area were marked, shaved, and prepared for infiltration anesthesia. All patients received one dose of an intraoperative intravenous broad-spectrum antibiotic. Tumescent infiltration using 1500

ml ringer lactate, 30 ml lidocaine, and epinephrine (1:1,000,000) per breast was performed using an automatic infiltration device without exceeding the recommended dosages (13).

The average operation duration was 100+/-20 minutes, including the infiltration of the entire solution within 14+/-2 minutes. After complete infiltration of fluid, liposuction was planned through three separate incisions located over the anterior axillary line, lower lateral level of the inframammary fold, and thorax midline (Figure 1). Ultrasonic liposuction was applied for 60+/-10 minutes on the total chest wall, lateral thoracic wall, and upper abdominal areas using a Vaser® device on continuous mode at 100% energy until ensuring total liquidization of the fat and glandular tissue (Video 1). Suction-assisted liposuction was applied to all areas mentioned for homogeneous mobilization, and the equalization of fat liposuction was tested by a skin pinch test. A skin pinch test less than 2 cm was considered adequate (Figure 2) (Video 2). After completion of liposuction, patients were brought to a 30-degree Trendelenburg position for skin re-draping (Figure 3). Skin was completely elevated from the chest wall and

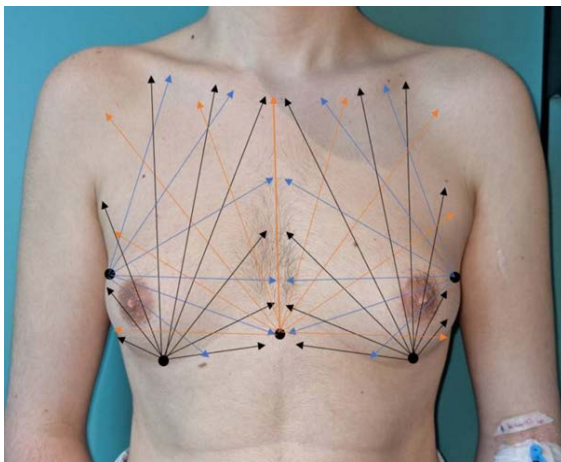


Figure 1. Liposuction incision sites and direction of liposuction. Three separate incision located over the anterior axillary line, lower lateral level of inframammarian fold and thorax midline.

[Video 1.](#) Liquidization of fat and glandular tissue using ultrasonic liposuction



Figure 2. Skin pinch test less than 2 cm was considered adequate.

[Video 2.](#) Skin pinch test application during the ultrasonic liposuction procedure



Figure 3. After completion of liposuction, patient was brought to 30 degrees Trendelenburg position for skin redraping.



Figure 4. Tensoplast® was applied to the whole chest wall stabilizing the redistributed skin flap

redistributed to the desired position, allowing the change of the NAC. Incisions were closed using absorbable sutures. No drains were used after the operation. Tensoplast was applied to the whole chest wall, stabilizing the redistributed skin flap (Figure 4). The gynecomastia corset was dressed over the Tensoplast to ensure hemostasis.

Since the procedure was extensive and there was a lot of tissue damage, one night of hospitalization and postoperative strong analgesia were provided to improve the comfort of the patients.

RESULTS

The patients were separated into two groups, UAL and SALS, with surgical excision (Table 3). Suction aspiration volumes



Figure 5. A 27 years old patient with Grade II B gynecomastia who underwent extensive ultrasound assisted liposuction operation. Preoperative images (a, b, c, d, e) and postoperative (f, g, h, i, j) first week images of the patient.



Figure 6. A 34 years old patient with Grade III gynecomastia with a residual breast tissue/ ptosis. Preoperative images (a, b, c) and postoperative 3rd month (d, e, f) images.

were not evaluated because they vary greatly depending on the body size and body mass index of each patient. In the UAL group, most of the patients (82%) were discharged on the same day. The remaining 8 patients were discharged the day after due to an increase in their comfort and pain control. The chest wall stabilizing Tensoplast bandage was removed on the 7th day of the operation (Figure 5). The remarkable edema on the chest wall persisted for up to one month. On SALS with surgical excision, 22% of the patients were discharged 8 hours after surgery. The remaining patients were discharged the day after.

Extensive ultrasonic liposuction was applied to 46 patients; one had a seroma that needed to be aspirated using a syringe. Three of the patients experienced residual breast tissue/ ptosis (Figure 6). None of the patients requested revision surgery. The

Table 3. Patient characteristics of UAL and SALS with gland excision groups.

Patient characteristics	Patients with UAL only n:46	Patients with surgical excision n:58
Mean Age, years \pm SD	40.5 \pm 8.3	44.3 \pm 9.2
Follow-up Time, months \pm SD	25 \pm 2.7	24 \pm 3.4
Rate of discharge from hospital at first day	82%	22%
Complication rates	8.7%	10.3%

Table 4. Complication and revision comparison of ultrasonic liposuction versus suction assisted liposuction combined with peri areolar mastopexy and glandular excision.

Complication	Patients with UAL only n:46	Patients with surgical excision n:58
Infection	0	0
Large Hematoma	0	1 (Placed Bedside Drain)
Limited Hematoma	1 (Not required)	2 (Not required)
Seroma	1 (Aspiration required)	1 (Aspiration Required)
Contour Irregularities	0	2 (Surgical Correction)
Total Nipple Necrosis	0	0
Partial Nipple Necrosis	0	1 (No intension required)
Saucer-like deformity	0	0
Residual Breast Tissue/ Ptosis	3	1

overall complication rate in our series was found to be 8.7% (Table 4).

Fifty-eight patients in our control group were operated on using suction-assisted liposuction combined with periareolar mastopexy and glandular excision. One had a large unilateral (left) hematoma, which required the placement of a bedside drain. Two had limited hematomas that did not require evacuation. Seroma was aspirated in one patient. One patient required revisions for contour irregularities. Partial nipple necrosis was observed in one patient but healed without surgical intervention. Residual breast tissue/ptosis was observed in one patient. The total complication rate in our control series was found to be 10.3%.

DISCUSSION

Numerous surgical modalities are available, each aiming to attain a masculine chest contour while mitigating visible scarring. The decision-making process for technique selection crucially involves factors like the relative placement of the nipple-areolar complex and the inframammary fold, the surplus of skin, and the glandular-to-adipose tissue ratio. Furthermore, evaluating skin health and the potential for cutaneous ptosis assumes significance, given their sway over the preferred surgical avenue (5). In our utilization of the extensive liposuction approach, our patient selection process encompassed an evaluation of both skin quality and the extent of surplus skin, as detailed in Table 2.

This approach centers on a fundamental principle: the strategic relocation of excess skin from the breast tissue and chest wall, subsequently anchoring it all over the chest wall, and increasing the skin contraction as much as possible. This deliberate placement facilitates a gradual re-draping of the skin over time, capitalizing on the diminishing laxity

of the skin. Notably, our observations have indicated that extensive liposuction performed on the area, starting from the clavicle on the superior border, the anterior axillary line, and the abdominal region on the inferior border, contributes to enhanced re-draping of the skin.

This leads to a reduced frequency of contour irregularities as the wound contraction mechanisms are equally distributed throughout the chest wall. Secondly, this approach allowed us to change the position of the NAC without making an incision on the chest wall if there was an evident asymmetry. In this approach, we aim to position the NAC as high as possible to decrease the chance of skin accumulation on the inframammary fold. A crucial aspect of our approach was to minimize the thickness of the skin flap as much as possible, aiming to amplify the potential for secondary skin contracture. We aim to keep the skin flap thickness less than 2 cm on the pinch test.

Another key point of the approach was to change the position of the patient to a 30-degree Trendelenburg position to decrease the effects of gravity. After position changes, the skin flap should be elevated far from the chest wall and pulled to a superior position. Then the elastic adhesive bandages should be placed vertically to ensure the positioning of the skin flaps. After proper bandaging, a corset should be used for 4 weeks. We recommend removing the bandages on day 7 to ensure the safety of the patient by facilitating skin adherence to the underlying fascia. The subsequent techniques in liposuction are classified as standalone or combined approaches for addressing gynecomastia, either in conjunction with glandular excision or as independent methods: syringe liposuction, axillary-incision liposuction, peri-areolar-incision liposuction, sternal-incision liposuction, power-assisted liposuction, ultrasonic liposuction, laser-assisted liposuction, and cross-

chest liposuction (14-18).

Instead of making an incision under the NAC, we utilized three different entry points to achieve better homogenization of the fat tissues. Incisions made on the NAC may cause tissue damage, which might deform this area and cause burn damage if a laser device is utilized. The use of ultrasound-assisted liposuction helped us to tunnelize and preserve vascular structures while being able to harvest all the fat accumulations under the superficial fascia of the chest wall. In addition, ultrasound-assisted liposuction provides effective disintegration of breast tissues. In this way, tissues that cannot be removed with standard liposuction can be removed from the area. In addressing cases of high-grade gynecomastia marked by ptosis and superfluous skin, several methods have been employed, including reduction mammoplasty coupled with the free transplantation of the nipple-areolar complex (NAC), as well as modified breast-reduction techniques utilizing I- or T-shaped patterns. Another approach involves subcutaneous mastectomy with skin reduction, executed through concentric skin excisions such as the 'Benelli type', 'inverted T', or lateral wedge resection, as described in the literature (19).

It is noteworthy that these methods have demonstrated a tendency to produce less-than-ideal outcomes, characterized by the persistence of residual scars and deformities in the nipple region, as documented in relevant literature instances (16, 20). Using liposuction only prevents the inverted nipple deformity and possible NAC necrosis, as we observed none in our series. A comprehensive review of existing literature underscores that breast amputation complemented by a free nipple graft or the application of the wise model breast reduction technique stands out as a superior choice in situations marked by significant skin redundancy and notable ptosis (8, 21, 22). Nevertheless, it is crucial to recognize that these techniques proficiently tackle the pertinent issue. They may concurrently lead to the emergence of noticeable, sizeable scars on the chest. For instance, instances of employing an elongated, horizontal incision to facilitate total mastectomy and free NAC transplantation revealed an approximate 33% incidence of hypertrophic scarring (19). Our approach allowed us to prevent any scarring around the NAC and minimize the chance of keloid formation. Also, patients are observed to heal within 2 weeks with minimal swelling, which resolves in 4 months in total. Zocchi et al. have delineated ultrasound-assisted liposuction (UAL) as a valuable approach for gynecomastia treatment (23). Building upon this foundation, researchers like Rohrich et al. and Gingrass et al. have delved into these applications, broadening the understanding of their utility (24,25).

Comparatively, ultrasonic liposuction offers several advantages over standard aspiration-assisted liposuction in the context of gynecomastia treatment. Ultrasonic liposuction is sensitive to fatty tissue, it contracts the skin more and causes less damage to the tissues compared to conventional liposuction (26). It exhibits the capability to effectively extract substantial adipose tissues within the fibrous parenchymal framework of the male breast, resulting in minimized bruising. Moreover, it alleviates the physical demands placed on

surgeons during high-volume procedures. Beyond these benefits, ultrasonic liposuction empowers surgeons to achieve more comprehensive contouring of the outcomes, leading to enhanced results (27). Ultrasonic liposuction stands out for its capacity to effectively refine the contours of the treatment area and disrupt inframammary wrinkles, given proper shaping (19). An additional advantageous outcome can arise from the stimulation of skin contractility (23), particularly valuable in addressing excessive skin in advanced instances of gynecomastia. This technique has found application as a standalone approach in patients with pseudo-gynecomastia devoid of glandular enlargement or associated indicators. However, it is noteworthy that while it can address the skin redundancy concern, it might not always yield optimal recovery outcomes (28).

The limitations of this study included a small patient sample size and a relatively short follow-up period. Despite high patient satisfaction, international patient satisfaction scoring was not utilized. This method is effective for patients with glandular tissue smaller than 3 x 3 cm. However, surgical excision should be considered if larger breast glandular tissue is detected on ultrasonography. We strongly recommend employing extensive liposuction to mitigate or enhance potential contour issues, surgical adjunctive methods such as inframammary fold (IMF) elimination, equalization liposuction, 3-point cross liposuction, and superficial liposuction, which encourage skin contraction through ultrasonic means, coupled with prudent usage of compression corsets. While promising outcomes have been documented, a comprehensive investigation of this approach within larger patient cohorts is warranted to further substantiate its efficacy.

CONCLUSION

Extensive ultrasonic liposuction provides a homogeneous spread of the excess skin and greatly reduces or eliminates the amount of skin fold formation. This approach reduces the need for possible skin excision, thus reducing the visible scars. Using the basic principles of plastic surgery, such as utilizing primary and secondary contractures like a skin graft and distributing the wound healing mechanisms to a broad surface, gave us the precision to achieve better cosmetics without forming a noticeable scar on the chest wall.

Conflict of interest: Author declares that there is no conflict of interest between the authors of the article.

Financial conflict of interest: Author declares that he did not receive any financial support in this study.

Address correspondence to: Atilla Adnan Eyuboglu, Arel University Faculty of Medicine, Bahcelievler Memorial Hospital, Department of Plastic and Reconstructive Surgery, Istanbul, Türkiye

e-mail: atillaeyuboglu@yahoo.com

REFERENCES

1. Handschin AE, Bietry D, Husler R, et al. Surgical management of gynecomastia -a 10-year analysis. *World J Surg* 2008;32(1):38-44.
2. Braunstein GD. Gynecomastia. *N Engl J Med* 1993;328(7):490-5.
3. Nicolis GL, Modlinger RS, Gabrilove JL. A study of the histopathology of human gynecomastia. *J Clin Endocrinol Metab* 1971;32(2):173-8.
4. Simon BE, Hoffman S, Kahn S. Classification and surgical correction of gynecomastia. *Plast Reconstr Surg* 1973;51(1):48-52.
5. Cordova A, Moschella F. Algorithm for clinical evaluation and surgical treatment of gynaecomastia. *J Plast Reconstr Aesthet Surg* 2008;61(1):41-9.
6. Webster JP. Mastectomy for Gynecomastia Through a Semicircular Intra-areolar Incision. *Ann Surg* 1946;124(3):557-75.
7. Kasielska A, Antoszewski B. Surgical management of gynecomastia: an outcome analysis. *Ann Plast Surg* 2013;71(5):471-5.
8. Song YN, Wang YB, Huang R, et al. Surgical treatment of gynecomastia: mastectomy compared to liposuction technique. *Ann Plast Surg* 2014;73(3):275-8.
9. Rohrich RJ, Ha RY, Kenkel JM, et al. Classification and management of gynecomastia: defining the role of ultrasound-assisted liposuction. *Plast Reconstr Surg* 2003;111(2):909-23.
10. Jarrar G, Peel A, Fahmy R, et al. Single incision endoscopic surgery for gynaecomastia. *J Plast Reconstr Aesthet Surg* 2011;64(9):231-6.
11. Ince B, Yarar S, Dadaci M. Simultaneous flap thinning with ultrasound-assisted liposuction during free flap surgery: Preliminary results. *Microsurgery* 2019;39(2):144-9.
12. Ince, B, Oltulu, P, Yildirim MEC, et al. Comparison of the effectiveness of ultrasonic liposuction and conventional liposuction in thinning of upper arm. *Selcuk Med J* 2017;33(3):50-3.
13. Klein JA. The tumescent technique. Anesthesia and modified liposuction technique. *Dermatol Clin* 1990;8(3):425-37.
14. Rohrich RJ, Ranieri J Jr, Beran SJ, et al. Patient evaluation and indications for ultrasound-assisted lipoplasty. *Clin Plast Surg* 1999;26(2):269-78.
15. Bracaglia R, Fortunato R, Gentileschi S, et al. Our experience with the so-called pull-through technique combined with liposuction for management of gynecomastia. *Ann Plast Surg* 2004;53(1):22-6.
16. Lista F, Ahmad J. Power-assisted liposuction and the pull-through technique for the treatment of gynecomastia. *Plast Reconstr Surg* 2008;121(3):740-7.
17. Murali B, Vijayaraghavan S, Kishore P, et al. Cross-chest liposuction in gynaecomastia. *Indian J Plast Surg* 2011;44(1):81-6.
18. Yoo KH, Bae JM, Won CY, et al. Laser-Assisted Liposuction Using the Novel 1,444-nm Nd:YAG Laser for the Treatment of Gynecomastia: A Pilot Study. *Dermatology* 2015;231(3):224-30.
19. Cardenas-Camarena L, Dorado C, Guerrero MT, et al. Surgical Masculinization of the Breast: Clinical Classification and Surgical Procedures. *Aesthetic Plast Surg* 2017;41(3):507-16.
20. Wiesman IM, Lehman JA Jr, Parker MG, et al. Gynecomastia: an outcome analysis. *Ann Plast Surg* 2004;53(2):97-101.
21. Hodgson EL, Fruhstorfer BH, Malata CM. Ultrasonic liposuction in the treatment of gynecomastia. *Plast Reconstr Surg* 2005;116(2):646-53.
22. Brown RH, Chang DK, Siy R, et al. Trends in the Surgical Correction of Gynecomastia. *Semin Plast Surg* 2015;29(2):122-30.
23. Zocchi ML. Ultrasonic assisted lipoplasty. Technical refinements and clinical evaluations. *Clin Plast Surg* 1996;23(4):575-98.
24. Rohrich RJ, Beran SJ, Kenkel JM, et al. Extending the role of liposuction in body contouring with ultrasound-assisted liposuction. *Plast Reconstr Surg* 1998;101(4):1090-102.
25. Gingrass MK, Kenkel JM. Comparing ultrasound-assisted lipoplasty with suction-assisted lipoplasty. *Clin Plast Surg* 1999;26(2):283-8.
26. Ince B, Oltulu P, Yildirim MEC, et al. Effects of aspiration time on immediate viability of adipocyte cell in ultrasound-assisted liposuction (UAL) and in traditional suction-assisted lipectomy (SAL). *J Plast Surg Hand Surg* 2019;53(1):14-9.
27. Maxwell GP, Gingrass MK. Ultrasound-assisted lipoplasty: A clinical study of 250 consecutive patients. *Plast Reconstr Surg* 1998;101(1):189-202.
28. Li CC, Fu JP, Chang SC, et al. Surgical treatment of gynecomastia: complications and outcomes. *Ann Plast Surg* 2012;69(5):510-5.

Does Sertraline Affect Contraction in Endothelium Damaged Aorta?

Sertralin, Endotel Hasarlı Aortta Kontraksiyonu Etkiler Mi?

Z. Isik Solak Gormus¹, Cahit Burkay Eker¹, Hatice Solak², Raviye Ozen Koca¹, Faik Ozdengul¹

¹Necmettin Erbakan University, Faculty of Medicine, Department of Physiology, Konya, Türkiye
²Kutahya Health Sciences University, Department of Physiology, Kutahya, Türkiye

ÖZET

Amaç: Selektif Serotonin Geri Alım İnhibitörü (SSRI) grubu antidepresanlar kalp hastalarında sık kullanılmaktadır. Çalışmada sertralinin (SE) aort kontraksiyonu üzerine etkilerini sağlıklı/hasarlı sıçan aortu üzerinde araştırmayı amaçladık.

Gereçler ve Yöntem: 24 Wistar albino rat ile grup1-aort-sağlam endotel, grup2-aort-hasarlı endotel oluşturuldu. İzole edilen aort dokuları organ banyolarına yerleştirildi. Aort halkalarının izometrik gerilimindeki değişiklikler kaydedildi. Fenilefrin (PE 10-6M) uygulanması sonrası her iki grupta kasılmalar kaydedildi. Sonrasında grup1'e kümülatif SE 50 mg, (10-9-10-4M) verildi. Grup2'de aort endotel hasarı kontrolü için asetilkolin (Ach 10-6M) uygulanıp bir saat süreyle dokular yıkandı, ikinci doz PE, ardından kümülatif olarak SE verildi (10-9-10-4M), kasılmalar kaydedildi.

Bulgular: Grup1'e kümülatif SE (10-9-10-4M) verildikten sonra ilk üç sertralin dozunda (10-9,10-8,10-7) spontan kasılmalarda belirgin inhibisyon saptandı ($p<0.05$), kalan sertralin dozlarında kasılma inhibisyonu devam etti. SE 10-6,-5,-4,10-9,-8,-7 kıyaslandığında kontraksiyonlarda inhibisyon oluştu ($p<0.005$). Grup2'de ikinci PE kasılmalarının inhibisyonu sertralin dozlarından sonra da devam etti, ancak grup1'e göre inhibisyon daha az gözlemlendi ($p<0.05$).

Sonuç: SE sıçan izole aortunda PE kaynaklı düz kas kontraksiyonunu inhibe etmiştir. Endotel hasarlı aortta PE kaynaklı düz kas kontraksiyonları daha yavaş inhibe olmuştur. Hasar sonucunda aortta NO salınımı ve NO'ya bağlı vazodilatasyonun azaldığı düşünülmektedir. Sertralinin kardiyovasküler sistem üzerindeki etkilerinin daha net anlaşılabilmesi ileri araştırmalarla mümkün olacaktır.

Anahtar Kelimeler: Aort, endotel, sertralin, kontraksiyon, vazorelaksasyon

ABSTRACT

Aim: Selective Serotonin Reuptake Inhibitor (SSRI) group antidepressants are frequently used in heart patients. In the study, we aimed to investigate the effects of sertraline (SE) on aortic contraction on healthy/damaged rat aorta.

Materials and Methods: Wistar albino rats (24) were divided into group1-aorta-intact endothelium and group2-aorta-damaged endothelium. The isolated aortic tissues were placed in organ baths. Changes in the isometric tension of the aortic rings were recorded. Contractions were recorded in both groups after the application of phenylephrine (PE 10-6M). Afterwards, cumulative sertraline (SE 50 mg) (10-9-10-4M) was given to group 1. In Group 2, to control aortic endothelial damage, acetylcholine (10-6M) was applied and the tissues were washed for an hour, the second dose of PE was given, then SE was given cumulatively (10-9-10-4M), and contractions were recorded.

Results: After cumulative SE (10-9-10-4M) was given to Group 1, a significant inhibition in spontaneous contractions was detected in the first three sertraline doses (10-9,10-8,10-7)($p<0.05$), and in the remaining sertraline doses contraction inhibition continued. When comparing SE 10-6,-5,-4 and 10-9,-8,-7 doses, there was inhibition of contractions ($p<0.005$). In group2, the inhibition of second PE contractions continued after sertraline doses, but the inhibition was observed less than in group1 ($p<0.05$).

Conclusion: SE inhibited PE-induced smooth muscle contraction in rat isolated aorta. PE-induced smooth muscle contractions were inhibited more slowly in the endothelium-damaged aorta. It is thought that NO release and NO-dependent vasodilation in the aorta decrease as a result of damage. A clearer understanding of the effects of sertraline on the cardiovascular system will be possible with further research.

Keywords: Aorta, endothelium, sertraline, contraction, vasorelaxation

Geliş Tarihi/Received: 23 Kasım/November 2023 **Kabul Tarihi/Accepted:** 10 Mart/March 2024 **Yayın Tarihi/Published Online:** 25 Mart/March 2024

Sorumlu Yazar/Corresponding Author: Z. Isik Solak Gormus, Necmettin Erbakan University, Faculty of Medicine, Department of Physiology, Konya, Türkiye
e-mail: igormus@gmail.com

Atıf yapmak için/ Cite this article as: Solak Gormus ZI, Eker CB, Solak H, Ozen Koca R, Ozdengul F. Does Sertraline Affect Contraction in Endothelium Damaged Aorta? Selcuk Med J 2024;40(1): 8-15

Disclosure: Author has not a financial interest in any of the products, devices, or drugs mentioned in this article. The research was not sponsored by an outside organization. Author has agreed to allow full access to the primary data and to allow the journal to review the data if requested.

"This article is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0)"



INTRODUCTION

Cardiovascular disease (CVD) and depression stand out as the most common factors impacting quality of life in high-income countries, and it is expected to be so in countries of all income levels by 2030. CVD and depression profoundly impact overall quality of life, particularly for patients with heart failure (1). The prevalence of unknown depression among heart patients has been a subject of study for over 60 years. In a study, it was suggested conducted by Wynn (2), it was suggested that 40% of the patients who were perceived as disabled after a myocardial infarction were experiencing depression, and for many of them this condition had not been previously identified (2). Cay et al. found depression and anxiety symptoms in two-thirds of patients treated for cardiac events (3).

Depression is highly prevalent in patients with CVD and is a predictor of adverse cardiovascular outcomes and increased healthcare costs. One in five patients with coronary artery disease or heart failure experiences depression, which is at least three times higher than in the general population. Heart failure patients with coronary heart disease (CHD) and depressive symptoms have a higher likelihood of having physical limitations and lower quality of life even after considering objective measurements of cardiac function (1). The American Heart Association has issued a scientific statement recommending the elevation of depression to a risk factor status in those who have survived acute coronary syndrome. Although most studies have been conducted in patients with existing CVD, depression has been found to be associated with CHD as well (4).

Both behavioral and biological mechanisms have been researched as potential pathways linking depression to CVD risk. Regarding behavioral factors, depression has been weakly associated with multiple health risk-reducing behaviors, including physical activity, smoking, and adherence to cardiovascular medications, and several studies suggest that these factors mediate the relationship with depression, at least partially (1). Although there are various pharmacological and behavioral therapies available to treat depression, we do not know which treatments are best for reducing the risk of death associated with cardiovascular events and depression. Researchers have conducted numerous randomized controlled trials to test whether improved treatment of depressive symptoms, using cognitive-behavioral therapy, medications, or traditional antidepressant therapies such as combination therapy, can reduce both depressive symptoms and cardiovascular events (5).

Selective serotonin reuptake inhibitors (SSRIs) are a group of agents characterized by preventing the reuptake of serotonin in synaptic clefts. This leads to an increase in brain serotonin activity, which is their common mechanism of action. These agents are considered selective because they have very little activity in blocking the reuptake of norepinephrine or other neurotransmitters. SSRIs are currently the most widely used antidepressants (6, 7). SSRIs are considered as first-line pharmacotherapy for most patients with depression due to their efficacy and better overall tolerability compared to other

antidepressants (8). While initially approved for depression treatment, the U.S. the Food and Drug Administration (FDA) has approved SSRIs also for various other conditions (8). Clinically, the off-label prescription of SSRIs is increasing due to their demonstrated efficacy in many other therapeutic applications. Off-label use of SSRIs may include fibromyalgia, premature ejaculation, and neurocardiogenic syncope (9).

Sertraline serves as a medication aimed at the management and treatment of a range of mental health disorders, including major depressive disorder, obsessive-compulsive disorder, panic disorder, post-traumatic stress disorder, premenstrual dysphoric disorder, and social anxiety disorder. This medication belongs to the class of SSRIs, selective serotonin reuptake inhibitors (SSRIs), specifically designed to modulate serotonin levels in the brain. Operating as an antidepressant within the SSRIs category, sertraline functions primarily by impeding the reuptake of serotonin at presynaptic sites. Consequently, this interference with serotonin reuptake fosters an accumulation of serotonin in the neural synapses. Given serotonin's pivotal role in regulating mood, personality, and wakefulness within the central nervous system, the obstruction of its reuptake proves advantageous in conditions such as major depression. While sertraline's impact on norepinephrine and dopamine uptake is minimal, research has shown that it exhibits greater dopaminergic activity compared to other SSRI drugs. Sertraline's mechanism of action makes it highly effective when used to treat various psychiatric conditions (10).

Nitric Oxide (NO)-Mediated Vasodilation

The vasodilation process mediated by Nitric Oxide (NO) was initially demonstrated by Furchgott and Zawadzki (11), showcasing how the endothelium counteracts acetylcholine-induced vasoconstriction in vascular smooth muscle by releasing NO. Numerous experimental and clinical studies have further verified the release of NO from all arterial endothelial cells, and to a lesser extent from venous endothelial cells. Several pathological conditions lead to endothelial dysfunction primarily by a reduction in endothelium-dependent vasodilation. In cases where endothelial dysfunction progresses to the extent of impeding NO release, vasoconstriction is induced by agonists directly activating smooth muscle receptors, instead of triggering endothelium-dependent vasodilation. Contraction of smooth muscle cells is prompted by an elevation of intracellular free Ca^{2+} levels. When the endothelium is intact, this latter effect is balanced by the strong vascular relaxing effect of NO. This phenomenon holds true for various agonists, including acetylcholine, bradykinin, serotonin, adenosine, ADP, ATP, histamine, and thrombin. Notably, even angiotensin II stimulates the release of NO from the macrovascular endothelium, which can modulate the vasoconstrictive effect of angiotensin II on smooth muscle cells. However, this favorable effect can be counteracted by the simultaneous production of peroxynitrite (ONOO-) within the vascular wall, which can contribute to diverse pathological processes (12, 13).

It is believed that nitric oxide (NO) has the potential to induce vasodilation either through the direct relaxation of

vascular smooth muscle or indirectly lowering blood pressure by acting on the rostral brainstem to reduce central sympathetic output, leading to decreased norepinephrine release from sympathetic nerve terminals (14). Various abnormalities in endothelial vascular tone regulation have been demonstrated in genetic and experimental hypertension models. Individuals with essential hypertension exhibit reduced endothelium-dependent relaxation. In these patients, the response of forearm blood flow to NG-monomethyl-L-arginine also diminishes, hinting at a potential contribution of impaired nitric oxide production to their hypertension. Notably, the abnormality in endothelial function in patients with essential hypertension is not limited to single surface receptor-type agonists and cannot be corrected by increasing the substrate availability for nitric oxide synthase (15). Vanhoutte (16) proposed that the production of an endothelium-derived contracting factor by endothelial cells reduces endothelium-dependent dilator responses. Indeed, several researchers have reported elevated plasma endothelin concentrations in human hypertension. Along with the imbalance between endothelium-dependent relaxation and contraction, this abnormal endothelial function may contribute to abnormal vascular responses with increased peripheral vascular resistance, which is a central hemodynamic abnormality in hypertension (15, 17).

For more than 40 years, tricyclic antidepressants (TCAs) have been extensively used in depression treatment. However, they have also revealed serious cardiovascular side effects that could potentially limit their therapeutic value. The most common side effect of TCAs is orthostatic hypotension, which may result from impaired vasoconstriction and reduced myocardial contractility. This side effect has been observed at therapeutic doses necessary for psychiatric treatment, making it potentially dangerous when administered to elderly patients or those with pre-existing heart disease. Selective serotonin reuptake inhibitors SSRIs have become the most commonly used drugs in depression treatment due to their significantly fewer side effects compared to TCAs. However, no extensive animal studies regarding the side effects of SSRIs have been conducted. Until recently, most studies on the cardiovascular side effects of antidepressant treatment were clinical reports, and the majority of research focused on TCAs. Additionally, a few reports have suggested that they have a blocking effect on calcium entry and inhibit vasoconstriction dependent on depolarization. Selective Serotonin Reuptake Inhibitor SSRI group of antidepressant drugs is commonly used in patients with cardiovascular disorders. However, their specific effects on blood vessels have not been investigated in an experimental study. Our study aims to elucidate whether sertraline, an SSRI drug, affects the contraction of the endothelium-damaged aorta in an animal study.

MATERIALS AND METHOD

Approval for the study was granted by the Local Ethics Committee for Animal Experiments at the Experimental Medicine Application and Research Center, under decision number 035- 2021, and all procedures in the study were

conducted in accordance with the ethics committee protocol. For the research, adult male Wistar Albino rats (weighing between 250-300 grams) were utilized. Two experimental groups were formed with 12 animals in each group, and their distribution was randomized. Throughout the experiment, the animals had ad libitum access to food and water and were kept under controlled conditions with a constant temperature ($21 \pm 2^\circ\text{C}$) and a 12-hour dark/12-hour light cycle (lights on at 07.00) periods. The aorta extraction procedure was performed on all animals in the experimental groups between 09:00-10:00 in the morning. The groups were as follows:

- Group 1: Intact endothelium group (consisting of 12 animals)
- Group 2: Damaged endothelium group (consisting of 12 animals).

The animals were subjected to cervical dislocation under anesthesia with ketamine/xylazine (80mg/kg-20mg/kg). After cervical dislocation, the descending thoracic aorta was rapidly isolated and placed in Krebs solution. Following the removal of any residual tissue and blood, the aorta were sectioned into rings measuring 3-4 mm. The rings were placed on hooks in a transverse plane within isolated organ baths containing Krebs solution, thermoregulated at 37°C , and continuously gassed (95% O_2 and 5% CO_2) and the tension was adjusted to 2 grams. Changes in isometric tension of the aorta rings were recorded using a four-channel force transducer. After the tissues were hung, they were washed at 15-minute intervals for one hour to allow the effects of anesthetic agents to diminish. Phenylephrine (PE 10^{-6} M) was administered to the isolated organ bath chambers, and contractions were recorded in both groups. Subsequently, sertraline (SE 50 mg) was administered in increasing doses (10^{-9} - 10^{-4} M) to group 1. In group 2, endothelial damage was induced in aorta by scratching the endothelium with a needle (18). After verifying endothelial damage by administering 10^{-6} M of Acetylcholine (Ach), the damaged strips were washed as well for one hour to reduce the effect of anesthetic agents, and it was followed by the second dose of PE administration; then, SE was administered in increasing doses (10^{-9} - 10^{-4} M) to the group 2, and contractions were recorded.

Recordings of the contractions were documented in terms of both frequency and tension, utilizing the isolated organ bath system. Statistical analysis was conducted using the Friedman and Kruskal-Wallis tests, facilitating an assessment of the contraction or relaxation responses observed in the aortic segments following the administrations.

RESULTS

A total of 24 experimental animals were included in our study, distributed across group 1 (n=12) and group 2 (n=12). The initial contraction baseline in the aorta-intact group registered an average of 1376 tension-mg. Following the administration of a 10^{-6} M dose of phenylephrine, this baseline contraction surged to an average of 2588 tension-mg. Subsequent to this, sertraline administration was performed in increasing doses. When sertraline was administered at a dose of 10^{-9} M, a tension of 2281 tension-mg was recorded. At the dose of 10^{-8} M, the

tension decreased to 1926 tension-mg. A further decrease to 1848 tension-mg was noted at the 10^{-7} M dose. At the dose of 10^{-6} M, the recorded tension subsided to 1778 tension-mg. Concluding the series, the tension levels reached 1744 tension-mg at 10^{-5} M and descended to 1675 tension-mg at 10^{-4} M. Remarkably, it was observed that the difference between these obtained data was statistically significant ($p=0.001$) (Table 1, Figure 1).

Table 1. Dose-dependent contraction force of the intact aorta

Doses (tension-mg)	Contraction force	P-value
Self contraction	1376	$p=0.001^*$
PE 10^{-6}	2588	
SE 10^{-9}	2281	
SE 10^{-8}	1926	
SE 10^{-7}	1848	
SE 10^{-6}	1778	
SE 10^{-5}	1744	
SE 10^{-4}	1675	

* The Friedman test was used.

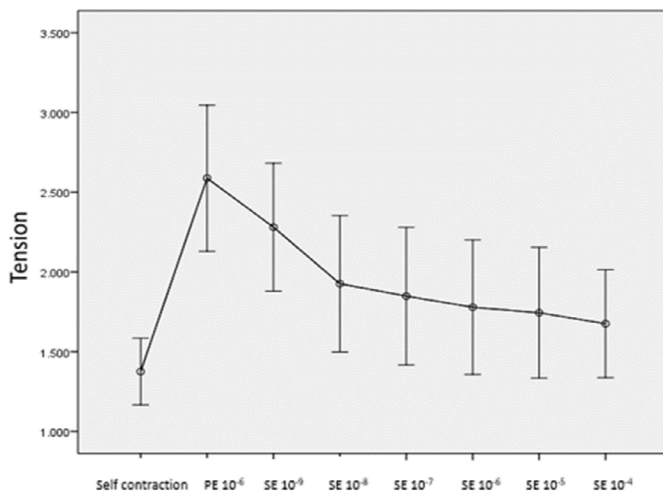


Figure 1. Drug dose-dependent contraction forces of the intact aorta

Statistically significant differences emerged in the contraction forces of the intact aorta, as affirmed by the Friedman test. To discern the specific groups accountable for these substantial disparities, pairwise comparisons were meticulously executed using the Mann-Whitney U test.

Compared against the SE 10^{-9} , SE 10^{-8} , SE 10^{-7} , and PE 10^{-6} doses, the basal value of the intact aorta exhibited a higher vasorelaxation (p values respectively: $p=0.004$, $p=0.000$, $p=0.000$, $p=0.000$). The SE 10^{-4} dose displayed a significant increase in vasorelaxation in comparison to the SE 10^{-9} , SE 10^{-8} , and PE 10^{-6} doses (p values respectively: $p=0.001$, $p=0.000$, $p=0.000$). Furthermore, the SE 10^{-5} dose exhibited a significant increase in vasorelaxation when compared to the SE 10^{-9} , SE 10^{-8} , and PE 10^{-6} doses (p values respectively: $p=0.050$, $p=0.002$, $p=0.000$). Likewise, the SE 10^{-6} dose demonstrated a noteworthy increase in vasorelaxation compared to the SE 10^{-9} and PE 10^{-6} doses (p values respectively: $p=0.050$, $p=0.001$) (Table 2).

The basal contraction of the damaged aorta was recorded at an average of 1489 tension-mg. Following the administration of phenylephrine at a dose of 10^{-6} M, this contraction increased to an average of 2697 tension-mg. When ACh was administered at a dose of 10^{-6} M, an average of 2604 tension-mg was recorded. The tension labeled as "basal contraction-2" was 1384 tension-mg. Then, a second dose of phenylephrine was administered at a dose of 10^{-6} M. The tension obtained after the second dose of phenylephrine was recorded as 2816 tension-mg. Afterward, increasing doses of sertraline were administered. When sertraline was administered at a dose of 10^{-9} M, the tension was 2648 tension-mg. 10^{-8} M sertraline administration yielded a tension of 2626 tension-mg. At a dose of 10^{-7} M sertraline, the tension was found to be 2635 tension-mg. 10^{-6} M sertraline administration lowered the tension to 2571 tension-mg. At a dose of 10^{-5} M, the tension was recorded to be 2542 tension-mg, and finally, the 10^{-4} M dose, demonstrated a tension of 2422 tension-mg. It was observed that the difference between these obtained data was statistically significant ($p=0.000$) (Table 3, Figure 2).

Significant differences were found in the contraction forces of the damaged aorta according to the Friedman test. In order to determine which groups were the cause of this significant difference, pairwise comparisons were conducted using the **Mann-Whitney U test**.

There was no significant difference between the first and second self contractions of the damaged aorta ($p>0.05$).

Table 2. Comparison of pairwise results for the intact aorta (P-significance levels)

	Self contraction	PE 10^{-6}	SE 10^{-9}	SE 10^{-8}	SE 10^{-7}	SE 10^{-6}	SE 10^{-5}
PE 10^{-6}	0.000						
SE 10^{-9}	0.000						
SE 10^{-8}	0.000						
SE 10^{-7}	0.004						
SE 10^{-6}		0.001	0.050				
SE 10^{-5}		0.000	0.002	0.050			
SE 10^{-4}		0.000	0.000	0.001			

Table 3. Dose-dependent contraction force of the damaged aorta

Doses	Contraction force (tension-mg)	P-value
Self contraction	1489	p= 0.000*
PE 10 ⁻⁶	2697	
Ach 10 ⁻⁶	2604	
Self contraction-2	1384	
PE 10 ⁻⁶ (2. dose)	2816	
SE 10 ⁻⁹	2648	
SE 10 ⁻⁸	2626	
SE 10 ⁻⁷	2635	
SE 10 ⁻⁶	2571	
SE 10 ⁻⁵	2542	
SE 10 ⁻⁴	2422	

* The Friedman test was used

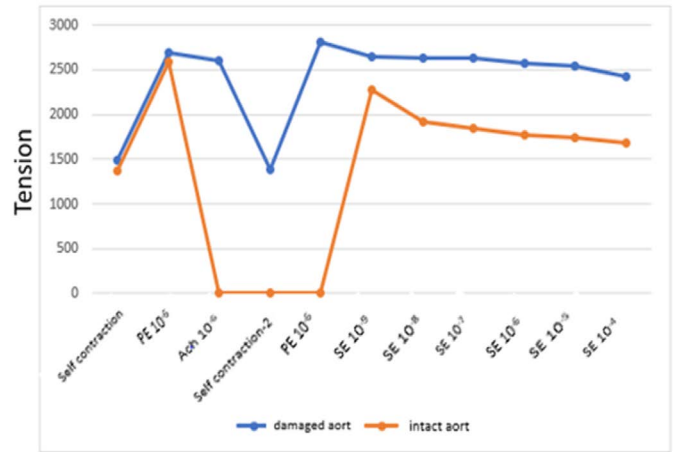


Figure 3. Dose-dependent contraction patterns in both groups (intact and damaged aorta)

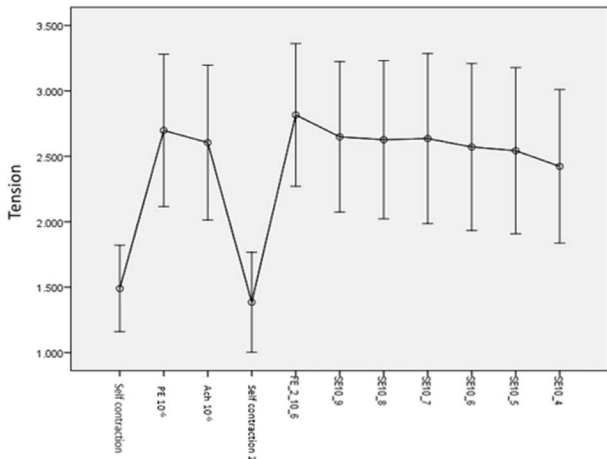


Figure 2. Dose-dependent contraction forces of the damaged aorta

The basal value of the damaged aorta showed a significant increase in vasorelaxation when compared to the SE 10⁻⁹, SE 10⁻⁸, SE 10⁻⁷, SE 10⁻⁶, PE 10⁻⁶, and second PE 10⁻⁶ doses (p values respectively: p=0.004, p=0.002, p=0.000, p=0.031, p=0.000, p=0.000). Furthermore, second self contraction of the damaged aorta showed a significant increase in vasorelaxation when compared to the SE 10⁻⁹, SE 10⁻⁸, SE 10⁻⁷, SE 10⁻⁶, PE 10⁻⁶, and second PE 10⁻⁶ doses (p values respectively: p=0.003, p=0.002, p=0.002, p=0.025, p=0.000, p=0.000). Additionally, the SE 10⁻⁴ dose also showed a significant increase in vasorelaxation when compared to the PE 10⁻⁶ and second PE 10⁻⁶ doses (p values respectively: p=0.002, p=0.003) (Table 4). The dose-dependent contraction responses obtained from the intact and damaged aorta are presented in Figure 3.

Table 4. Comparison of pairwise results for the damaged aorta (P-significance levels)

	Self contraction	PE 10 ⁻⁶	Ach 10 ⁻⁶	Self contraction-2	PE 10 ⁻⁶ (2. dose)	SE 10 ⁻⁹	SE 10 ⁻⁸	SE 10 ⁻⁷	SE 10 ⁻⁶	SE 10 ⁻⁵
PE 10 ⁻⁶	0.000									
Ach 10 ⁻⁶										
Self contraction-2		0.000								
PE 10 ⁻⁶ (2. dose)	0.000			0.000						
SE 10 ⁻⁹	0.004									
SE 10 ⁻⁸	0.002									
SE 10 ⁻⁷	0.002									
SE 10 ⁻⁶	0.031									
SE 10 ⁻⁵										
SE 10 ⁻⁴		0.002			0.003					

DISCUSSION

Sertraline is an SSRI class drug used to manage and treat major depressive disorder, obsessive-compulsive disorder, panic disorder, post-traumatic stress disorder, premenstrual dysphoric disorder, and social anxiety disorder. Sertraline is an antidepressant that primarily exerts inhibitory effects on presynaptic serotonin reuptake. This inhibition of serotonin reuptake leads to an accumulation of serotonin. Serotonin plays a role in regulating mood, personality, and wakefulness in the central nervous system, thus making the blockade of serotonin reuptake beneficial for disorders like major depression. Sertraline also has minimal effects on norepinephrine and dopamine reuptake, and research has shown that it exhibits greater dopaminergic activity compared to other drugs in the same SSRI class (19, 20).

Coronary artery disease (CAD) and depression have started to become a significant financial burden in recent years. Moreover, both diseases often coexist in the same individuals. Therefore, there is an increasing emphasis on antidepressant interventions in patients with CAD. Since their introduction to the market in 1987, the use of Selective Serotonin Reuptake Inhibitors (SSRIs) has significantly increased. SSRIs are increasingly prescribed to CAD patients, including those who underwent coronary artery bypass surgery (CABG) (21). However, our knowledge regarding the cardiovascular effects of SSRIs is mainly based on animal studies conducted in various vascular beds. Additionally, SSRIs have shown conflicting results with both vasodilator and vasoconstrictor responses (22). Unfortunately, the vasoactive effects of these drugs on different arteries are not always directly comparable.

Antidepressants have been found to reduce the risk of developing chronic heart disease when used in the treatment of depression and have positive effects on patients who already have this condition. It is known that the increase in total cholesterol levels leading to dyslipidemia also contributes to the increased prevalence of cardiovascular diseases. These findings were derived from studies conducted on depressive monkeys (22). The results showed an increase in heart rate as a consequence of impaired autonomic functions and an elevation in cortisol levels. In the 2000s, depression treatment associated with coronary diseases often involved the use of SSRIs for this particular reason. Moreover, it has been discovered that the use of tricyclic antidepressants is associated with the destabilization of diastolic and systolic blood pressure, as well as the development of hypertension.

The current evidence demonstrates that sertraline has a mitigating effect on atherosclerosis. Sertraline has been shown to reduce the expression of the proinflammatory cytokine interferon-gamma (IFN- γ) in blood stimulated with lipopolysaccharide (LPS) and phytohemagglutinin while increasing the expression of the anti-inflammatory and anti-atherogenic cytokine interleukin-10 (IL-10) (23, 24). Similarly, in human aortic endothelial cells (HAECs) stimulated with TNF- α , sertraline reduced the expression of VCAM-1 and ICAM-1 and inhibited the adhesion of HAEC to U937 monocytes. It has been proposed that sertraline stabilizes NF- κ B by binding

to cell surface receptor molecules dependent on intracellular calcium influx, inducing constitutive nitric oxide synthase (cNOS) expression and NO production (25). The vascular effects of sertraline may also be mediated by endothelium-independent mechanisms through the inhibition of calcium influx into smooth muscle cells (26).

The effects of other SSRIs, such as fluoxetine, on the aorta have also been investigated in some studies. In one study, the vasorelaxant effects of fluoxetine on thoracic aortic rings of endothelium-damaged and endothelium-intact rats were examined. The cumulative increase in fluoxetine dose was shown to induce dose-dependent vasorelaxation significantly in both endothelium-intact and endothelium-damaged groups. The dilation effect of fluoxetine has been observed to occur independently from endothelium-derived dilator factors such as nitric oxide, as no significant difference was observed in the relaxation response averages between the groups (27).

Seabrook and Nolan reported a rightward shift in the 5-HT dose-response curve in rat mesenteric arteries caused by fluoxetine. A recent report by Ungvari et al. explains the finding that fluoxetine causes dilation in rat cerebral arteries. In some studies, sertraline has been found to induce concentration-dependent relaxation in pre-contracted mesenteric artery rings. Cohen and Wiley conducted a study indicating that fluoxetine exhibits vasodilatory effects in rat aorta pre-contracted with norepinephrine and 5-HT. In the study conducted by Melle (28), the effect of sertraline on the internal mammary artery was investigated. In this relevant study, it was determined that sertraline preserved the endothelium of both the human internal mammary artery and rat aorta and induced vasorelaxation. In our study, the vasorelaxant effect of sertraline was experimentally investigated in rat aorta. Two randomly assigned rat groups, one with intact endothelium and the other with damaged endothelium were prepared in our study. Phenylephrine (PE 10^{-6} M) was administered to the isolated organ bath chambers, and contractions were recorded in both groups. Then, sertraline (SE 50 mg) was administered in increasing doses (10^{-9} - 10^{-4} M) to group 1. Subsequently, in Group 2, the same procedure was followed, but with the addition of acetylcholine (ACh) at a dose of 10^{-6} M, and contractions were recorded. The obtained results were recorded and compared. The basal contraction of the intact aorta was recorded as an average of 1376 tension-mg. After the application of phenylephrine at a dose of 10^{-6} M, this contraction increased to an average of 2588 tension-mg. Subsequently, sertraline was administered in cumulative doses. When sertraline was introduced at a dosage of 10^{-9} M, a resultant tension of 2281 tension-mg was observed. This value decreased to 1926 tension-mg at the 10^{-8} M dose, followed by a further reduction to 1848 tension-mg at the 10^{-7} M dose. Subsequently, at the 10^{-6} M dose, the recorded tension decreased to 1778 tension-mg. Continuing this pattern, the tension decreased to 1744 tension-mg at the 10^{-5} M dose, and finally, reached 1675 tension-mg at the 10^{-4} M dose. The difference between these obtained data was found to be statistically significant ($p=0.000$). In our study, it was determined that sertraline exhibited a vasorelaxant

effect in increasing doses, and this was found to be statistically significant. Similarly, a study was conducted on the damaged aorta. After damaging the aorta, sertraline was administered at cumulative doses following the protocol described in detail above. According to the results, there was no significant difference between the first and second self contractions of the damaged aorta ($p > 0.05$). The basal value of the damaged aorta compared to SE 10^{-9} , SE 10^{-8} , SE 10^{-7} , SE 10^{-6} , PE 10^{-6} , and PE-2 10^{-6} doses, it was observed that vasorelaxation was significantly higher (p-values respectively: $p = 0.004$, $p = 0.002$, $p = 0.000$, $p = 0.031$, $p = 0.000$, $p = 0.000$). When comparing the second self-contraction of the damaged aorta with SE 10^{-9} , SE 10^{-8} , SE 10^{-7} , SE 10^{-6} , PE 10^{-6} , and PE-2 10^{-6} doses, a similar trend emerged and vasorelaxation was found to be significantly increased (Respectively, p-values; $p = 0.003$, $p = 0.002$, $p = 0.002$, $p = 0.025$, $p = 0.000$, $p = 0.000$). Moreover, the SE 10^{-4} dose exhibited a significant increase in vasorelaxation compared to PE 10^{-6} and PE-2 10^{-6} doses (p-values respectively: $p = 0.002$, $p = 0.003$). The vasorelaxant effect of the sertraline drug was observed in both the damaged aorta and the intact aorta. It was found that the vasorelaxant effect was less pronounced in the damaged aorta compared to the intact aorta, and this decrease was determined to be due to a reduction in NO release.

The mechanism responsible for the vasodilator responses of SSRIs has not been fully elucidated yet. Research conducted by Ungvari et al. using fluoxetine suggests that this SSRI interacts with L-type calcium channels to prevent Ca^{2+} influx. This reduction in Ca^{2+} influx by sertraline may decrease smooth muscle contraction induced by high extracellular K^+ , which promotes extracellular Ca^{2+} entry (29). Additionally, sertraline has also been found to reduce contractions following PE and 5-HT, which rely on (IP3-mediated) calcium mobilization/release from intracellular stores. Thus, if inhibition of calcium influx through L-type calcium channels were the primary mechanism, sertraline would not be expected to reduce receptor-mediated contractions as observed. Therefore, it is possible that the dilator effects of sertraline, similar to findings with fluoxetine, may arise from interactions with intracellular calcium signaling pathways in addition to the blockade of calcium influx through L-type calcium channels (30).

One of the limiting factors of our study is the possible contractile-relaxant mechanism of sertraline or other SSRIs at the cellular level, which we could not investigate due to our limited resources. Further detailed studies with sertraline and other SSRI drugs will help to elucidate the underlying mechanisms more clearly.

CONCLUSION

It was observed that sertraline inhibited smooth muscle contraction induced by PE in isolated rat aorta in this study. Acetylcholine administration in the endothelium-damaged aortic tissue resulted in slower inhibition of PE-induced smooth muscle contractions. Endothelial damage led to a decrease in NO release in the aorta treated with PE, causing a reduction in the NO-mediated vasodilation effect. It is

suggested that sertraline inhibits PE-induced contractions through the NO mechanism. Sertraline, the most widely used antidepressant drug with a lower side effect profile, showed a significant vasorelaxative effect in isolated rat thoracic aorta. It is therefore conceivable that sertraline increases coronary and peripheral blood flow in vivo, which may contribute to its previously described beneficial effects in depression-related cardiovascular diseases. Although this study constitutes a step forward for science, new and advanced studies are also needed to better understand the effects of sertraline on the cardiovascular system.

Conflict of interest: Author declares that there is no conflict of interest between the authors of the article.

Financial conflict of interest: Author declares that he did not receive any financial support in this study.

Address correspondence to: Z. Isik Solak Gormus, Necmettin Erbakan University, Faculty of Medicine, Department of Physiology, Konya, Türkiye

e-mail: igormus@gmail.com

REFERENCES

- David LH, Samia RT, Peter J, et al. Depression and cardiovascular disease: A clinical review. *Eur Heart J* 2014;35(21):1365-72.
- Wynn A. Unwarranted emotional distress in men with ischemic heart disease (IHD). *Med J Aust* 1967;4;2(19):847-51.
- Cay EL, Vetter N, Philip NE, et al. Psychological status during recovery from an acute heart attack. *J Psychosom Res* 1972;16:425-35.
- Thombs BD, de Jonge P, Coyne JC, et al. Depression screening and patient outcomes in cardiovascular care: A systematic review. *JAMA* 2008;12;300(18):2161-71.
- Meijer A, Conradi HJ, Bos EH, et al. Prognostic association of depression following myocardial infarction with mortality and cardiovascular events: a meta-analysis of 25 years of research. *Gen Hosp Psychiatry* 2011;33(3):203.
- Thomas SJ, Shin M, McInnis MG, et al. Combination therapy with monoamine oxidase inhibitors and other antidepressants or stimulants: strategies for the management of treatment-resistant depression. *Pharmacotherapy* 2015;35(4):433-49.
- Anderson IM. Selective serotonin reuptake inhibitors versus tricyclic antidepressants: A meta-analysis of efficacy and tolerability. *J Affect Disord* 2000;58(1):19-36.
- Chu A, Wadhwa R. Selective Serotonin Reuptake Inhibitors. In: *StatPearls* [Internet]. Treasure Island (FL): StatPearls Publishing; 2022.
- Hoffman RS. Off-Label Uses for Selective Serotonin Reuptake Inhibitors. *Am Fam Physician* 2005;1;71(1):4346.
- Cipriani A, La Ferla T, Furukawa TA, et al. Sertraline versus other antidepressive agents for depression. *Cochrane Database Syst Rev* 2010;14;(4):CD006117.
- Furchgott RF, Zawadzki JV. The obligatory role of endothelial cells in the relaxation of arterial smooth muscle by acetylcholine. *Nature* 1980;27;288(5789):373-76.
- Pueyo ME, Arnal JF, Rami J. Angiotensin II stimulates the production of NO and peroxynitrite in endothelial cells. *Am J Physiol* 1998;274(1):C214-20.

14. Linder L, Kioski W, Buhler FR, et al. Indirect evidence for release of endothelium-derived relaxing factor in human forearm circulation in vivo: blunted response in essential hypertension. *Circulation* 1990;81(6):1762-7.
15. Stauffer BL, Westby CM, DeSouza CA. Endothelin-1, aging and hypertension. *Curr Opin Cardiol* 2008;23(4): 350-5.
16. Vanhoutte PM. The endothelium-Modulator of vascular smooth muscle tone. *N Engl J Med* 1988;25;319(8):512-3.
17. Tousoulis D, Kampoli AM, Tentolouris C, et al. The role of nitric oxide on endothelial function. *Curr Vasc Pharmacol* 2012;10(1):4-18
18. Nurullahoğlu Atalık KE, Kutlu S, Solak H, et al. Cilostazol enhances atorvastatin-induced vasodilation of female rat aorta during aging. *Physiol Int* 2017;104(3):226–34.
19. Ostuzzi G, Matcham F, Dauchy S, et al. Antidepressants for the treatment of depression in people with cancer. *Cochrane Database Syst Rev* 2018;23;4(4):CD011006.
20. Nezafati MH, Vojdanparast M, Nezafati P. Antidepressants and cardiovascular adverse events: A narrative review. *ARYA Atheroscler* 2015;11(5):295–304.
21. Fioranelli M, Bottaccioli AG, Bottaccioli F, et al. Stress and Inflammation in Coronary Artery Disease: A Review Psychoneuroendocrineimmunology-Based. *Front Immunol* 2018;6;9:2031.
22. Edinoff AN, Akuly HA, Hanna TA, et al. Selective Serotonin Reuptake Inhibitors and Adverse Effects: A Narrative Review. *Neurol Int* 2021;13(3):387–401.
23. Maes M, Song C, Lin AH, et al. Negative immunoregulatory effects of antidepressants: Inhibition of interferon-gamma and stimulation of interleukin-10 secretion. *Neuropsychopharmacology* 1999;20:370-9.
24. Ouyang W, Rutz S, Crellin NK, et al. Regulation and functions of the IL-10 family of cytokines in inflammation and disease. *Annu Rev Immunol* 2011;29:71-109.
25. Lekakis J, Ikonomidis I, Papoutsis Z, et al. Selective serotonin reuptake inhibitors decrease the cytokine-induced endothelial adhesion molecule expression, the endothelial adhesiveness to monocytes and the circulating levels of vascular adhesion molecules. *Int J Cardiol* 2010;4;139(2):150–8.
26. Vila JM, Medina P, Segarra G, et al. Relaxant effects of antidepressants on human isolated mesenteric arteries. *Br J Clin Pharmacol* 1999;48(2):223–9.
27. Işık B, Özen Koca R, Solak Görmüş ZI, et al. Vasoactive effects of fluoxetine in rat thoracic aorta smooth muscle. *Cukurova Medical Journal*, 2022;47(2):729-37.
28. Melle Van JP, Buikema H, van den Berg MP, et al. Sertraline causes strong coronary vasodilation: Possible relevance for cardioprotection by selective serotonin reuptake inhibitors. *Cardiovasc Drugs Ther* 2004;18(6):441.
29. Ungvari Z, Pacher P, Kecskeméti V, et al. Fluoxetine dilates isolated small cerebral arteries of rats and attenuates constrictions to serotonin, norepinephrine, and a voltage-dependent Ca²⁺ channel opener. *Stroke* 1999;30(9):1949-54.
30. Wu S, Zhou Y, Xuan Z, et al. Repeated use of SSRIs potentially associated with an increase on serum CK and CKMB in patients with major depressive disorder: a retrospective study. *Sci Rep* 2021;28;11(1):13365.

Early And Mid-Term Radiological Results of Isolated Pembersal Procedure in Cases of Developmental Dislocation of The Hip

Gelişimsel Kalça Çıkığı Olgularda İzole Pembersal Prosedürünün Erken ve Orta Dönem Radyolojik Sonuçları

¹Alim Can Baymurat¹, ¹Ferid Abdulaliyev¹, ¹Asim Ahmadov¹, ¹Elsad Osmanli¹, ¹Nusret Ok², ¹Orkun Gul³,
¹Sacit Turanli¹

¹Gazi University, Medical Faculty, Department of Orthopaedics and Traumatology, Ankara, Türkiye
²Pamukkale University, Medical Faculty, Department of Orthopaedics and Traumatology, Denizli, Türkiye
³Trabzon Yıldızlı Medicalpark Hospital, Department of Orthopaedics and Traumatology, Trabzon, Türkiye

ÖZET

Amaç: Gelişimsel Kalça Displazisi (GKD) olan hastalarda erken tanı ve erken tedavi önemlidir. Geç başvuran veya ihmal edilen hastalarda çeşitli osteotomi prosedürleri gerekebilir. Literatürde GKD cerrahisinde Pembersal osteotomi ile ilgili sınırlı sayıda makale bulunmaktadır. Çalışmamızın amacı GKD'li 18 aylıktan büyük çocuklarda izole Pembersal osteotominin sonuçlarını değerlendirmektir.

Gereç ve Yöntemler: Bu retrospektif çalışmada 2014-2021 yılları arasında kliniğimizde GKD nedeniyle Pembersal osteotomi uygulanan hastaların sonuçları incelendi. Çalışmaya açık redüksiyon ile birlikte izole periasetabular Pembersal osteotomi uygulanan, en az 2 yıllık takibi olan ve yaşları 19 ile 36 ay arasında değişen 9 çocuk (7 kız, 2 erkek) dahil edildi. Ameliyat öncesi, ameliyat sonrası erken dönem, ameliyat sonrası 6. hafta ve son kontrol radyografileri değerlendirildi ve Wiberg'in orta kenar açısı (CEA), asetabular indeks (AI) ve Tönnis dereceleri not edildi.

Bulgular: Hastaların ortalama yaşı 28.75 ay ve takip süresi 50.33 aydı. CEA ve AI ameliyattan sonra erken dönemde düzelme görüldü ve bu düzelme daha sonraki dönemlerde de devam ettiği görüldü. Tönnis evrelemesi tüm hastalarda ameliyattan sonra iyileşme gösterdi ve bu iyileşme de ameliyat sonrası erken dönemde ve 6. hafta kontrol grafilerinde de devam etti. Ancak, son kontrol radyografilerinde 3 kalçada CEA<20°, AI>20° ve Tönnis evresi ≥2 idi ve bu üç kalça radyolojik kötü sonuç olarak değerlendirildi.

Sonuç: Bu çalışma, izole Pembersal osteotominin gelişimsel kalça displazisinin tedavisinde asetabular indeks ve diğer radyolojik parametrelerde iyileşme ile birlikte etkili ve güvenli bir seçenek olduğunu göstermiştir.

Anahtar Kelimeler: Gelişimsel kalça displazisi, periasetabular osteotomi, Pembersal osteotomi, merkez kenar açısı, asetabular indeks

ABSTRACT

Aim: Early diagnosis and timely care is important in patients with Developmental Hip Dysplasia (DDH). Late presenting or neglected patients may require various osteotomy procedures. There is a limited number of articles in the literature on Pembersal osteotomy in DDH surgery. The aim of this study was to assess the outcomes of isolated Pembersal osteotomy in children over 18 months of age with DDH.

Materials and Methods: A retrospective analysis was made of the outcomes of patients who underwent Pembersal osteotomy for DDH at our clinic from 2014 to 2021. The study included 9 children (7 girls, 2 boys) aged between 19 and 36 months with at least 2 years of follow-up who underwent isolated periacetabular Pembersal osteotomy with open reduction. Preoperative, early postoperative, 6 weeks postoperative and final follow-up radiographs were evaluated and Wiberg's centre-edge angle (CEA), the acetabular index (AI) and Tönnis grades were noted.

Results: The mean age of the patients was 28.75 months and the follow-up period was 50.33 months. CEA and AI showed improvement in the early postoperative period and this improvement continued in the later periods. Tönnis staging showed postoperative improvement in all patients, and this improvement continued in the early postoperative period and on the 6-week follow-up radiographs. At the final follow-up examination, 3 hips had CEA <20°, AI >20° and Tönnis stage ≥2 and these 3 hips were considered as a radiologically poor outcome.

Conclusion: This study demonstrated that isolated Pembersal osteotomy is an effective and safe option for the treatment of developmental dysplasia of the hip, with improvement in acetabular index and other radiological parameters.

Keywords: Developmental dysplasia of the hip, periacetabular osteotomy, Pembersal osteotomy, centre-edge angle, acetabular index

Geliş Tarihi/Received: 20 Aralık/December 2023 **Kabul Tarihi/Accepted:** 13 Mart/March 2024 **Yayın Tarihi/Published Online:** 25 Mart/March 2024

Sorumlu Yazar/Corresponding Author: Alim Can Baymurat, Gazi University Medical Faculty, Department of Orthopaedics and Traumatology, Ankara, Türkiye
e-mail: alimcanbaymurat@yahoo.com

Atıf yapmak için/ Cite this article as: Baymurat AC, Abdulaliyev F, Ahmadov A, Osmanli E, Ok N, Gul O, Turanli S. Early and Mid-Term Radiological Results of Isolated Pembersal Procedure in Cases of Developmental Dislocation of The Hip. Selcuk Med J 2024;40(1): 16-21

Disclosure: Author has not a financial interest in any of the products, devices, or drugs mentioned in this article. The research was not sponsored by an outside organization. Author has agreed to allow full access to the primary data and to allow the journal to review the data if requested.

"This article is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0)"



INTRODUCTION

Although significant advances have been made in the early diagnosis and treatment of developmental dysplasia of the hip (DDH), cases of delayed DDH are sometimes encountered. Delayed cases require advanced surgical procedures such as periacetabular and/or proximal femur osteotomies (1). These procedures are associated with lower success rates, higher complication rates and higher cost. Balanced and complete formation of the acetabular and triradiate cartilage and proper positioning of the femoral head within the acetabulum are essential for normal development of the hip joint (2). In children older than 18 months with DDH, it is not possible to treat the hip with closed reduction due to elongated and thickened ligamentum teres, upward displacement of the capsule, and narrowing of the acetabular entrance of the iliopsoas tendon (hourglass deformity) and inverted labrum, and in these cases open reduction methods are preferred (3). The goal of open reduction is to achieve and maintain concentric reduction, prevent damage to the femoral head, and provide an optimal environment for growth of the proximal femur and acetabulum. Open reduction can be performed using various techniques. The goal of acetabular osteotomies is coverage of the femoral head by the acetabular roof. The most used techniques include Salter, Pemberton and Dega osteotomies (4). The Pembersal osteotomy was described by Morissy (5) and is a combination of the Salter and Pemberton procedures (6). This osteotomy technique avoids damage to the triradiate cartilage plane and involves an osteotomy line that extends from the ilium to the ischium along the posterior ilioischial branch of the triradiate cartilage. The method not only tilts the acetabular roof to cover the femoral head but also allows for some rotation (7). Although there are some studies in the literature of Pembersal osteotomy in the treatment of DDH, most of those studies have presented the results of the patients who underwent proximal femoral osteotomy, femoral shortening, and autograft use in conjunction with Pembersal osteotomy (5, 6).

The aim of this study was to evaluate the radiological results of patients who underwent isolated Pembersal osteotomy with open reduction for DDH.

MATERIALS AND METHODS

Ethics committee approval was obtained from the Ethics Committee of our institution for this retrospective study (Date: 21.11.2023; No: 20). A retrospective screening was conducted on patients diagnosed with Developmental Hip Dysplasia (DDH) who underwent periacetabular osteotomy in our clinic from 2014 to 2021. Of the 22 patients who underwent periacetabular osteotomy without femoral osteotomy for DDH, 9 patients who underwent isolated Pemberton osteotomy and continued regular follow-up, were included in this study. The age of the patients at the time of surgery ranged from 19 to 36 months, and the follow-up period ranged from 26 to 81 months. Patients without regular follow-up (n=4), who underwent revision surgery (n=2), or other (n=7) periacetabular osteotomies (e.g. Salter, Dega) (13 patients in total) were excluded. Patients who underwent proximal

femoral shortening and derotation osteotomy in addition to Pembersal osteotomy were also excluded.

Radiographic evaluation included measurements of the Wiberg centre-edge angle (CEA), acetabular index (AI), and classification of the hip according to Tönnis staging on preoperative (PrO), early (immediate) postoperative (EPO), late (6 weeks) postoperative (LPO) and last control (LC) radiographs (Figure 1).

The operative success was gauged by the approximation of these values to the normal range postoperatively, while long-term surgical success was assessed by deviation from the normal range, particularly in the mid-postoperative period. The influence of gender on surgical outcomes was also examined. There was also evaluation of the impact of preoperative values on immediate postoperative and final control measurements.

AI, defined as the angle between the line joining the base of the acetabulum to its upper outer ossified edge and the Hilgenreiner line, is the preferred metric for assessing acetabular development in children under the age of eight years (8). A normal AI is expected to be around 20 degrees after two years of age, with an increase indicative of hip dysplasia (9). Wiberg's centre-edge angle (CEA), representing the angle between the line connecting the centre of the femoral head and the Hilgenreiner line and the line to the acetabulum's outermost point, has a physiological range of 20-40 degrees (10). Values below 20 degrees suggest dysplasia, with less than 17 degrees indicating severe dysplasia. Tönnis staging categorizes hips based on the femoral head position relative to

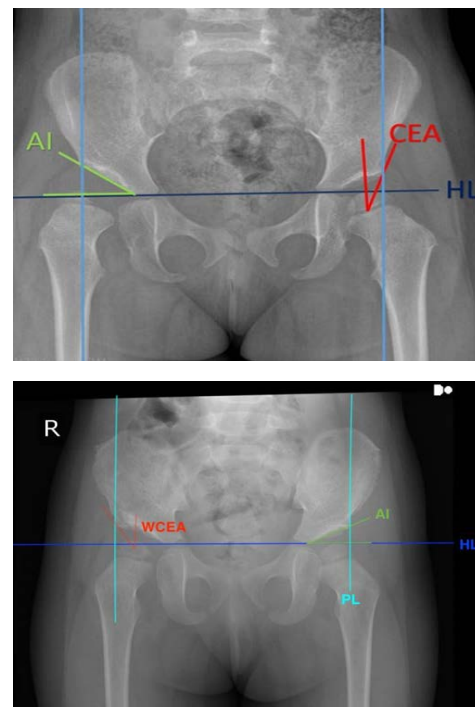


Figure 1. Preoperative (a) and postoperative (b) radiological evaluation.

the Perkins line, divided into four stages (11).

Surgical technique

All the operations were performed by the same surgeon. Pemborsal osteotomy was used according to the technique described by Perlik et al. (7). The ilium was exposed subperiosteally using the iliofemoral approach. At the level of the triradiate cartilage, an iliopsoas tenotomy was performed. Arthrotomy was routinely performed in all cases to examine the joint to debride the pulvinar and to evaluate the reduction. The labrum was preserved in all cases. A pelvic osteotomy was performed 1-1.5 cm above the anterior inferior iliac spine to the body of the ischium, parallel to the acetabular dome and remaining anterior to the sciatic notch. Care was taken to avoid damage to the joint. The osteotomy opening results in a greenstick fracture of the remaining ischial body, causing the lower quarter of the body to move forward and downward. This leads to anterolateral rotation of the acetabulum around an axis that passes through the ischial fracture and symphysis pubis. In addition, the acetabular roof was tilted inferiorly and laterally, with the triradiate cartilage acting as a hinge. The osteotomy was performed in the visible part of the ilium near the sciatic notch, ending at the ilioischial line just superior to the medial end of the triradiate cartilage (TRC), without damaging the TRC. This was a total osteotomy and the inferior part of the pelvis was displaced forward and downward. Simultaneously, the roof of the acetabulum was laterally rotated, and the orientation of the acetabular cavity was repositioned. To avoid posterior displacement of the acetabulum, external rotation of the distal portion was not performed. Acetabular deepening was performed as in Pemberton's osteotomy, and reorientation as in Salter's technique. A curved bone graft in a triangular shape was harvested from the iliac crest on the same side as the surgery and then placed at the site of the osteotomy. No fixation material was employed along the osteotomy line. Patients underwent a six-week follow-up period in pelvipedal casting, after which the gradual discontinuation of abduction devices was initiated.

Whether or not a proximal femoral osteotomy was necessary was decided on the basis of clinical assessment during surgery. After the periacetabular osteotomy, the hip was assessed for joint stability by moving the hip in all directions while the hip joint was reduced, and proximal femoral osteotomy was not performed in hips that were stable in all directions, especially in extension and adduction. If the hip dislocated during this examination, a proximal femoral osteotomy was performed in addition to the Pemborsal osteotomy.

Statistical Analysis

Data obtained in the study were analyzed using SPSS version 27 (IBM Corp., Armonk, NY, USA).

Descriptive statistics were computed to summarize the basic features like central tendency and overview of the data distribution. Normality of the data was assessed using the Shapiro-Wilk test.

RM ANOVA was utilized to evaluate the temporal changes in CEA, AI, and Tönnis grades. Mauchly's Test of Sphericity assessed the assumption of sphericity, with Greenhouse-Geisser correction applied where necessary. Spearman's Rho correlation analysis was used to explore the relationships between CEA, AI, Tönnis grades and age, as it is ideal for assessing associations between ranked variables.

Preoperative and postoperative measurements for CEA, AI, and Tönnis grades were compared using the Wilcoxon Signed Ranks Test as this test was suitable for paired samples to identify changes over time within subjects.

In line with standard statistical practice, p-values less than 0.05 were considered statistically significant. This threshold was used to determine the presence of significant differences or correlations in the data.

RESULTS

Evaluation was made of 12 hips of 9 patients, over a mean follow-up period of 50.33 months (SD= 11.04). Descriptive statistics for preoperative and postoperative CEA and AI measurements revealed a range of distribution patterns, with CEA measurements showing both symmetric and skewed distributions, and AI measurements varying from slightly skewed to leptokurtic. The patients comprised 7 (78%) females and 2 (22%) males with a mean age of 28.75 (SD= C) months (range, 19 -36 months) with a slightly negatively skewed distribution. The surgeries were performed in 9 (75%) left hips and 3 (25%) right hips (Table 1).

According to the Shapiro-Wilk tests, normal distribution was seen most variables in the study, including CEA (PrO, EPO LC) and AI (PrO, EPO, LPO) preoperatively and postoperatively, and patient age, and significant deviations from normality were determined in the CEA on LPO and AI on LC (Table 2).

Repeated measures ANOVA revealed no significant overall time effect on CEA measurements, but a significant quadratic trend ($F(1, 11) = 5.698, p = .036$) suggested a complex relationship between time and CEA values; Greenhouse-Geisser correction was applied due to the violation of sphericity ($W = 0.344, p = 0.067$).

Repeated measures ANOVA on AI measurements indicated a significant time effect with significant linear, quadratic, and cubic trends over time (Greenhouse-Geisser $F(1.939, 21.329) = 30.990, p < 0.001$; Huynh-Feldt $F(2.347, 25.820) = 30.990, p < 0.001$), after corrections for sphericity violations

Repeated measures ANOVA on Tönnis grade revealed

Table 1. Demographic characteristics and basic patient information

Number of patients	Hips	Side R/L	Age range, month (mean±SD)	Gender F/M	Follow-up period range, months (mean±SD)
9	12	3/9	19-36 (28.75±11.04)	7/2	26-81 (50.33±24.013)

SD: standard deviation

Table 2. Results of the descriptive statistics analysis.

	N	Range	Min.	Max.	Mean	SD
CEA PrO	12	37	15	52	32.58	12.688
CEA EPO	12	19	14	33	24.75	5.864
CEA LPO	12	22	10	32	25.58	6.186
CEA LC	12	13	22	35	27.00	4.156
AI PrO	12	24	27	51	36.25	6.524
AI EPO	12	10	18	28	24.00	2.796
AI LPO	12	12	18	30	23.25	3.388
AI LC	12	22	18	40	24.00	5.800
Age	12	17	19	36	28.75	6.412
Valid N (listwise)	12					

CEA PrO: preoperative centre-edge angle; CEA EPO: centre-edge angle immediately after surgery; CEA LPO: centre-edge angle at postoperative week 6; CEA LC: centre-edge angle at the last control; AI PrO: preoperative acetabular index, AI EPO: acetabular index immediately after surgery, AI LPO: acetabular index at postoperative week 6, AI LC: acetabular index at the last control, N - number of patients. Min: minimum, Max: maximum. SD: standart deviation. Std: standart, Stat: statistic.

Table 3. Spearman's rho correlation analysis of CEA, AI, Tönnis grades and age

		CEA PrO	CEA EPO	CEA LPO	CEA LC	AI PrO	AI EPO	AI LPO	AI LC	Tönnis PrO	Tönnis EPO	Tönnis LPO	Tönnis LC	Age
CEA PrO	C.C.	1.000	0.218	0.037	-0.059	-0.599	-0.349	-0.496	-0.379	-0.682*	0	0	-0.755**	-0.496
	Sig.	0	0.497	0.908	0.857	0.040	0.266	0.101	0.225	0.014	0	0	0.005	0.101
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
CEA EPO	C.C.	0.218	1.000	0.572	0.349	-0.302	-0.585	-0.391	-0.326	-0.492	0	0	-0.197	0.562
	Sig.	0.497	.0	0.052	0.266	0.340	0.046	0.209	0.302	0.104	0	0	0.540	0.057
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
CEA LPO	C.C.	0.037	0.572	1.000	0.293	-0.007	-0.230	-0.728	-0.389	-0.135	0	0	-0.368	0.301
	Sig.	0.908	0.052	.0	0.356	0.982	0.472	0.007	0.212	0.675	0	0	0.239	0.342
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
CEA LC	C.C.	-0.059	0.349	0.293	1.000	0.229	-0.679	-0.287	-0.005	0.000	0.	0.	0.113	0.456
	Sig.	0.857	0.226	0.356	.0	0.474	0.015	0.366	0.987	10.000	0.	0.	0.727	0.136
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
AI PrO	C.C.	-0.599	-0.302	-0.007	0.229	1.000	0.208	0.253	0.127	0.763**	0.	0.	0.621*	0.384
	Sig.	0.040	0.340	0.982	0.474	.0	0.518	0.427	0.695	0.004	0.	0.	0.031	0.218
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
AI EPO	C.C.	-0.349	-0.585	-0.230	-0.679	0.208	1.000	0.296	0.046	0.553	0.	0.	0.338	-0.221
	Sig.	0.266	0.046	0.472	0.015	0.518	.0	0.350	0.886	0.062	0.	0.	0.282	0.490
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
AI LPO	C.C.	-0.496	-0.391	-0.728	-0.287	0.253	0.296	1.000	0.769	0.468	0.	0.	0.655*	0.124
	Sig.	0.101	0.209	0.007	0.366	0.427	0.350	.0	0.003	0.125	0.	0.	0.021	0.700
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
AI LC	C.C.	-0.379	-0.326	-0.389	-0.005	0.127	0.046	0.769	1.000	0.358	0.	0.	0.366	0.057
	Sig.	0.225	0.302	0.212	0.987	0.695	0.886	0.003	.0	0.253	0.	0.	0.243	0.860
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
Tönnis PrO	C.C.	-0.682*	-0.492	-0.135	0.000	0.763**	0.553	0.468	0.358	10.000	0.	0.	0.707*	0.343
	Sig.	0.014	0.104	0.675	10.000	0.004	0.062	0.125	0.253	0.	0.	0.	0.010	0.275
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
Tönnis EPO	C.C.	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sig.	0	0	0	0	0	0	0	0	0	0	0	0	0
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
Tönnis LPO	C.C.	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sig.	0	0	0	0	0	0	0	0	0	0	0	0	0
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
Tönnis LC	C.C.	-0.755**	-0.197	-0.368	0.113	0.621*	0.338	0.655*	0.366	0.707*	0	0	10.000	0.591*
	Sig.	0.005	0.540	0.239	0.727	0.031	0.282	0.021	0.243	0.010	0	0	0.043	0.043
	N	12	12	12	12	12	12	12	12	12	12	12	12	12
Age	C.C.	-0.496	0.562	0.301	0.456	0.384	-0.221	0.124	0.057	0.343	0	0	0.591*	10.000
	Sig.	0.101	0.057	0.342	0.136	0.218	0.490	0.700	0.860	0.275	0	0	0.043	0.043
	N	12	12	12	12	12	12	12	12	12	12	12	12	12

CEA PrO: preoperative centre-edge angle; CEA EPO: centre-edge angle immediately after surgery; CEA LPO: centre-edge angle at postoperative week 6; CEA LC: centre-edge angle at the last control; AI PrO: preoperative acetabular index, AI EPO: acetabular index immediately after surgery, AI LPO: acetabular index at postoperative week 6, AI LC: acetabular index at the last control, Tönnis PrO: preoperative Tönnis grade, Tönnis EPO: Tönnis grade immediately after surgery; Tönnis LPO: Tönnis grade at postoperative week 6, Tönnis LC: Tönnis grade, at the last control

significant differences as indicated by significant multivariate tests (e.g., Pillai's Trace: $F(2, 10) = 43.333, p < .001$) and within-subjects effects (Greenhouse-Geisser: $F(1.307, 14.381) = 59.667, p < .001$).

Spearman's rho correlation analysis revealed significant

relationships between preoperative and postoperative measurements of CEA and AI, with significant negative correlations between preoperative CEA and preoperative AI ($\rho = -0.599, p = 0.040$), Tönnis preoperative grade ($\rho = -0.682, p < 0.05$), and the Tönnis LC angle (Tönnis LC; $\rho = -0.755, p <$

Table 4. Wilcoxon Signed Ranks Test Results for Postoperative and Preoperative Measurements

	CEA EPO- CEA PrO	CEA LPO- CEA PrO	CE LC- CEA PrO	AI EPO- AI PrO	AI LPO- AI PrO	AI LC- AI PrO	Tönnis EPO- Tönnis PrO	Tönnis LPO- Tönnis PrO	Tönnis LC- Tönnis PrO
Z	-1.961 ^b	-1.778 ^b	-1.415 ^b	-3.065 ^b	-3.061 ^b	-3.059 ^b	-3.095 ^b	-3.095 ^b	-3.140 ^b
p value	0.050	0.075	0.157	0.002	0.002	0.002	.002	.002	.002

b. Based on positive ranks. Z: Wilcoxon test statistics value; CEA PrO: preoperative center edge angle; CEA EPO: centre-edge angle immediately after surgery; CEA LPO: centre-edge angle at postoperative week 6; CEA LC: centre-edge angle at the last control; AI PrO: preoperative acetabular index, AI EPO: acetabular index immediately after surgery, AI LPO: acetabular index at postoperative week 6, AI LC: acetabular index at the last control, Tönnis PrO: preoperative Tönnis grade, Tönnis EPO: Tönnis grade immediately after surgery; Tönnis LPO: Tönnis grade at postoperative week 6, Tönnis LC: Tönnis grade, at the last control, Z: Wilcoxon test statistics value

0.01), and the Tönnis LC grade. The test also showed a positive correlation between CEA EPO and AI EPO measurements ($\rho = -0.679$, $p = 0.015$), and positive correlations between different AI measurements and Tönnis grades with age, indicating both inverse and direct associations (Table 3).

Wilcoxon Signed Ranks Tests revealed significant reductions in AI and Tönnis grades from preoperative to postoperative, while changes in CEA measurements were not consistently significant ($Z = -1.961$, $p = 0.050$ for the CEA in EPO) (Table 4).

DISCUSSION

The short and mid-term results obtained in this study of patients who underwent isolated Pembersal osteotomy for DDH showed a significant improvement in radiological AI values.

The treatment of delayed DDH presents significant challenges for both surgeon and the patient. Achieving femoral head acetabular alignment is crucial for extending hip joint longevity. In this study, the intermediate radiological results are presented of patients undergoing isolated Pembersal osteotomy for DDH. A study by Agarwai et al. of 16 patients over 54 months reported similar significant improvements in AI and CEA (5). The AI improvements observed in the current study were consistent with the findings of Agarwai et al., although the long-term CEA differences were not statistically significant. Li et al. reported that AI was statistically superior in specificity, sensitivity, and diagnostic accuracy post-closed reduction in DDH compared to the CEA and Reimer index (8). In the current study, improvements in AI were noted postoperatively, and Tönnis staging revealed an improvement from stage 4 to stages 1 and 2 in three patients.

The study by Bursalı and Tonbul (6) had a longer follow-up period and a larger number of patients compared to the present study. However, in the present study, isolated Pembersal osteotomy was performed, whereas in the Bursalı study, proximal femoral osteotomy was performed together with Pembersal osteotomy. While Bursalı and Tonbul (6) observed long-term improvements with a mean follow-up of 10.5 years, the shorter mean follow-up of 50.33 months in the current study may not capture the full extent of long-term skeletal maturation and stability after osteotomy. Nevertheless, the application of robust statistical methods such as Shapiro-Wilk and repeated measures ANOVA in this study revealed complex, time-dependent changes in CEA and AI, suggesting a nuanced

trajectory of radiological improvement that parallels the clinical and radiographic improvements noted by Bursalı and Tonbul. In evaluating the outcomes of Pembersal osteotomy for DDH in this patient cohort, with a mean age significantly lower than that reported by Bursalı and Tonbul, it is acknowledged that there is the limitation of the ability to fully capture long-term complications such as premature closure of the triradiate cartilage and postoperative avascular necrosis. Although the findings of Bursalı and Tonbul on these complications provide an important context for interpreting the current study results, the relatively short mean follow-up of 50.33 months may not be sufficient to detect such late-onset complications, which are critical considerations for a comprehensive assessment of surgical outcomes.

Another study evaluated the effectiveness of interventions targeting only the acetabular side in the surgical treatment of Legg-Calvé-Perthes disease. That study involved twelve patients undergoing acetabular osteotomies including Pembersal, with significant improvements observed both clinically and radiologically. This complements the current study findings, suggesting the efficacy of acetabular-side surgeries in specific hip conditions without requiring femoral intervention (12).

Bortulev et al. compared different pelvic osteotomy techniques in the treatment of hip dysplasia in children and divided their patients into 3 groups. The first group included patients with Tönnis type 1 and $AI \leq 35^\circ$, who underwent a modified Salter osteotomy. The second group included patients with Tönnis type 2 and $AI > 35^\circ$, on whom Pemberton osteotomy was performed. Patients with Tönnis type 3 and 4 and $AI > 35^\circ$ were designated as the third group and Pembersal osteotomy was performed. It was reported that all three osteotomies successfully corrected acetabular dysplasia without causing hemipelvic deformity. However, considering that the third group of patients had a higher dislocation and acetabular index than the other groups, the Pembersal osteotomy seems to correct acetabular dysplasia better. The mean AI values of the patients in the current study were above 35° and satisfactory postoperative results were obtained. These findings are consistent with the emphasis in the current study on the efficacy of specific osteotomy techniques, such as Pembersal surgery, in the treatment of hip dysplasia, and highlight the importance of tailored surgical approaches based on individual anatomical variations (13).

Limitations

The main limitations of this study can be said to be the small sample size and retrospective design, which may limit the generalizability of the findings. The absence of a control group makes it challenging to draw direct comparisons with other treatments. Furthermore, the focus on a specific surgical method may not encompass the variety of cases encountered in clinical practice. Long-term follow-up data was not extensively analyzed, which is crucial for understanding the durability of the surgical outcomes. In addition, the study did not account for variables such as patient lifestyle or comorbidities, which could influence recovery and results. Previous studies have shown that patients with bilateral developmental dysplasia of the hip have a higher risk of avascular necrosis and worse outcomes (14). Therefore, the fact that 3 of the 9 patients included in the study had bilateral developmental dysplasia of the hip can also be considered a limitation of the study.

CONCLUSION

The results of this study demonstrated that Pembursal osteotomy is an effective and safe option for the treatment of DDH with improvement in acetabular index and other radiological parameters. Significant improvements were noted in the Acetabular Index and other radiological parameters, indicating the efficacy of this surgical approach in correcting hip dysplasia. However, long-term outcomes need further investigation. The study underscores the importance of individualized surgical techniques based on specific anatomical variations in managing DDH. These findings can be considered to contribute to the growing body of evidence supporting tailored surgical interventions for optimal patient outcomes in pediatric orthopedics.

Conflict of interest: Author declares that there is no conflict of interest between the authors of the article.

Financial conflict of interest: Author declares that he did not receive any financial support in this study.

Address correspondence to: Alim Can Baymurat, Gazi University Medical Faculty, Department of Orthopaedics and Traumatology, Ankara, Türkiye

e-mail: alimcanbaymurat@yahoo.com

REFERENCES

1. Bakarman K, Alsiddiky AM, Zamzam M, et al. Developmental Dysplasia of the Hip (DDH): Etiology, Diagnosis, and Management. *Cureus* 2023; 15:43207.
2. Ponseti IV. Growth and development of the acetabulum in the normal child. Anatomical, histological, and roentgenographic studies. *J Bone Joint Surg Am* 1978; 60:575-85
3. Sungur I, Cetinus ME. Treatment of developmental dysplasia of the hip in children older than 18 months. *TOTBID Journal* 2014; 13:412-25.
4. Şenar M, Westhoff B, Zilkens C, et al. Indikation und Ergebnisse hüftnaher Osteotomien bei Dysplasie [Indications and results of corrective pelvic osteotomies in developmental dysplasia of the

- hip]. *Orthopade* 2008; 37:556-70, 572-4, 576. German.
5. Agarwal A, Rastogi P. Clinicoradiological outcomes following pembursal acetabular osteotomy for developmental dysplasia of hip in young children: A series of 16 cases followed minimum 2 years. *J Clin Orthop Trauma* 2021; 23:101669.
6. Bursali A, Tonbul M. How are outcomes affected by combining the Pemberton and Salter osteotomies? *Clin Orthop Relat Res* 2008; 466:837-46.
7. Perlik PC, Westin GW, Marafioti RL. A combination pelvic osteotomy for acetabular dysplasia in children. *J Bone Joint Surg Am* 1985; 67:842-50.
8. Li Y, Guo Y, Li M, et al. Multi-center Pediatric Orthopedic Study Group of China. Acetabular index is the best predictor of late residual acetabular dysplasia after closed reduction in developmental dysplasia of the hip. *Int Orthop* 2018; 42:631-40.
9. Weinstein SL, Mubarak SJ, Wenger DR. Developmental hip dysplasia and dislocation: Part I. *Instr Course Lect* 2004; 53:523-30.
10. Wenger DR, Bomar JD. Human hip dysplasia: evolution of current treatment concepts. *J Orthop Sci* 2003; 8:264-71.
11. Akman B, Ozkan K, Cift H, et al. Treatment of Tönnis type II hip dysplasia with or without open reduction in children older than 18 months: a preliminary report. *J Child Orthop* 2009; 3:307-11.
12. Albayrak M, Ugur F. Evaluating the effectiveness of interventions targeting only the acetabular side in the surgical treatment of Legg-Calvé-Perthes disease. *Eur Rev Med Pharmacol Sci* 2023; 27:6151-61.
13. Bortulev PI, Baskaeva TV, Vissarionov SV, et al. The choice of pelvic osteotomy technique in young children with hip dysplasia. *Pediatric Traumatology, Orthopaedics and Reconstructive Surgery* 2023; 11:5-16.
14. Sankar WN, Young CR, Lin AG, et al. Risk factors for failure after open reduction for DDH: a matched cohort analysis. *J Pediatr Orthop* 2011; 31:232-9.

Evaluation of Attitudes and Knowledge Levels of Medical Faculty Students about Probiotics

Tıp Fakültesi Öğrencilerinin Probiyotikler Hakkındaki Tutum ve Bilgi Düzeylerinin Değerlendirilmesi

✉ Fatma Goksin Cihan, ✉ Nur Demirbas, ✉ Nazan Karaoglu¹, ✉ Ruhusen Kutlu¹

¹Necmettin Erbakan University, Medical Faculty, Family Medicine, Konya, Türkiye

ÖZET

Amaç: Probiyotikler pek çok hastalığın önlenmesi ve tedavisinde kanıtlanmış yararları olan nispeten yan etkileri az olan doğal ürünlerdir. Çalışmanın amacı, tıp öğrencilerinin probiyotikler hakkında bilgi, tutum ve kullanım alışkanlıklarının değerlendirilmesidir.

Gereçler ve Yöntem: Bu tanımlayıcı tipteki çalışmanın evrenini bir tıp fakültesinin 2019-2020 eğitim dönemi son sınıf öğrencileri oluşturdu. Katılımcılara çalışma hakkında ön bilgi verilip, sözlü onamları alındı. Çalışmaya katılacak öğrencilere araştırmacılar tarafından hazırlanan sosyodemografik bilgiler, probiyotik besin tüketimi ve probiyotikler hakkındaki bilgi düzeylerini değerlendiren literatür doğrultusunda hazırlanan bir anket formu uygulandı.

Bulgular: Çalışmaya katılan 229 öğrencinin (%78,4) yaş ortalaması 24,24±1,61 yıl olup %58,1'i kadındı. Öğrencilerin %92,6'sı probiyotik terimini, %44,1'i probiyotikli besinlerin içerdiği mikroorganizmaları bildiğini belirtti. Katılımcıların %54,2'si probiyotik içerikli besinleri kullanmıyordu. Probiyotik besin tüketimini etkileyen en sık sebepler "sindirim sistemine faydaları" (%42,4) ve "bağışıklık sistemini güçlendirmesi" (%26,6) iken probiyotik tüketmeme nedeninin "ihtiyaç duymamak" olduğu tespit edildi. Öğrencilerin %51,5'i probiyotik tüketimini çevrelerine ve hastalarına önerdiklerini ve en sık öneri nedeninin kabızlık şikayeti (%73,4) olduğunu ifade ettiler. Katılımcıların probiyotik bilgi düzeyi ortalama puanı 52,41±8,70 (20-76) olarak bulundu. Erkek öğrencilerin bilgi düzeyi (51,34±9,05) ile kadın öğrencilerin bilgi düzeyleri (53,26±8,38) arasında istatistiksel olarak anlamlı ilişki yoktu (p=0,101). Probiyotikleri sık kullananların bilgi düzeyi (57,03±13,22) hiç kullanmayanlara (46,11±6,80) göre daha yüksek tespit edildi (p<0,001).

Sonuç: Tıp Fakültesi son sınıf öğrencilerinin probiyotik bilgi düzeyleri, kendi tüketimleri ve hastalarına önerme tutumları orta düzeyde bulundu. Sağlıklı veya hasta bireylerin doğru probiyotikli gıdaları tüketmeleri, konu hakkında eğitim almış hekimlerin tavsiyeleri ile olmalıdır.

Anahtar Kelimeler: Probiyotik, Tıp Öğrencisi, Bilgi, Tutum

ABSTRACT

Aim: Probiotics are natural products with proven benefits in the prevention and treatment of many diseases, with relatively few side effects. The study aimed to assess medical students' knowledge, attitudes and usage habits about probiotics.

Materials and Methods: This descriptive study comprised final-year medical students in the academic year 2019-2020. Preliminary information about the study was given to the participants, and their verbal consent was obtained. A questionnaire prepared by the researchers in line with the literature evaluating socio-demographic characteristics, probiotic food consumption and knowledge about probiotics was applied to the participants.

Results: The mean age of 229 students (78.4%) who participated in the study was 24.24±1.61 years and 58.1% were female. Of the participants, 92.6% stated that they knew the term 'probiotic', 44.1% indicated that they knew the microorganism content of probiotic foods, and 54.2% did not consume probiotic-containing foods. The most common reasons for taking probiotics were 'digestive benefits' (42.4%) and 'boosting the immune system' (26.6%), while the most common reason for not taking probiotics was 'not needed'. In the study, 51.5% of students said they would recommend probiotic foods to their peers and patients, and the most common reason for recommendation was constipation (73.4%). The participants had a mean probiotic knowledge score of 52.41±8.70 (20-76) points. There was no relationship between male students' (51.34±9.05) and female students' knowledge levels (53.26±8.38) (p=0.101).

Conclusion: The level of knowledge about probiotics, the consumption of probiotics and the attitude towards recommending probiotics among the Faculty of Medicine senior students were found to be moderate. Consumption of probiotics by healthy or sick people should be done on the advice of trained physicians

Keywords: Probiotic, Medical Student, Knowledge, Attitude

Geliş Tarihi/Received: 25 Kasım/November 2023 **Kabul Tarihi/Accepted:** 26 Şubat/February 2024 **Yayın Tarihi/Published Online:** 25 Mart/March 2024

Sorumlu Yazar/Corresponding Author: Address correspondence to: Nur Demirbas, Necmettin Erbakan University, Medical Faculty, Family Medicine, Konya, Türkiye **e-mail:** ndemirbas76@hotmail.com

Atıf yapmak için/ Cite this article as: Cihan FG, Demirbas N, Karaoglu N, Kutlu R. Evaluation of Attitudes and Knowledge Levels of Medical Faculty Students about Probiotics. Selcuk Med J 2024;40(1): 22-28

Disclosure: Author has not a financial interest in any of the products, devices, or drugs mentioned in this article. The research was not sponsored by an outside organization. Author has agreed to allow full access to the primary data and to allow the journal to review the data if requested.

"This article is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0)"



INTRODUCTION

The World Health Organization defines probiotics as live microorganisms that are beneficial for the host's health when consumed in sufficient amounts (1). The term probiotic is derived from "pro" (for) and "bios" (life) (2). The microorganism species used as probiotics are mainly *Lactobacillus*, *Bifidobacterium*, *Streptococcus thermophilus*; some *Lactococcus*, *Leuconostoc* and *Pediococcus* species; specific beneficial strains of *Escherichia coli*, *Bacillus lacterosporus*, *Bacillus subtilis*, *Bacillus coagulans*, *Propionibacterium* species and non-pathogenic yeast *Saccharomyces boulardii* (1). Probiotics are foods or products that naturally or artificially contain microorganisms with a positive effect on the consumer's health (3). Physicians increasingly recognize the benefits of probiotic foods on human health and nutrition. Probiotics offer remarkable potential for the prevention and management of infective diseases such as *Helicobacter pylori* infections, bacterial gastroenteritis, urinary tract infections, microbial vaginosis infections, and non-infective diseases such as inflammatory bowel diseases, irritable bowel syndrome, colon cancer and breast cancer. They are also helpful in treating recurrent childhood infections such as diarrhea and upper respiratory tract infections, especially in infants aged 4-11 months (4-6). In addition to foods with natural probiotics, the number and type of probiotic-added foods and beverages available to consumers and marketed as beneficial for health has increased significantly.

Despite studies supporting the use of probiotics, the consumption of probiotics and the frequency with which doctors recommend them to patients is still low (7-9). This may be due to a lack of knowledge about probiotics and their benefits among both health professionals and consumers. A previous study conducted in Turkey showed that more than half of the physicians had a moderate level of general knowledge about probiotics and were not sure about their contribution to health (7). Studies conducted on probiotics in university students revealed that 49.5 - 63.2% of the students had knowledge about probiotics, and only half consumed probiotic foods (10-12).

Medical students who will become future doctors require adequate knowledge of probiotics. This knowledge will enable them to manage their diet and provide appropriate recommendations to their patients when necessary. When the literature was reviewed, research on the extent of medical students' knowledge regarding probiotics was scarce. This study aimed to determine the dietary habits of junior doctors, the frequency with which they consume probiotic-containing foods, and to assess their knowledge, attitudes and habits regarding probiotics.

MATERIALS AND METHOD

The population of this descriptive study consisted of final-year students at a medical school in the 2019-2020

Table 1. Socio-demographic characteristics of the participants

	Mean±SD	Min-max
Age (years)	24.24±1.61	20-36
	n	%
Gender		
Male	96	41.9
Female	133	58.1
Mother education level*		
Literate	11	4.8
Primary school	99	43.2
High school	64	27.9
University	52	22.7
Father education level		
Literate	5	2.1
Primary school	59	25.8
High school	49	21.4
University	116	50.7
Income level		
Income higher than expenses	64	28.0
Income and expenses are equal to each other	134	58.5
Income lower than expenses	31	13.5
Place of residence		
Homestay	71	31.0
At home with friends	70	30.6
Home alone	64	27.9
Dormitory	10	4.4
Other	14	6.1
Chronic disease status		
Has a chronic disease	39	17.0
None	190	83.0

* Three people did not answer this question

academic year. It was planned to reach all intern doctors who volunteered to participate in the study. Participants were given preliminary information about the study, and their verbal consent was obtained. The participants completed a socio-demographic information form and a questionnaire designed to evaluate their knowledge, attitudes, and consumption of probiotic foods in accordance with the relevant literature. When the completed questionnaires were examined, three questionnaires were cancelled due to missing information, and the study was completed with 229 participants.

Ethics committee approval: Approval for the study was obtained from the Pharmaceutical and Non-Medical Device Research Ethics Committee (2019/1806).

Socio-demographic data form: The form consists of 13 questions about the participants' age, gender, height, weight, parental education and chronic diseases.

Probiotic knowledge and attitude questionnaire: This form, designed in accordance with the literature on the subject, includes 11 questions on the recognition of natural and supplemental probiotic foods, the frequency of consumption of probiotic foods, and a Likert-type attitude questionnaire

consisting of 20 statements to measure the level of knowledge about probiotic foods (13). The statements prepared for knowledge and attitudes towards probiotics were answered using a five-point Likert scale (strongly disagree, disagree, neither agree nor disagree, agree, strongly agree), seven of which are reversed, and scored between 0 and 4. In the tables, the 'strongly disagree and disagree' options and 'strongly agree and agree' options are combined for ease of presentation. The higher the score obtained from the questionnaire, the higher the level of knowledge about probiotics. The scores varied between 20 and 80. Individuals were considered to have a high level of knowledge if they scored above the average score (40 points).

Statistical Analysis

Statistical Package for Social Sciences for Windows (SPSS) 24.0 program was used for statistical analysis. Descriptive statistics for continuous variables were expressed as mean and standard deviation, and descriptive statistics for categorical data were expressed as frequencies and percentages. The Chi-square test was used to compare categorical data. Independent samples t-test and one-way ANOVA test were

Table 2. Knowledge, Attitudes and Habits about Probiotics

Knowing what the term probiotic is...		n (%)	
Knows		212	(92.6)
Does not know		17	(7.4)
Knowledge of the content of microorganisms in probiotic foods			
Knows		101	(44.1)
Does not know		128	(55.9)
Consumption of probiotic-containing foods			
I've never heard of or used it before		9	(4.0)
Heard of it but never used it		63	(27.5)
Tried several times		52	(22.7)
Rarely/Sometimes		71	(31.0)
Frequently		34	(14.8)
Reason for probiotic food consumption*			
Benefits for digestive system		97	(42.4)
Thinking that it strengthens the immune system		61	(26.6)
Taste		45	(19.7)
Advertisements		23	(10.0)
Thinking it is protective against cancer		22	(9.6)
Others		11	(4.8)
Recommendation of probiotic foods			
Recommend		118	(51.5)
Not recommend		19	(8.3)
Undecided		92	(40.2)
Conditions when probiotic foods are recommended*			
Constipation	168 (73.4)	Cancer	46 (20.1)
Diarrhea	115 (50.2)	Allergies	30 (13.1)
Irritable bowel syndrome	110 (48.0)	Hyperlipidemic	21 (9.2)
Frequent infections	100 (43.7)	Urogenital infections	14 (6.1)
Lactose intolerance	49 (21.4)	Acute pancreatitis	6 (2.6)
Reasons not to consume probiotic foods (n=141)			
I don't need it	61(43.3)	I do not find it natural	15(10.6)
I find it expensive	23(16.3)	I find it unpalatable	12(8.6)
I don't know why	16(11.3)	Other...	14(9.9)

* More than one option was chosen

used to compare quantitative data that met the assumption of normal distribution. The Mann-Whitney U test was used for paired groups that did not meet the assumption of normal distribution, and the Kruskal-Wallis test was used for groups of more than two. The existence of a statistical relationship between two variables was tested using the Pearson correlation test.

RESULTS

The mean age of 229 (229/292; 78.4%) students was 24.24±1.61 years old and 58.1% (n=133) were female. Table 1 shows the socio-demographic characteristics of the participants. Of the participants, 92.6% (n=212) knew the term probiotic, and 44.1% (n=101) knew the microorganisms found in probiotic foods. No significant relationship existed between the term probiotic and the knowledge of the microorganisms contained in these foods and gender (p>0.05). Only 14.8% of the participants consumed probiotic foods often. 31.0% consumed them rarely, and more than half never consumed them. There was no statistically significant relationship between probiotic consumption and gender (p=0.588). The most common reasons for taking probiotics were 'digestive benefits' (42.4%) and 'to boost immunity' (26.6%). The most frequently cited reason for not taking probiotics (43.3%) was that they 'did not feel the need'. While 51.5% of students

recommended probiotic foods to their friends and patients, the most common reasons for recommending probiotics were 'constipation' (73.4%), 'diarrhea' (50.2%) and 'irritable bowel syndrome' (48.0%) (Table 2). The answers given to the form prepared following the literature on the level of knowledge of probiotics are listed in Table 3.

The mean probiotic knowledge score of the participants was 52.41±8.70 (20-76) points. The knowledge score of male students (51.34±9.05 points) was lower than that of female students (53.26±8.38 points), but there was no statistically significant relationship between them (p=0.101). There was no significant relationship between knowledge of probiotics and maternal and paternal education or income (p>0.05). Knowledge among frequent probiotic users (57.03±13.22 points) was statistically higher than never-users (46.11±6.80 points) (p<0.001). Those who recommended probiotics to family members and patients (54.75±8.97 points) had higher knowledge than those who did not (47.21±11.34 points) (p=0.001) (Table 4).

DISCUSSION

Probiotics are live microorganisms shown to have health benefits when consumed in sufficient quantities (1). Various studies have demonstrated the effectiveness of these microorganisms in preventing and controlling various diseases,

Table 3. Probiotics knowledge questionnaire

	Disagree	Neither agree nor disagree	Agree	Score (points)
	n (%)	n (%)	n (%)	Mean±SD
1 Contains elements beneficial to health	12(5.2)	30(13.1)	187(81.7)	2.95±0.8
2 It helps strengthen the immune system.	10(4.4)	30(13.1)	189(82.5)	2.96±0.7
3* It does not affect the regulation of the digestive system.	190(83.0)	28(12.2)	11(4.8)	3.05±0.7
4 Contains a high number of microorganisms.	21(9.2)	48(21.0)	160(69.8)	2.67±0.8
5 No discomfort similar to milk consumption	28(12.2)	109(47.6)	92(40.2)	2.31±0.7
6 Supports bone development.	22(9.6)	40(17.5)	167(72.9)	2.71±0.7
7* It has no therapeutic effect.	118(51.5)	65(28.4)	46(20.1)	2.40±0.9
8 It facilitates the digestion of the consumed foods.	16(7.0)	39(17.0)	174(76.0)	2.79±0.7
9* It causes cancer.	185(80.8)	27(11.8)	17(7.4)	3.07±0.9
10 It prevents pathogens from settling in the intestine.	44(19.2)	58(25.3)	127(55.5)	2.37±1.0
11 It is good for antibiotic-induced diarrhea.	27(11.8)	75(32.8)	127(55.4)	2.55±0.9
12* It causes allergic diseases.	91(39.7)	106(46.3)	32(14.0)	2.34±0.8
13 It keeps the microorganisms in the oral cavity in balance.	25(10.9)	61(26.7)	143(62.4)	2.57±0.8
14* It helps lose weight.	57(24.9)	72(31.4)	100(43.7)	3.22±0.9
15 Synthesizes vitamins (B12, folic acid).	41(17.9)	77(33.6)	111(48.5)	2.34±0.9
16 Supports bone development by increasing calcium absorption.	22(9.6)	63(27.5)	144(62.9)	2.59±0.7
17* Negatively affects oral and dental health.	163(71.2)	42(18.3)	24(10.5)	2.80±0.9
18 Regulates bowel function in the elderly.	13(5.7)	26(11.3)	190(83.0)	2.88±0.7
19* It is not safe for use in children.	109(47.6)	90(39.3)	30(13.1)	2.43±0.9
20 It keeps the microorganisms living in the intestines in balance.	13(5.7)	34(14.8)	182(79.5)	2.91±0.7

* Reverse coded expressions

Table 4. Comparison of participants' probiotic knowledge with socio-demographic characteristics

	Mean±SD	p
Gender		
Male	51.34±9.05	0.101*
Female	53.26±8.38	
Income level		
Income lower than expenses	51.23±6.11	0.572**
Income and expenses are equal to each other	52.37±9.51	
Income higher than expenses	53.22±7.99	
Father education level		
Literate	45.20±13.46	0.130**
Primary school	53.98±7.86	
High School	52.47±8.60	
University	51.98±8.83	
Mother education level		
Literate	48.45±12.16	0.216**
Primary school	53.43±8.76	
High School	51.47±8.41	
University	52.87±8.17	
Chronic disease status		
Has a chronic disease	53.23±9.01	0.542*
None	52.29±8.65	
Knowing what the term probiotic is...		
Knows	52.90±8.47	0.006*
Does not know	46.94±9.85	
Knowing the microorganism content of probiotic foods		
Knows	53.63±8.74	0.068*
Does not know	51.52±8.59	
Consumption of probiotic-containing foods		
I've never heard of or used it before	46.11±6.80	0.001**
Heard of it but never used it	50.44±7.00	
Tried several times	51.73±7.88	
Rarely/Sometimes	53.37±7.07	
Frequently	57.03±13.22	
Recommendation of probiotic foods		
Recommend	54.75±8.97	0.001**
Not recommend	47.21±11.34	
Undecided	50.59±6.68	

*independent T testi **Oneway Anova

such as gastrointestinal disorders, cancers, immune system disorders, hypertension, allergies, atopic eczema and obesity (4, 5, 14). Despite the abundance of data supporting the health benefits of probiotics and the increasing availability of natural/fortified probiotic foods, consumption of these products remains below recommended levels. This discrepancy may be due to a lack of knowledge among doctors or a lack of trust in probiotics.

Physicians' and other healthcare professionals' knowledge of probiotics and the beneficial effects of different probiotic products is an important area for research. In this regard, the present study was considered an essential contribution to the literature. Almost all final-year medical students who participated in the study knew what probiotics were. However, over half of them had never used probiotics, and only half recommended them to their peers and patients. This shows that although students are theoretically aware of probiotics, they do not make sufficient use of this information in their

daily lives.

In a study conducted in Iran to emphasize the importance of probiotics in health promotion, three-quarters of health sciences students correctly defined the term probiotic, and more than half of them knew the beneficial effects of probiotics on health (15). Another study conducted on university students found that half of the students had knowledge about probiotic foods (16). A survey on probiotics involving healthcare professionals and university students in India demonstrated that medical students had a higher knowledge of probiotics compared to dietetics and pharmacy students. (17). This supports the idea that medical students have a theoretically high level of knowledge about probiotics.

Female students were more familiar with the term 'probiotic food' than male students, according to Koçak and Kalkan (16). However, in another study conducted at a medical faculty (17), no difference was found between the knowledge levels of male and female students. In this study, male and female intern

doctors exhibited similar levels of knowledge regarding the term 'probiotic' and the microorganisms contained in these foods.

In studies conducted throughout the country, the frequency of probiotic consumption has been reported to range between 45% and 52% (18, 19). Natural probiotics, such as milk, yoghurt, vinegar, pickles, and probiotic-added yoghurts are frequently consumed in society. Additionally, sachet/drop forms of probiotics sold in pharmacies are also popular choices (7,18,19). Most medical faculty students also stated yoghurt and other dairy products are commonly available probiotic products (15). Women have more knowledge about probiotic-containing products than men and are more likely to consume probiotics (20). Again, the frequency of probiotic consumption was higher in those with higher education levels and socio-economic status (21). A study of food technology students found that only a third (of the students) consumed probiotic products (11). Gender was not a determining factor in the frequency of probiotic consumption, as evidenced by Koçak's study (16). The present study found that more than half of the participants did not consume probiotic foods, and there was no discernible relationship between socio-demographic factors such as gender or income level and probiotic food consumption. This lack of association could be attributed to the study's focus on medical students with similar levels of knowledge.

In a study evaluating the knowledge and consumption of probiotic foods among adults, 64.5% of participants reported familiarity with the term 'probiotic food', while 73.6% reported actual consumption of such foods. Only 21% of them reported receiving information about probiotic foods from healthcare professionals (22). A Canadian study from 2001 revealed that only one-third of family physicians recommended probiotics to their patients after antibiotic use (23). However, a subsequent primary care study in 2015 reported a significant shift, with three-quarters of family doctors recommending probiotics to their patients for various reasons (24). Similarly, the majority of family physicians in our country recommend probiotics to their patients, with more than half suggesting these products, particularly for infants and children (7). Healthcare professionals acknowledge the valuable role of probiotics in clinical medicine and recommend their use based on research findings. (8,25). Over time, as the literature continues to expand, there is an increasing trend among doctors recommending probiotics. This study found that students' overall knowledge of probiotics was above average, and there was no significant difference in knowledge levels between male and female students. In contrast, a prior study at a different medical school reported that half of the participants demonstrated a high level of general knowledge about probiotics, with female students having a higher level of knowledge than males (15). Additionally, another study suggested that as students' monthly income increases, their level of knowledge about probiotic products increases (26). In a study involving 1066 healthcare professionals from 30 countries, most participants' knowledge of probiotics was defined as fair or good, and the

knowledge levels of male and female participants were found to be similar (9).

As a result, this study revealed that although the probiotic knowledge levels of senior medical students were high, their personal consumption habits and attitudes towards recommending probiotics to patients were moderate. With relatively few side effects, probiotics have demonstrated significant benefits in preventing and treating various diseases. People should take the appropriate probiotic foods as recommended by trained doctors and healthcare professionals, whether they are healthy or sick.

Conflict of interest: A author declares that there is no conflict of interest between the authors of the article.

Financial conflict of interest: Author declares that he did not receive any financial support in this study.

Address correspondence to: Nur Demirbas, Necmettin Erbakan University, Medical Faculty, Family Medicine, Konya, Türkiye

e-mail: gndemirbas76@hotmail.com



REFERENCES

1. FAO (Food and Agriculture Organization of the United Nations and World Health Organization). Guidelines for the Evaluation of Probiotics in Food, Food and Agriculture Organization. Rome 2002. available at: <ftp://ftp.fao.org/es/esn/food/wgreport2.pdf> Date of access: 20.10.2021
2. Kırdar SS. Effects of Probiotics on Nutrition and Health. *Diabetes and Life* 2009;1(1):52-9
3. Nagpal R, Kumar A, Kumar M, et al. Probiotics, their health benefits and applications for developing healthier foods: A review. *FEMS Microbiol Lett.* 2012;334(1):1-15.
4. Draper K, Ley C, Parsonnet J. Probiotic guidelines and physician practice: A cross-sectional survey and overview of the literature. *Benef Microbes.* 2017;8(4):507-19.
5. Ozdemir M, Demircili ME, Feyzioglu B, et al. Investigation of Acute Viral Gastroenteritis Factors in Patients with Diarrhea. *Selcuk Med J* 2013;29(3):127-30.
6. Sniffen JC, McFarland LV, Evans CT, et al. Choosing an appropriate probiotic product for your patient: An evidence-based practical guide. *PLoS One.* 2018;13(12):e0209205.
7. Altindis M, İnci MB, Elmas B, et al. Knowledge, Attitudes and Behaviors of Family Physicians, Pediatricians and Pharmacists About Probiotic Use. *J Biotechnol and Strategic Health Res* 2018;2(2):108-16.
8. Ensminger A, Haque RS. Clinical Use of Probiotics: A Survey of Physicians' Beliefs and Practice Patterns. *J. Am. Diet. Assoc* 2011;11(1):A41.
9. Fijan S, Frauwallner A, Varga L, et al. Health Professionals' Knowledge of Probiotics: An International Survey. *Int J Environ Res Public Health* 2019;16(17):3128.
10. Aydın M, Acıkgöz I, Simsek B. Determination of Probiotic Product Consumption of Isparta Süleyman Demirel University Students and the Level of Knowledge of Probiotic Concept. *Electronic Journal of Food Technologies* 2010;5(2):1-6.
11. Derin DO, Keskin S. Determination of Probiotic Product Consumption Status of Food Engineering Students: The Case of Ege University. *GIDA* 2013;38(4):215-22.

12. Derin DO, Erdem N. Determination of Probiotic Food Consumption Habits of University Students: The Example of Selçuk University. *GUSBD* 2018; 7(1): 87-93.
13. Gulec M. Secondary School Teachers' Level of Knowledge about Probiotic Products and Their Consumption of Probiotic Products: Ceyhan District Example, Gazi University Institute of Educational Sciences Department of Family and Consumer Sciences Education Master's Thesis, Ankara, 2015.
14. Ragan MV, Wala SJ, Goodman SD, et al. Next-Generation Probiotic Therapy to Protect the Intestines From Injury. *Front Cell Infect Microbiol* 2022;12:863949.
15. Payahoo L, Nikniaz Z, Mahdavi R, et al. Perceptions of medical sciences students towards probiotics. *Health Promot Perspect* 2012;2(1):96-102.
16. Kocak H, Kalkan S. Determination of Probiotic Food Consumption Habits of University Students-Bahce Vocational High School Example. *DBHAD International Journal of Nutrition Research* 2014;1(1):27-37.
17. Soni R, Tank K, Jain N. Knowledge, attitude and practice of health professionals about probiotic use in Ahmedabad. *Nutr Food Sci* 2018;48(2):125-35.
18. Yucelsengun I, Kirmizigul A, Ozaydin I, et al. Determination of Consumers' Knowledge Levels and Consumption Status of Probiotic and Prebiotic Foods: *GIDA* 2019;45(1):103-14.
19. Kose B, Aydın A, Ozdemir M, et al. Determination of the knowledge level and consumption of probiotic, prebiotic and synbiotics on healthcare professionals. *Journal of Academic Gastroenterology* 2019;18(2):67-72.
20. Khalesi S, Bellissimo N, Vandelanotte C, et al. A review of probiotic supplementation in healthy adults: helpful or hype? *Eur J Clin Nutr* 2019;73(1):24-37.
21. Kim CE, Yoon LS, Michels KB, et al. The Impact of Prebiotic, Probiotic, and Synbiotic Supplements and Yogurt Consumption on the Risk of Colorectal Neoplasia among Adults: A Systematic Review. *Nutrients* 2022;14(22):4937.
22. Arduzlar Kagan D, Ozlu T, Yurttas H. A Study on Adult Individuals' Knowledge and Consumption of Probiotic Foods. *European Journal of Science and Technology* 2019;17:556-63.
23. Edmunds L. The underuse of probiotics by family physicians *CMAJ* 2001;164 (11):1577.
24. Jordan D, Johnson N, Thomas L. Probiotics in primary care: A survey of health professionals. *Pract Nurs* 2015;26(4):550-4.
25. Wilson Z, Whitehead K. A cross-sectional survey to assess healthcare professionals' attitudes to and understanding of probiotics. *Clinical Nutrition ESPEN* 2019;34(1):104-09.
26. Arpa Zemzemoglu TE, Uludag E, Uzun S. Determination of probiotic knowledge level and consumption status of university students. *GIDA* 2019;44(1):118-30.

Monocyte/High-Density Lipoprotein Ratio: An Indicator of Oxidative Stress and Disease Severity in Lichen Planus Patients

Monosit/Yüksek Yoğunluklu Lipoprotein Oranı: Liken Planus Hastalarında Oksidatif Stres ve Hastalık Şiddetinin Bir Göstergesi

 Selami Aykut Temiz¹,  Munise Daye¹

¹Necmettin Erbakan University, Medical Faculty, Department of Dermatology, Konya, Türkiye

ÖZET

Amaç: Liken planusun etyopatogenezi tam olarak bilinmemekle birlikte ilaçlar, enfeksiyonlar, otoimmün faktörler, genetik faktörler ve oksidatif stres mekanizmaları gibi çeşitli faktörlerle ilişkili olduğu fark edilmiştir. Oksidatif stres, kanser ve kronik inflamatuvar hastalıklar gibi çeşitli hastalıkların patogenezinde rol oynar. Tam kan sayımı parametreleri, kronik inflamatuvar süreçlerle ilişkili birçok hastalık için oksidatif stres tanısı biyobelirteçleri olarak kullanılabilir. Son dönemde yapılan klinik çalışmalarda monosit/yüksek yoğunluklu lipoprotein (HDL) oranının birçok kronik dermatozda oksidatif stresin bir belirteci olarak faydalı olabileceği gösterilmiştir. Ancak bildiğimiz kadarıyla liken planus vakalarında oksidatif stres ile monosit/HDL oranı arasındaki ilişki literatürde henüz çalışılmamıştır.

Gereçler ve Yöntem: Şubat 2018 ile Temmuz 2021 tarihleri arasında üçüncü basamak bir üniversite hastanesinin dermatoloji kliniğinde liken planus tanısıyla takip edilen olguların dosyaları retrospektif olarak incelendi. 99'u histopatolojik ve klinik olarak doğrulanmış liken planus olgusu ve 102 yaş ve cinsiyet uyumlu kontrol grubu dahil olmak üzere toplam 201 katılımcı vardı.

Bulgular: Monosit değerleri ($p=0,16$) ve HDL düzeyleri ($p=0,26$) her iki grup arasında istatistiksel olarak farklı bulunmazken, monosit/yüksek yoğunluklu lipoprotein (HDL) oranının liken planus grubunda kontrol grubuna göre istatistiksel olarak anlamlı derecede yüksek olduğu tespit edildi ($p=0,04$). Oral liken planus olgularında oral hastalık şiddet skoru ile ürik asit değerleri arasında korelasyon bulunmazken ($p=0,11$), oral hastalık şiddet skoru ile CRP ($p=0,03$) ve monosit/yüksek yoğunluklu lipoprotein (HDL) oranı ($p=0,001$) değerleri arasında korelasyon saptandı.

Sonuç: Çalışmada liken planus hastalarında monosit/yüksek yoğunluklu lipoprotein (HDL) düzeylerinin kontrol grubuna göre anlamlı derecede yüksek olduğunu bulduk. Yine monosit/yüksek yoğunluklu lipoprotein (HDL) oranını oral mukoza hastalığı şiddet skoru ile CRP'ye göre daha iyi korelasyon gösterdiğini tespit ettik. Monosit/yüksek yoğunluklu lipoprotein (HDL) oranının liken planuslu hastaların takibinde hastalık aktivitesini değerlendirmede potansiyel bir belirteç olabileceğini düşünüyoruz.

Anahtar Kelimeler: Liken planus, oral mukoza, monosit/yüksek yoğunluklu lipoprotein oranı

ABSTRACT

Aim: Although the etiopathogenesis of lichen planus is not clearly known, it has been noticed to be associated with various factors such as drugs, infections, autoimmune factors, genetic factors, and oxidative stress mechanisms. Oxidative stress is implicated in the pathogenesis of various diseases such as cancer and chronic inflammatory diseases. Complete blood count parameters can be utilized as oxidative stress diagnostic biomarkers for many diseases related to chronic inflammatory processes. In recent clinical studies, it has been shown that the monocyte/high-density lipoprotein (HDL) ratio (MHR) may be useful as a marker of oxidative stress in many chronic dermatoses. However, as far as we know, the relationship between oxidative stress and monocyte/HDL ratio in lichen planus cases has not been studied in the literature yet.

Materials and Methods: The files of cases who were followed up with lichen planus in the dermatology clinic of a tertiary university hospital between February 2018 and July 2021 were reviewed retrospectively. There were 201 participants in the analysis, including 99 histopathologically and clinically verified LP cases and 102 age and sex-matched controls.

Results: Monocyte values ($p=0.16$) and HDL levels ($p=0.26$) were not statistically different for both groups, but the MHR value ($p=0.04$) was detected to be statistically significantly higher in the lichen planus group than in the control group. In oral lichen planus cases, whilst the oral disease severity score and uric acid values were not correlated ($p=0.11$), the oral disease severity score was correlated with the CRP ($p=0.03$) and MHR ($p=0.001$) values.

Conclusions: In the study, we found that MHR levels were significantly higher in lichen planus patients compared to the control group. Again, we detected that MHR had a better correlation with oral mucosa disease severity score than CRP. We suggest that MHR may be a potential index to assess disease activity in follow-up patients with lichen planus.

Keywords: Lichen planus, oral mucosa, monocyte/high-density lipoprotein ratio

Geliş Tarihi/Received: 15 Kasım/November 2023 **Kabul Tarihi/Accepted:** 29 Şubat/February 2024 **Yayın Tarihi/Published Online:** 25 Mart/March 2024

Sorumlu Yazar/Corresponding Author: Selami Aykut Temiz, Necmettin Erbakan University, Medical Faculty, Department of Dermatology, Konya, Türkiye
e-mail: aykutmd42@gmail.com

Atf yapmak için/ Cite this article as: Temiz SA, Daye M. Monocyte/High-Density Lipoprotein Ratio: An Indicator of Oxidative Stress and Disease Severity in Lichen Planus Patients. Selcuk Med J 2024;40(1): 29-33

Disclosure: Author has not a financial interest in any of the products, devices, or drugs mentioned in this article. The research was not sponsored by an outside organization. Author has agreed to allow full access to the primary data and to allow the journal to review the data if requested.

"This article is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0)"



INTRODUCTION

Lichen planus (LP) is an inflammatory dermatosis with characteristic histopathological and clinical properties. Lichen planus tends to affect the skin and oral mucosa but may involve the scalp, nails, anogenital, and esophagus regions. Although the etiopathogenesis of lichen planus is not clearly known, it has been noticed to be associated with various factors such as drugs, infections, hereditary factors, autoimmune factors, and oxidative stress mechanisms (1).

Oxidative stress is based on metabolic reactions using oxygen and indicates a disturbance in the equilibrium state of prooxidant / antioxidant reactions in alive organisms. Excessive oxidative stress can impair cellular proteins, lipids, or DNA by inhibiting the regular functions of cells. Therefore, oxidative stress is implicated in the pathogenesis of various diseases such as cancer and chronic inflammatory diseases (2). Additionally, there is much information on the role of oxidative stress in many chronic inflammatory dermatologic disorders such as acne vulgaris, psoriasis vulgaris, pemphigus vulgaris, and lichen planus (3). When the role of oxidative stress in LP, which is a chronic inflammatory disease, is investigated, it is observed that the relevant publications are mostly related to oral LP (4).

Complete blood count parameters can be utilized as oxidative stress diagnostic biomarkers for many diseases related to chronic inflammatory processes (2,3,4). In some studies, the use of some hematological parameters (eg. neutrophil) and biochemical parameters (eg. C - reactive protein, uric acid) as an indicator of oxidative stress in lichen planus has been investigated (5). In recent clinical studies, it has been shown that the monocyte/high-density lipoprotein (HDL) ratio may be useful as an indicator of oxidative stress in many chronic dermatoses (6,7,8,9). However, as far as we know, the relationship between oxidative stress and monocyte/HDL ratio (MHR) in lichen planus cases has not been studied in the literature yet. In our study, it was planned to evaluate the monocyte / HDL ratio in lichen planus cases in terms of its power to show oxidative stress and its intercourse with disease severity.

MATERIAL AND METHODS

The files of cases who were followed up with lichen planus in the dermatology clinic of a tertiary university hospital between February 2018 and July 2021 were reviewed retrospectively. Patients who were diagnosed with lichen planus histopathologically or clinically between these dates and were followed up regularly in our clinic with a lichen planus patient file were included in the study. The patients consisted of lichen ruber planus, oral lichen planus, lichen planus pigmentosus, lichen planopilaris, and hypertrophic lichen planus subtypes. Oral lichen planus; It was used only for cases with oral mucosal involvement and no cutaneous involvement. Patients with any systemic disorder (diabetes mellitus, hypertension, heart disease, hyperlipidemia, thyroid disease, etc.) or another cutaneous disease and those who received any systemic or topical treatment in the last three months were excluded.

Cases that applied to the dermatology outpatient clinic for any reason and did not have a dermatological disease and did not meet the exclusion criteria were included in our study as the control group. The reason for these cases to apply to the dermatology clinic was to get a prescription for the moisturizers they use regularly or to consult about cosmetic defects that do not cause skin disease. There were 201 participants in the analysis, including 99 histopathologically and clinically verified LP cases and 102 age and sex-matched controls.

The involved sites and pain were determined in the clinical examination according to an oral mucosa disease severity system developed by Escudier et al. 106 points is the maximum score (min, 0 – max, 106) in the scoring system (10). It was recorded patients' age, gender, areas of involvement, disease duration, and disease severity scores at the time of diagnosis from the recorded information in the patients' files. Again, it was recorded the complete blood count parameters and biochemistry parameters (triglyceride, C-reactive protein (CRP), low-density lipoprotein (LDL), high-density lipoprotein (HDL), and uric acid) requested at the time of diagnosis. In addition, the monocyte/HDL ratio was obtained and recorded.

Ethics committee confirmation

All the operations followed the Helsinki declaration and the local ethics committee confirmation was ensured for the study (Decision date and number: 2021/3423).

Statistical analysis

The associations between the numerical data were interpreted with Student's t-test for independent examples when normality assumptions were supplied and nonparametric equals of the same tests in cases where normality was not reached. The One-way ANOVA test was utilized for comparison between lichen subgroups. The chi-square test specified the associations between categorical factors. Pearson's correlation analysis was applied to the relationship between parameters. The p-value of smaller than 0.05 was taken as statistically significant.

RESULTS

A total of 201 participants, including 99 lichen cases and 102 control cases, were included in the study. 56 (56.6%) lichen planus patients were women. The mean age of the lichen cases was 51 ± 14.3 (18-86) and the average disease period was 40.2 ± 33.9 months. 57 (56%) of the participants in the control group were female, and the mean age of the control group was 50.7 ± 13.2 . There was no statistically significant distinction between the two groups in terms of age and sex. When the lichen planus group and control group data were compared, it was found that triglyceride ($p=0.01$), total cholesterol ($p=0.02$), and CRP values ($p=0.05$) in the lichen group were statistically significantly higher than the control group. Monocyte values ($p=0.16$) and HDL levels ($p=0.26$) were not statistically different for both groups, but the MHR value ($p=0.04$) was detected to be statistically significantly higher in the lichen planus group than in the control group. The histogram of MHR values of the lichen planus group and the control group is shown in Figure 1. The collation of the lichen planus group and control group

data was summarized in Table 1.

When the subgroups of lichen planus cases were evaluated according to their clinical types, it was found that the uric acid value ($p=0.002$) was statistically significantly different between the clinical groups, but the CRP ($p=0.16$) and MHR values ($p=0.98$) were not different. The ratios of lichen planus clinical types and the relationship between MHR, CRP, uric acid levels

and clinical types are shown in Table 2.

In oral lichen planus cases, while the oral disease severity score and uric acid values were not correlated ($p=0.11$), the oral disease severity score was correlated with the CRP ($p=0.03$) and MHR ($p=0.001$) values. The correlation graph between oral mucosa disease severity score and MHR value is shown in Figure 2.

Table 1. Comparison of the lichen planus and control group

	Lichen planus group	Control group	p value
Age	51±14.3	50.7±13.2	0.86
Gender (female), n (%)	56 (56.6%)	57 (56%)	0.9
WBC ($\times 10^3$ /ml)	8.59±2.74	7.95±2.34	0.08
Neutrophil ($\times 10^3$ /ml)	5.78±4.8	4.84±1.35	0.07
Monocyte ($\times 10^3$ /ml)	0.52±0.32	0.46±0.3	0.16
HDL(mg/dl)	46.5±9.93	48.1±10	0.26
MHR	0.012±0.0085	0.0099±0.006	0.04
LDL(mg/dl)	106.2±36.49	99.65±32.4	0.18
Total cholesterol (mg/dl)	187.25±12.7	173.35±42.1	0.02
Triglyceride (mg/dl)	161.54±85.1	133±71	0.01
Uric acid (mg/dL)	4.55±1.12	4.27±1.35	0.1
CRP (mg/L)	2.92±3.17	2.18±2.1	0.05

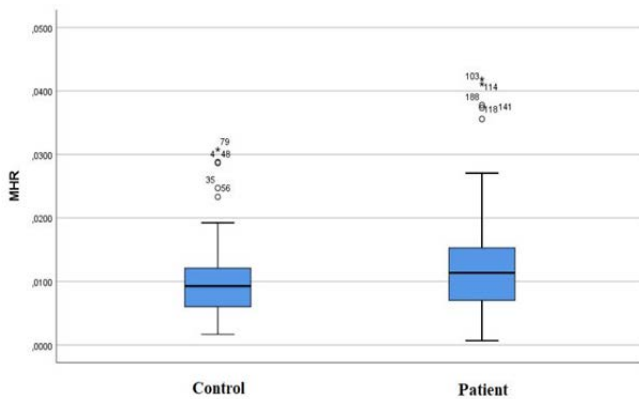


Figure 1. Monocyte/HDL cholesterol ratio (MHR) for the patients and controls

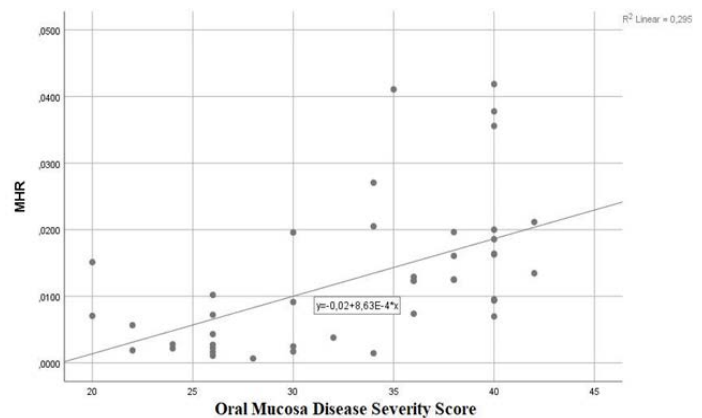


Figure 2. The correlation graph between oral mucosa disease severity score and MHR value

Table 2. Lichen planus clinical types and MHR, CRP, Uric acid levels

Clinical type	Number of patients, n (%)	MHR	p value	CRP (mg/L)	p value	Uric acid (mg/dL)	p value
Lichen ruber planus	51 (51.5%)	0.012±0.008	0.98	2.42±3.1	0.16	4.48±1.1	0.002
Oral lichen planus	29 (29.3%)	0.012±0.011		3.51±3.1		5.12±1.05	
Lichen planus pigmentosus	7 (7.1%)	0.011±0.003		5.17±4.6		4.13±1.04	
Lichen planopilaris	6 (6.1%)	0.01±0.003		2.9±2.76		4.1±0.4	
Hypertrophic lichen planus	6 (6.1%)	0.012±0.004		1.7±0.65		3.38±0.9	

DISCUSSION

In the study, we found that MHR levels were significantly higher in lichen planus cases compared to the control group. Again, we detected that MHR had a better correlation with oral mucosa disease severity score than CRP. We suggest that MHR may be a potential index to assess disease activity in follow-up patients with lichen planus. To the best of our knowledge, this is the first study in the literature to evaluate the relationship between lichen planus and MHR. The limitation of our research is its retrospective character.

In recent years, the relationship between metabolic syndrome and lichen planus has been clearly demonstrated (11). Again, the incidence of hyperlipidemia was detected to be higher in lichen planus cases than in the normal population (12,13). Although we did not examine all metabolic syndrome parameters in the study, triglyceride and total cholesterol values were detected to be statistically significantly higher in lichen planus patients compared to the control group, in line with the literature.

Lichen planus is a common mucocutaneous disease of unknown etiology, in which cytotoxic T lymphocytes cause chronic inflammation and trigger apoptosis of epithelial cells (1,2,14). The factors blamed for the etiology of lichen planus are oxidative stress and systemic inflammation, as in many diseases (2,14). The relationship between oxidative stress and systemic inflammation in the pathogenesis of many diseases, especially cancer and chronic inflammatory diseases, is well known (2,3,15). There are many studies in the literature investigating hemogram and biochemistry parameters as markers of oxidative stress and systemic inflammation. Neutrophils and monocytes are known as cost-effective and simple hemogram parameters that show systemic inflammation in many diseases (16). It can be considered as a systemic inflammation marker alone or with ratios such as neutrophil/lymphocyte, and monocyte / lymphocyte ratios (17,18). In our study, although neutrophil and monocyte counts were higher in the lichen planus group than in the control group, they were not statistically significant.

In recent studies, it has been argued that the increase in MHR value may increase more significantly than other inflammatory parameters in various chronic inflammatory diseases such as metabolic syndrome, diabetes mellitus, and coronary artery disease (19,20). It has also been argued that MHR value can be used as a systemic inflammation marker in many dermatological diseases such as acne (6,9,21), psoriasis (8), behçet's disease (22), and vitiligo (7). Önder et al. (21) argued that the increase in MHR in acne cases using isotretinoin may be more significant than other laboratory parameters in predicting systemic inflammation. In our study, although there was no significant difference in monocyte and HDL levels in lichen planus cases compared to the control group, a statistically significant difference was found in MHR levels. Again, among the systemic inflammation values (CRP, uric acid, MHR) we determined in our data, MHR values were found to be more significant than others between lichen planus and the control group.

In the literature, oral lichen planus has been found to be the type in which systemic inflammation and its consequences (such as metabolic syndrome, diabetes mellitus, hyperlipidemia) are observed the most among the sub-clinical types of lichen planus (1,11). In our study, the lichen planus subclinical types were compared in terms of inflammatory parameters, it was found that the MHR value was higher in the oral lichen planus group, but it was not significant. In terms of other systemic inflammatory markers (CRP, uric acid), it was seen that there was a statistically significant difference between subgroups only in uric acid values. It was determined that this statistical difference was due to the high uric acid value in the oral lichen planus group. Consistent with the literature, our study concluded that systemic inflammation may be more prominent in the oral lichen planus group.

In the literature, Demirbař et al. (7) found a correlation between vitiligo severity and MHR. In our study, the correlation between disease severity score and systemic inflammatory markers (CRP, MHR, Uric acid) in oral lichen planus patients were examined, it was detected that CRP and MHR were positively correlated with oral mucosal disease severity score. Remarkably, the positive correlation of MHR with disease severity was found to be a stronger indicator than CRP.

CONCLUSION

In our study, MHR levels in lichen planus were significantly higher than in the control group. Again, it was observed that MHR had a better correlation with the oral mucosal disease severity score in lichen planus than CRP. We think that MHR may be a potential index to evaluate disease activity in the follow-up of patients with lichen planus. Additional studies with larger exemplary sizes are needed to strengthen the conclusions drawn in this study and the clinical significance of MHR.

Conflict of interest: Author declares that there is no conflict of interest between the authors of the article.

Financial conflict of interest: Author declares that he did not receive any financial support in this study.

Address correspondence to: Selami Aykut Temiz, Necmettin Erbakan University, Medical Faculty, Department of Dermatology, Konya, Türkiye
e-mail: aykutmd42@gmail.com

REFERENCES

1. Dayer M, Temiz SA, Iřık B, et al. Relationship between acanthosis nigricans, acrochordon and metabolic syndrome in patients with lichen planus. International Journal of Clinical Practice 2021;75(10):e14687.
2. Ergun S, Trořala řC, Warnakulasuriya S, et al. Evaluation of oxidative stress and antioxidant profile in patients with oral lichen planus. Journal of oral pathology & medicine 2011;40(4):286-93.
3. Yesilova Y, Ucmak D, Selek S, et al. Oxidative stress index may play a key role in patients with pemphigus vulgaris. J Eur Acad Dermatol Venereol 2013;27:465-7.

4. Agha-Hosseini F, Mirzaii-Dizgah I, Mikaili S, et al. Increased salivary lipid peroxidation in human subjects with oral lichen planus. *Int J Dent Hyg* 2009; 7: 246-50.
5. An I, Ucmak D, Ozturk M. Evaluation of neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte ratio and mean platelet volume in patients with lichen planus. *Annals of Medical Research* 2019;26(2):161-4.
6. Turkmen D, Altunisik N, Sener S. Investigation of monocyte HDL ratio as an indicator of inflammation and complete blood count parameters in patients with acne vulgaris. *International Journal of Clinical Practice* 2020;74(12): e13639.
7. Demirbaş A, Elmas ÖF, Atasoy M, et al. Can monocyte to HDL cholesterol ratio and monocyte to lymphocyte ratio be markers for inflammation and oxidative stress in patients with vitiligo? A preliminary study. *Archives of Dermatological Research* 2020;1-8.
8. Sirin MC, Korkmaz S, Erturan I, et al. Evaluation of monocyte to HDL cholesterol ratio and other inflammatory markers in patients with psoriasis. *Anais Brasileiros de Dermatologia* 2020;95:575-82.
9. Kutlu Ö. Effect of isotretinoin treatment on the inflammatory markers in patients with acne vulgaris: Can monocyte/HDL be a new indicator for inflammatory activity of isotretinoin treatment? *Cutaneous and ocular toxicology* 2020;39(1):67-70.
10. Escudier M, Ahmed N, Shirlaw P, et al. A scoring system for mucosal disease severity with special reference to oral lichen planus. *British Journal of Dermatology* 2007;157(4):765-70.
11. Daye M, Temiz SA, Isık B. The relationship between lichen planus and metabolic syndrome. *Journal of cosmetic dermatology* 2021;20(8):2635-9.
12. Krishnamoorthy B, Suma GN, Mamatha NS, et al. Lipid profile and metabolic syndrome status in patients with oral lichen planus, oral lichenoid reaction and healthy individuals attending a dental college in northern India-a descriptive study. *Journal of clinical and diagnostic research: JCDR* 2014;8(11):ZC92.
13. Dave A, Shariff J, Philipone E. Association between oral lichen planus and systemic conditions and medications: Case-control study. *Oral Diseases* 2021;27(3):515-24.
14. Le Cleach L, Chosidow O. Lichen planus. *New England Journal of Medicine* 2012;366(8):723-32.
15. Sosa V, Moliné T, Somoza R, et al. Oxidative stress and cancer: An overview. *Ageing research reviews* 2013;12(1):376-90.
16. Tezcan D, Turan Ç, Yılmaz S, et al. What do simple hematological parameters tell us in patients with systemic sclerosis? *Acta Dermatovenerol Alp Pannonica Adriat* 2020;29(3):101-7.
17. Mazza MG, Lucchi S, Rossetti A, et al. Neutrophil-lymphocyte ratio, monocyte-lymphocyte ratio and platelet-lymphocyte ratio in non-affective psychosis: A meta-analysis and systematic review. *The World Journal of Biological Psychiatry* 2020;21(5):326-38.
18. Ataseven A, Temiz SA, Eren G, et al. Comparison of anti-TNF and IL-inhibitors treatments in patients with psoriasis in terms of response to routine laboratory parameter dynamics. *Journal of Dermatological Treatment* 2020;1-6.
19. Battaglia S, Scialpi N, Berardi E, et al. Gender, BMI and fasting hyperglycaemia influence Monocyte to-HDL ratio (MHR) index in metabolic subjects. *PloS one* 2020;15(4):e0231927.
20. Cetin EHO, Cetin MS, Canpolat U, et al. Monocyte/HDL-cholesterol ratio predicts the definite stent thrombosis after primary percutaneous coronary intervention for ST-segment elevation myocardial infarction. *Biomarkers in medicine* 2015;9(10):967-77.
21. Önder S, Ozturk M. Can monocyte/HDL show inflammatory activity of isotretinoin treatment in acne patients? *Cutaneous and ocular toxicology* 2020;39(2):111-4.
22. Acikgoz N, Kurtoğlu E, Yagmur J, et al. Elevated monocyte to high-density lipoprotein cholesterol ratio and endothelial dysfunction in Behçet disease. *Angiology* 2018;69(1):65-70.

OPEN

ARAŞTIRMA MAKALESİ / RESEARCH ARTICLE

Intra- and Inter-Rater Reliability of Magnetic Resonance Imaging Measurements of Supraspinatus Muscle Thickness, Acromiohumeral Distance, and Coracohumeral Distance in Patients with Shoulder Pain

Omuz Ağrısı Olan Hastalarda Supraspinatus Kas Kalınlığı, Akromiohumeral Mesafe ve Korakohumeral Mesafenin Manyetik Rezonans Görüntüleme Ölçümlerinin Değerlendiriciler İçi ve Değerlendiriciler Arası Güvenilirliği

¹Burak Tayyip Dede¹, ²Muhammed Oguz¹, ³Berat Bulut¹, ⁴Fatih Bagcier², ⁵Mustafa Turgut Yildizgoren³, ⁶Ebru Aytekin¹

¹Istanbul Training and Research Hospital, Physical Medicine and Rehabilitation Clinic, Istanbul, Türkiye

²Çam and Sakura City Hospital, Physical Medicine and Rehabilitation Clinic, Istanbul, Türkiye

³Konya City Hospital, Physical Medicine and Rehabilitation Clinic, Konya, Türkiye

ÖZET

Amaç: Bu çalışmada omuz ağrısında supraspinatus kas kalınlığı (SKK), akromiohumeral mesafe (AHM) ve korakohumeral mesafenin (KHM) değerlendiriciler içi ve değerlendiriciler arası güvenilirlik katsayılarının değerlendirilmesi amaçlanmaktadır.

Gereçler ve Yöntem: Bu retrospektif çalışma Ocak 2023 ile Ocak 2024 tarihleri arasında tek merkezde gerçekleştirildi. Çalışmaya omuz ağrısı olan 80 hasta dahil edildi. Supraspinatus kas kalınlığı, akromiohumeral mesafe ve korakohumeral mesafe, bir hafta arayla iki gözlemci tarafından elde edildi. Sınıf içi korelasyon katsayısı (ICC), minimum tespit edilebilir değişiklik ve standart ölçüm hatası hesaplandı.

Bulgular: Koronal kesitlerde değerlendirilen AHM değerlendiriciler içi güvenilirlik sonuçları mükemmeldi (Değerlendirici 1, ICC=0,96; %95 GA, 0,94-0,97; Değerlendirici 2 ICC=0,75; %95 GA, 0,61-0,84). Sagittal kesitlerde değerlendirilen AHM değerlendiriciler içi güvenilirlik sonuçları mükemmeldi (Değerlendirici 1, ICC=0,94; %95 GA, 0,91-0,96; Değerlendirici 2 ICC=0,77; %95 GA, 0,64-0,85). Koronal kesitler kullanılarak ölçülen KHM sonuçları iyiydi (Değerlendirici 1, ICC=0,85; %95 GA, 0,76-0,90; Değerlendirici 2 ICC=0,82; %95 GA, 0,71-0,88). Koronal kesitler kullanılarak ölçülen SKK ölçüm sonuçları mükemmeldi (Değerlendirici 1, ICC=0,98; CI, 0,98-0,99; Değerlendirici 2, ICC=0,89; %95 CI, 0,82-0,93). Değerlendiriciler arası güvenilirlik değerleri AHM-Koronal (ICC= 0,75; %95 GA, 0,61-0,84) ve AHM-Sagittal için (ICC=0,86; %95 GA, 0,79-0,91) iyi, koronal kesitlerde değerlendirilen KHM ölçümleri için orta (ICC=0,74; %95 GA, 0,58-0,83) ve koronal kesitlerde değerlendirilen SKK için mükemmeldi (ICC=0,92; %95 GA, 0,87-0,95).

Sonuç: Bu bulgular, supraspinatus kas kalınlığı, akromiohumeral mesafe ve korakohumeral mesafenin manyetik rezonans görüntüleme ölçümlerinin omuz ağrısı olan hastaların klinik değerlendirmesinde güvenilir ve tutarlı olabileceğini göstermektedir.

Anahtar Kelimeler: Güvenilirlik, omuz ölçümü, manyetik rezonans görüntüleme

ABSTRACT

Aim: The aim of this study was to evaluate the intra- and inter-rater reliability coefficients of the supraspinatus muscle thickness (SMT), acromiohumeral distance (AHD), and coracohumeral distance (CHD) in patients with shoulder pain.

Materials and Methods: This retrospective study included 80 patients who presented with complaints of shoulder pain at a single centre between January 2023 and January 2024. The supraspinatus muscle thickness, acromiohumeral distance, and coracohumeral distance measurements were obtained one week apart by two observers. The intraclass correlation coefficient (ICC), minimum detectable change, and standard error of measurement were subsequently calculated.

Results: AHD intra-rater reliability results evaluated on coronal sections were excellent (Rater 1, ICC=0.96; 95% CI, 0.94-0.97; Rater 2 ICC=0.75; 95% CI, 0.61-0.84). AHD intra-rater reliability results evaluated on sagittal sections were excellent (Rater 1, ICC=0.94; 95% CI, 0.91-0.96; Rater 2 ICC=0.77; 95% CI, 0.64-0.85). The results of CHD measured using coronal sections were good (Rater 1, ICC=0.85; 95% CI, 0.76-0.90; Rater 2 ICC=0.82; 95% CI, 0.71-0.88). SMT measurement results measured using coronal sections were excellent (Rater 1, ICC=0.98; CI, 0.98-0.99; Rater 2, ICC=0.89; 95% CI, 0.82-0.93). The inter-rater reliability values were good for AHD-Coronal (ICC= 0.75; 95% CI, 0.61-0.84) and AHD-Sagittal (ICC=0.86; 95% CI, 0.79-0.91), were fair for CHD evaluated on coronal sections (ICC=0.74; %95 CI, 0.58-0.83), and were excellent for SMT evaluated on coronal sections (ICC=0.92; 95% CI, 0.87-0.95).

Conclusion: These results suggest that magnetic resonance imaging measurements of the supraspinatus muscle thickness and acromiohumeral distance can be reliable and consistent for the clinical evaluation of patients with shoulder pain.

Keywords: Reliability, shoulder measurement, magnetic resonance imaging

Geliş Tarihi/Received: 13 Ocak/January 2024 **Kabul Tarihi/Accepted:** 20 Mart/March 2024 **Yayın Tarihi/Published Online:** 25 Mart/March 2024

Sorumlu Yazar/Corresponding Mustafa Turgut Yildizgoren, Konya City Hospital, Physical Medicine and Rehabilitation Clinic, Konya, Türkiye
e-mail: ftr.mustafaturgut@hotmail.com

Atıf yapmak için/ Cite this article as: Dede BT, Oguz M, Bulut B, Bagcier F, Yildizgoren MT, Aytekin E. Intra- and Inter-Rater Reliability of Magnetic Resonance Imaging Measurements of Supraspinatus Muscle Thickness, Acromiohumeral Distance, and Coracohumeral Distance in Patients With Shoulder Pain. Selcuk Med J 2024;40(1): 34-38

Disclosure: Author has not a financial interest in any of the products, devices, or drugs mentioned in this article. The research was not sponsored by an outside organization. Author has agreed to allow full access to the primary data and to allow the journal to review the data if requested.

"This article is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0)"



INTRODUCTION

The shoulder joint is susceptible to injuries due to its extensive range of motion and frequent use in daily living activities. Shoulder pain is a frequently reported issue in the population and is commonly seen in rehabilitation clinics. The rotator cuff (RC) is the umbrella term for the muscle group surrounding the shoulder, and this group of muscles and tendons is responsible for stabilizing the shoulder joint and facilitating arm and shoulder movement. RC problems include inflammation, tears, and subacromial impingement syndrome (SAIS), which is the most common cause of shoulder pain (1). Physical examination and conventional imaging methods such as direct radiographs (X-ray), ultrasound (US), computed tomography (CT), and magnetic resonance imaging (MRI) are usually sufficient for the diagnosis of RC pathologies (2). While a diagnosis can often be made through examination, imaging techniques are necessary to validate the diagnosis. In recent years, studies have shown that measurements of acromio-humeral distance (AHD), coraco-humeral distance (CHD) and supraspinatus muscle thickness (SMT) are useful in understanding the underlying pathology in RC problems. In the literature, AHD has been associated with SAIS and RC tears (3-10) and CHD with RC tears (9,11,12). The relationship between SMT and SAIS has been examined in numerous studies (13). In all those studies, AHD, CHD, and SMT measurements were made using X-ray, US, CT, or MRI images. Despite being a controversial issue in the literature, some studies have claimed that MRI is the most valuable imaging method for patients with shoulder pain (14). However, the reliability of measurements and the selected imaging method remain topics that need clarification.

There are studies in the literature investigating the reliability of AHD measurements made with direct radiography (15,16). Similarly, numerous studies have explored the reliability of AHD, CHD, and SMT measurements using ultrasonography (17-21). However, while studies have evaluated the reliability of AHD and CHD measurements made on MRI images of patients with RC pathology, there is currently a gap in research regarding the reliability of SMT measurements in addition to these (22, 23). Therefore, the aim of this study was to assess the reliability of AHD, CHD and SMT measurements of individuals with no pathology detected on shoulder MR images.

MATERIALS AND METHODS

This retrospective study was conducted in a single centre between January 2023 and January 2024. Initially, the study included a total of 80 patients who presented at the Physical Medicine & Rehabilitation clinic with complaints of shoulder pain. These patients underwent evaluation with shoulder MRI, but no shoulder pathology was determined on the MRI scans. Of these 80 patients, 5 were excluded due to image artifacts and 2 were excluded because the T1 sequence was not included in the image sequence.

Thus, the analysis was conducted on a total of 73 individuals, consisting of 28 males and 45 females, with an average age of 51.9 ± 7.4 years (range: 45 to 65 years). The study exclusion

criteria were defined as the presence of any shoulder pathology on MRI, cervical radiculopathy, a history of rheumatological disease, shoulder fracture or surgery, a diagnosis of adhesive capsulitis, or the presence of artifacts determined on MRI during evaluations. The study protocol received approval from the Ethics Committee of Istanbul Training and Research Hospital (Approval no: 2023 / 243).

MRI Evaluation

A 1.5 T MRI (Signa HDxt 1.5T, GE Company) device was utilized for all measurements. Following the shooting using the Shoulder Protocol, T1 sequences (sequence thickness 3.5 mm) in coronal and sagittal sections were used for the measurements. The AHD, CHD and SMT measurements were taken by physiatrists with 15 years (MTY) and 10 years (FB) of experience in musculoskeletal system MRI evaluation. AHD was measured from the section with the narrowest gap in the T1 coronal (AHD coronal) and T1 sagittal (AHD sagittal) planes. CHD was measured from the narrowest section on T1 sagittal sections. SMT was measured at the thickest part of the muscle on T1 coronal slices. Each clinician performed a total of 3 evaluations, one week apart. During each assessment, measurements were taken three times, and the mean values were recorded. A statistical analysis was then conducted to compare the recorded values between the groups. The measurement method is shown in Figure 1.

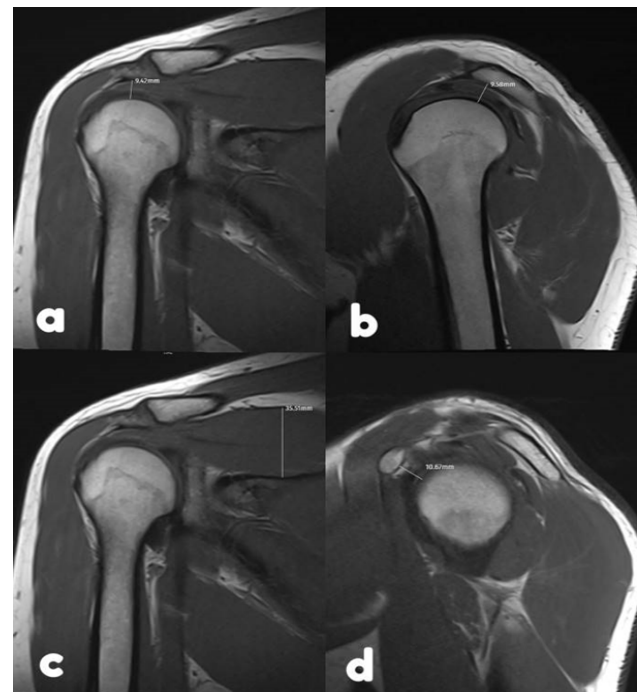


Figure 1. MRI showing the measurement of acromiohumeral distance on (a) coronal, and (b) sagittal T1 images, (c) supraspinatus muscle thickness measurement on coronal T1 image, and (d) the measurement of coracohumeral distance on sagittal T1 image.

Table 1. Reliability results of the measurements

	Intra-rater reliability						Inter-rater reliability		
	Rater 1			Rater 2			Rater 1-Rater2		
	ICC (95% CI)	SEM	MDC	ICC (95% CI)	SEM	MDC	ICC (95% CI)	SEM	MDC
AHD - coronal	0.96 (0.94- 0.97)	0.213	0.591	0.77 (0.63-0.85)	0.542	1.503	0.75 (0.61-0.84)	0.519	1.437
AHD - sagittal	0.94 (0.91-0.96)	0.238	0.660	0.77 (0.64-0.85)	0.551	1.526	0.86 (0.79-0.91)	0.370	1.027
CHD - coronal	0.85 (0.76-0.90)	0.688	1.906	0.82 (0.71-0.88)	0.962	2.665	0.74 (0.58-0.83)	0.956	2.648
SMT - coronal	0.98 (0.98-0.99)	0.520	1.440	0.89 (0.82-0.93)	1.398	3.873	0.92 (0.87-0.95)	1.083	3.002

CI; confidence interval, ICC; intraclass correlation coefficient, SEM; standard error of the mean, MDC; minimum detectable change, AHD; acromiohumeral distance, CHD; coracohumeral distance, SMT; supraspinatus muscle thickness

Statistical Analysis

The data obtained were analyzed statistically using IBM SPSS version 22.0 software (IBM Corp., Armonk, NY, USA). Standard Error of the Mean (SEM) and Minimal Detectable Change (MDC) values were calculated. SEM was determined as $(SD) \times \sqrt{(1-ICC)}$ and MDC was calculated as $(SEM) \times (\sqrt{2}) \times (1.96)$, where 1.96 represents a 95% confidence level. The reliability of the MRI measurements was evaluated by calculating Intraclass Correlation Coefficients (ICC) with 95% Confidence Intervals (CI) based on absolute agreement for a single measurement. In the evaluation of ICC reliability, a score between 0.5 and 0.75 signifies moderate reliability, a value between 0.75 and 0.90 suggests acceptable reliability, and a value greater than 0.90 indicates exceptional reliability.

RESULTS

The mean age of the participants was 51.9 ± 7.4 years, with a male/female ratio of 28/45 (30.4% /61.6%). The intra-rater reliability for AHD, assessed on coronal sections, was highly satisfactory. Rater 1 achieved an ICC of 0.96 (95% CI, 0.94-0.97), whereas Rater 2 achieved an ICC of 0.75 (95% CI, 0.61-0.84). AHD assessed on sagittal sections showed excellent reliability, with Rater 1 achieving an ICC of 0.94 (95% CI: 0.91-0.96) and Rater 2 achieving an ICC of 0.77 (95% CI: 0.64-0.85). CHD measurements on coronal sections were deemed satisfactory, with Rater 1 achieving an ICC of 0.85 (95% CI, 0.76-0.90) and Rater 2 achieving an ICC of 0.82 (95% CI, 0.71-0.88). SMT measurements on coronal sections yielded excellent results (Rater 1, ICC=0.98; CI, 0.98-0.99; Rater 2, ICC=0.89; 95% CI, 0.82-0.93). Specifically, the AHD-Coronal (ICC= 0.75; 95% CI, 0.61-0.84) and AHD-Sagittal (ICC=0.86; 95% CI, 0.79-0.91) measurements demonstrated good reliability. CHD measurements on coronal sections were considered fair (ICC= 0.74; 95 % CI, 0.58-0.83), while SMT measured on coronal sections showed excellent reliability (ICC=0.92; 95% CI, 0.87-0.95). Table 1 shows the reliability coefficients for both intra- and inter-rater measurements, determined by the ICC, SEM, and MDC values.

DISCUSSION

In this study, assessments were made of the reliability coefficients of magnetic resonance imaging (MRI) measurements for supraspinatus muscle thickness (SMT), acromiohumeral distance (AHD), and coracohumeral distance (CHD) parameters in patients suffering from shoulder pain. It was also aimed to investigate the reliability of MRI measurements of AHD, CHD and SMT parameters used to evaluate shoulder pain. The results demonstrated excellent inter- and intra-rater reliability for SMT measurements. AHD measurements exhibited excellent intra-rater reliability and good inter-rater reliability, and the CHD measurements showed good intra-rater reliability, and moderate inter-rater reliability.

Several studies in literature have reported a decrease in AHD in cases of RC tendon ruptures and SAIS (4,6,10), and a negative correlation has been indicated between tear severity and degeneration and AHD (22). However, there is also a study stating that AHD in SAIS is in a range similar to that of the healthy population (7), and in a study by Hunter et al. (8), AHD was found to increase in SAIS. In another study, CHD and AHD were reduced in patients with subscapular tendon rupture compared to shoulders without subscapular tendon rupture, and it was argued that CHD in particular, can be a guide for subscapular tears (9).

In another study showing that CHD decreased in subscapular tendon tears, the effect of the tear etiology on distance was discussed. While CHD was found to be significantly lower in patients with subscapular tendon ruptures due to degenerative processes, CHD in traumatic ruptures was found to be similar to that of the healthy population (12). There are also studies reporting that the SMT is thicker in SAIS compared to an asymptomatic control group (13). In the light of all these studies, it is clear that AHD, CHD and SMT measurements can be used in RC pathologies, especially SAIS. Many imaging methods, such as ultrasound, direct radiography, MRI and CT, can be used when taking measurements. MRI is considered the most appropriate imaging technique for evaluating anatomical structures with a complex appearance. However, although

there are many reliability studies, especially related to AHD measurements, it is undeniable that there is a need for further studies to investigate the reliability of these measurements.

Bernhardt et al. (15) assessed the reliability of AHD measurements using direct radiography and showed that both the intraobserver and interobserver reliability of assessments based on plain radiographs was found to be low. Another study compared reliability using 10 plain radiographs and 10 MRI/CT scans. The measurements made on MRI/CT were found to be more reliable than those on direct radiography. However, the sample set in that study was limited and the MRI/CT scans were considered a single group (16). In a study that investigated the AHD effect of abductor and adductor muscle strengths through MR imaging, the reliability of both intra-observer and inter-observer measurements was tested and was found to be safe (24). There are also studies reporting that AHD measurements made with ultrasound can be safe (17).

Similar to AHD measurements, there are studies in the literature that have evaluated coracohumeral distance measurements using ultrasound (21). In a study testing the reliability of CHD measurements made with MRI, good intraobserver and interobserver reliability was demonstrated (23). The data obtained in the current study supported that study. In other studies of the reliability of SMT measurements, ultrasound has been found to be safe within and between observers (18-20). In a study of hemiplegic patients, supraspinatus muscle thickness measurement with US was found to be a reliable method and showed a positive correlation with the cross-sectional area of the supraspinatus muscle on MRI. However, MRI is costly and not always available. In contrast, US is less expensive than MRI and is usually available in outpatient clinics (19). To the best of our knowledge, no previous study has assessed the reliability of SMT measurement using MRI. Therefore, the current study can be considered valuable, as the results demonstrate that the SMT measurement, previously associated with SAIS, is a reliable parameter.

The primary limitations of this study were the single-centre, retrospective design. Another limitation was that the measurements were taken on shoulder MRI images without detected pathology. In addition, the MRI acquisition method does not allow measurement of the acromiohumeral distance during shoulder abduction. Therefore, taking measurements on MRI of shoulder pathology in future studies may contribute further to the literature.

In conclusion, the results of this study suggest that AHD and CHD measurements, and especially SMT, obtained from shoulder MRI images without any detected pathology, can be deemed reliable. These findings may increase the clinical utility of these measurements in the assessment of shoulder pathologies.

Conflict of interest: Author declares that there is no conflict of interest between the authors of the article.

Financial conflict of interest: Author declares that he did not receive

any financial support in this study.

Address correspondence to: Mustafa Turgut Yildizgoren, Konya City Hospital, Physical Medicine and Rehabilitation Clinic, Konya, Türkiye

e-mail: ftr.mustafaturgut@hotmail.com

REFERENCES

- Lewis J. Rotator cuff related shoulder pain: Assessment, management and uncertainties. *Man Ther* 2016;23:57-68.
- Zoga AC, Kamel SI, Hynes JP, et al. The Evolving Roles of MRI and Ultrasound in First-Line Imaging of Rotator Cuff Injuries. *AJR Am J Roentgenol* 2021;217(6):1390-400.
- Graichen H, Bonel H, Stammberger T, et al. Three-dimensional analysis of the width of the subacromial space in healthy subjects and patients with impingement syndrome. *AJR Am J Roentgenol* 1999;172(4):1081-6.
- Cholewinski JJ, Kusz DJ, Wojciechowski P, et al. Ultrasound measurement of rotator cuff thickness and acromio-humeral distance in the diagnosis of subacromial impingement syndrome of the shoulder. *Knee Surg Sports Traumatol Arthrosc* 2008;16(4):408-14.
- Goutallier D, Le Guilloux P, Postel JM, et al. Acromio humeral distance less than six millimeter: its meaning in full-thickness rotator cuff tear. *Orthop Traumatol Surg Res* 2011;97(3):246-51.
- Nové-Josserand L, Lévigne C, Noël E, et al. L'espace sous-acromial. Etude des facteurs influençant sa hauteur [The acromio-humeral interval. A study of the factors influencing its height]. *Rev Chir Orthop Reparatrice Appar Mot* 1996;82(5):379-85.
- Michener LA, Subasi Yesilyaprak SS, Seitz AL, et al. Supraspinatus tendon and subacromial space parameters measured on ultrasonographic imaging in subacromial impingement syndrome. *Knee Surg Sports Traumatol Arthrosc* 2015;23(2):363-9.
- Hunter DJ, Rivett DA, McKiernan S, et al. Acromiohumeral distance and supraspinatus tendon thickness in people with shoulder impingement syndrome compared to asymptomatic age and gender-matched participants: a case control study. *BMC Musculoskelet Disord* 2021;22(1):1004.
- Zhu S, Tan J, Wu D, et al. Bilateral coracohumeral distance discrepancy is associated with subscapularis tear in rotator cuff rupture patients. *Knee Surg Sports Traumatol Arthrosc* 2021;29(12):3936-42.
- Di Mario M, Fraracci L. MR study of the intrinsic acromial angle in 74 symptomatic patients. *Radiol Med* 2005;110(3):273-9.
- Asal N, Şahan MH. Radiological Variabilities in Subcoracoid Impingement: Coracoid Morphology, Coracohumeral Distance, Coracoglenoid Angle, and Coracohumeral Angle. *Med Sci Monit* 2018;24:8678-84.
- Balke M, Banerjee M, Greshake O, et al. The Coracohumeral Distance in Shoulders With Traumatic and Degenerative Subscapularis Tendon Tears. *Am J Sports Med* 2016;44(1):198-201.
- Blume C, Wang SS. Comparison of changes in supraspinatus muscle thickness in persons with subacromial impingement syndrome and asymptomatic adults. *Physiother Theory Pract* 2014;30(8):544-51.
- Naredo AE, Aguado P, Padrón M, et al. A comparative study of ultrasonography with magnetic resonance imaging in patients with painful shoulder. *J Clin Rheumatol* 1999;5(4):184-92.
- Bernhardt GA, Glehr M, Zacherl M, et al. Observer variability

- in the assessment of the acromiohumeral interval using anteroposterior shoulder radiographs. *Eur J Orthop Surg Traumatol* 2013;23(2):185-90.
16. Werner CM, Conrad SJ, Meyer DC, et al. Intermethod agreement and interobserver correlation of radiologic acromiohumeral distance measurements. *J Shoulder Elbow Surg* 2008;17(2):237-40.
 17. Bagcier F, Geler Kulcu D, Yorulmaz E, et al. Intra- and Inter-Rater Reliability of Ultrasound Measurements of Supraspinatus Tendon Thickness, Acromiohumeral Distance, and Occupation Ratio in Patients With Shoulder Impingement Syndrome. *Arch Rheumatol* 2020;35(3):385-93.
 18. Temes WC, Temes Clifton A, Hilton V, et al. Reliability and validity of thickness measurements of the supraspinatus muscle of the shoulder: an ultrasonography study. *J Sport Rehabil* 2014;23(2):2013-23.
 19. Yi TI, Han IS, Kim JS, et al. Reliability of the supraspinatus muscle thickness measurement by ultrasonography. *Ann Rehabil Med* 2012;36(4):488-95.
 20. Schneebeli A, Egloff M, Giampietro A, et al. Rehabilitative ultrasound imaging of the supraspinatus muscle: Intra- and interrater reliability of thickness and cross-sectional area. *J Bodyw Mov Ther* 2014;18(2):266-72.
 21. Cavaggion C, Navarro-Ledesma S, Juul-Kristensen B, et al. Reliability of coracohumeral distance and subcoracoid tendons in subacromial pain syndrome. *Sci Rep* 2023;13(1):2383.
 22. Saupe N, Pfirrmann CW, Schmid MR, et al. Association between rotator cuff abnormalities and reduced acromiohumeral distance. *AJR Am J Roentgenol* 2006;187(2):376-82.
 23. Reichel T, Herz S, Tabbakh ME, et al. Less than 9.5-mm coracohumeral distance on axial magnetic resonance imaging scans predicts for subscapularis tear. *JSES Int* 2021;5(3):424-9.
 24. Hinterwimmer S, Von Eisenhart-Rothe R, Siebert M, et al. Influence of adducting and abducting muscle forces on the subacromial space width. *Med Sci Sports Exerc* 2003;35(12):2055-9.

Is Being an Emergency Service Professional a Risk Factor for Violence in Healthcare?

Acil Servis Çalışanı Olmak Sağlıkta Şiddet için Bir Risk Faktörü müdür?

Ali Avcı¹, Muhammet Rasit Ozer², Mehmet Emre Ay³

¹Karaman Training and Research Hospital, Department of Emergency Medicine Karaman, Türkiye

²Karamanoğlu Mehmetbey University Faculty of Medicine, Department of Emergency Medicine Karaman, Türkiye

³Karamanoğlu Mehmetbey University, Faculty of Medicine, Department of Family Medicine Karaman, Türkiye

ÖZET

Amaç: Hastanelerimizde şiddet olayları giderek artan bir sorun haline gelmiştir. Pek çok şiddet olayı sağlık personelinde yıkıcı hasarlar meydana getirmektedir. Bu çalışmada hastanelerde görülen şiddet olaylarında fiziksel ve sözlü şiddet arasındaki etiyolojik farklılıkları, özellikle acil servis çalışanı olmanın fiziksel ve sözlü şiddete etkisinin olup olmadığını incelemeyi amaçladık.

Gereçler ve Yöntem: Üçüncü basamak bir hastanede 2018-2022 yılları arasındaki dört yıllık beyaz kod vaka kayıtları geriye dönük olarak incelendi. Şiddetin türü, olay yeri, şiddet uygulayan ve uygulanan kişinin cinsiyeti, mesleği kaydedildi. Fiziksel şiddet ve sözlü şiddet olarak vakalar iki gruba ayrıldı. Toplanan veriler gruplar arası kıyaslandı.

Bulgular: Belirtilen süre içerisinde 231 beyaz kod vakası bildirilmiştir. Şiddete maruz kalan kişilerin 51,9%'u erkek iken ortalama yaşı 33(28-40) olarak tespit edildi. En çok şiddete maruz kalan meslek 102 kişi (44,2%) ile hekimler olmuştur. En sık şiddet uygulanan yer %54,5 ile acil servis olmuştur. Fiziksel şiddet %26,4 oranında meydana gelmiştir. Acil serviste fiziksel şiddet oranı sözlü şiddete (%63,9-%51,2) göre istatistiksel olarak anlamlı olmasa da yüksek bulunmuştur. Fiziksel şiddet olaylarında şiddete maruz kalan kişinin erkek olma oranı, sözlü şiddet olaylarına göre istatistiksel anlamlı yüksek bulunmuştur (43/61(70.5%), 77/170(%47) <0,001). Sözlü şiddet olaylarında şiddet uygulayan kişinin kadın olma oranı, fiziksel şiddet olaylarına göre istatistiksel anlamlı yüksek saptanmıştır (35/170(20.6%), 3/61(4.9%), <0,001).

Sonuç: Çalışmamızda fiziksel şiddete maruz kalanlar daha çok erkekler olduğu bulunmuştur. Kadınların fiziksel şiddete nazaran sözlü şiddeti daha fazla uyguladıkları tespit edilmiştir. Hekimler daha çok sözlü şiddete maruz kalmışlardır. Ayrıca fiziksel şiddet olaylarında acil servis lokalizasyonu olma oranı sözlü şiddet olaylarına göre yüksek olmasına rağmen aradaki fark istatistiksel anlamlı tespit edilmemiştir.

Anahtar Kelimeler: Fiziksel şiddet, sözlü şiddet, beyaz kod, acil servis

ABSTRACT

Aim: Violent incidents have become an increasing problem in our hospitals. Many violent incidents cause devastating damage to healthcare personnel. In this study, we aimed to examine the etiological differences between physical and verbal violence in violent incidents seen in hospitals, and especially whether being an emergency service professional has an effect on physical and verbal violence.

Materials and Method: Four-year white code case records between 2018 and 2022 in a tertiary hospital were retrospectively reviewed. The type and setting of violence, the gender, and the occupation of the perpetrator were recorded. The cases were divided into two groups: physical violence and verbal violence. The collected data were compared between the groups.

Results: During the indicated period, 231 cases of code white were reported. While 51.9% of those affected by violence were men, the mean age was 33 (28-40). Physicians were the most common professional group affected by violence, with 102 individuals (44.2%). The most common site of violence was the emergency service, at 54.5%. The rate of physical violence in the emergency department was found to be higher than verbal violence (63.9%-51.2%), although it was not statistically significant. In cases of physical violence, the proportion of the individual exposed to violence being male was statistically significantly higher than in cases of verbal violence (43/61(70.5%), 77/170(%47) <0,001). The proportion of female perpetrators of verbal violence was statistically significantly higher than that of physical violence (35/170(20.6%), 3/61(4.9%), <0,001).

Conclusion: In our study, it was found that those exposed to physical violence were mostly men. It has been determined that women use verbal violence more than physical violence. Physicians were more exposed to verbal violence. In addition, although the proportion of emergency room location in physical violence incidents was higher than in verbal violence incidents, the difference was not found to be statistically significant.

Keywords: Physical violence, verbal violence, code white, emergency service

Geliş Tarihi/Received: 9 Aralık/December 2023 **Kabul Tarihi/Accepted:** 1 Mart/March 2024 **Yayın Tarihi/Published Online:** 25 Mart/March 2024

Sorumlu Yazar/Corresponding Author: Ali Avcı, Karaman Training and Research Hospital, Department of Emergency Medicine Karaman, Türkiye
e-mail: aliavci171@hotmail.com

Atıf yapmak için/ Cite this article as: Avcı A, Ozer MR, Ay ME. Is Being an Emergency Service Professional a Risk Factor For Violence in Healthcare? Selcuk Med J 2024;40(1): 39-44

Disclosure: Author has not a financial interest in any of the products, devices, or drugs mentioned in this article. The research was not sponsored by an outside organization. Author has agreed to allow full access to the primary data and to allow the journal to review the data if requested.

"This article is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0)"



INTRODUCTION

Violence against healthcare workers is increasing day by day (1). Physical violence is four times more common in healthcare facilities than in other industries (2). Violence against emergency service employees causes serious problems for patients, healthcare providers, and healthcare workers exposed to violence. Rates of violence are higher in emergency services than in other settings (3). The high number of applications to emergency services, acute trauma and sudden deaths in the emergency service, patients with low impulse control, psychiatric disorders, and emergencies, or the application to emergency services by those who are under the influence of alcohol/drugs and/or their families, and the inclination of these people to brutality, are the reasons why the emergency service is exposed to violence (4). Violence against medical personnel can be physical or verbal. Violence has emotional effects, such as low morale and low productivity, as well as physical effects on healthcare workers who are exposed to it (5). In addition, physical and verbal violence against healthcare workers has professional implications, such as lower employee retention and the recruitment of new employees (6). Although verbal violence is more common than physical violence, more destructive harm is observed among those exposed to physical violence (2). It has been shown that after physical violence, the repeated memories of the violence, thoughts, and image of the attack cause extreme distress in the person, and severe insomnia is caused by the constant repetition of the attack in the brain. It was reported that 40% of people exposed to physical violence and 25.8% of people exposed to verbal violence were depressed by repeated disturbing memories, thoughts, or images (7).

All healthcare workers, including physicians and nurses, are at risk in cases of increasing healthcare violence (8). Healthcare workers are even more at risk of workplace violence than the police (9). Due to this increased risk, healthcare workers may experience burnout, decreased work efficiency, and disengagement from patients. In addition, the response and decisions of a healthcare worker exposed to physical violence rather than verbal violence vary depending on the level of increased violence. The greater the physical violence, the stronger the healthcare worker's response (10).

The "White Code" application in Turkey has been in effect since May 2012 to protect healthcare workers' safety and record violence. An emergency phone number, "113," has been established to immediately report the violence incident (11). In this way, the incident of violence is recorded and followed up.

Studies in the literature on violence in health care are mostly in the form of survey studies. Unlike the literature, this study is not a survey study. It was conducted using data registered in the "White Code" system. It is important to note that the violence that causes negative situations is either physical or verbal. By examining the recorded incidents of violence, risk factors such as work area (emergency department, operating room, outpatient clinic, etc.), occupational group, gender, and age were identified, as well as possible reasons that may increase physical violence.

MATERIALS AND METHOD

Violence incidents that occurred in a public hospital between January 2018 and May 2022 in the emergency service, outpatient clinic, intensive care unit, and other clinical services were retrospectively analyzed using the data recorded in the "White Code" system. After the public hospital where the study was conducted consented to the use of the data, approval was obtained from a local ethics committee with the decision number 09-2022/11. The study retrospectively examined violent events in the hospital, which were recorded in the "white code" system based on the automation system used. The age, gender, and service of the medical staff who gave the "white code", the age and gender of the perpetrator of the violence, and the quality of the violence (the patient's own, the relatives, etc.) were examined. Additionally, the work area (emergency service, outpatient clinic, etc.) where the code was given and the type of violence were recorded. After writing down the collected data individually, the violent incidents were divided into physical and verbal groups. The data collected between the groups were compared statistically.

Statistical analysis of the data was performed using the SPSS 20.0 package program (SPSS Inc., Chicago, IL). Normality analysis of the data was performed using histograms and the Kolmogorov-Smirnov test. Because all quantitative data did not conform to the normal distribution, the median (25%–75% quartiles) and categorical variables were reported as frequencies (percentages). Differences between the groups were examined with the Mann-Whitney U test for quantitative variables. Comparisons between groups for categorical variables were performed with the chi-square test. A p value of < 0.05 was considered statistically significant.

RESULTS

Our study included 231 hospital staff exposed to violence in the past 4 years, as recorded in the "white code" system. The mean age of staff exposed to violence was 33 years (28–40 years). In general, 51.9% of staff exposed to violence were men, and 48.1% were women. Physicians constituted the majority of violence victims (44.2%), while the next highest rate of violence victims were nurses (30.7%). Looking at the location where the violence occurred, the emergency service was the area with the most white codes, with 126 (54.5%) incidents. While 73.6% of violent incidents were verbal, 26.4% were physical. While 49.4% of the perpetrators were patient relatives, 43.7% of the perpetrators were patients. While 76.6% of the perpetrators were male, 16.5% were female. The detailed characteristics of the violence incidents are shown in Table 1.

Physical violence incidents were referred to as the physical violence group, and verbal violence incidents were referred to as the verbal violence group. There was no statistically significant difference between the median age of those exposed to physical violence and those exposed to verbal violence ($p=0.357$). In the group of those exposed to physical violence, the male sex ratio was statistically significantly higher than that of those exposed to verbal violence ($p<0.001$). In the verbal violence group, the female sex ratio of perpetrators was

Table 1. Comparison gender of victim, gender of perpetrators, location, type, perpetrator of violence

Total incidents of violence		231(100%)
Age of victim(years)*		33(28-40)
Gender of victim**	Male	120(51.9%)
	Female	111(48.1%)
Occupation of victim**	Physician	102(44.2%)
	Nurse	71(30.7%)
	Secretary	31(13.4%)
	Security guard	27(11.7%)
Location of violence**	Emergency Service	126(54.5%)
	ICU	14(6.1%)
	Ward	24(10.4%)
	Outpatient clinic	67(29%)
Type of violence**	Verbal	170(73.6%)
	Physical	61(26.4%)
Perpetrator of Violence**	Patient	101(43.7%)
	Relative of patient	114(49.4%)
	Both patient and relative of the patient	16(6.9%)
Gender of perpetrators**	Male	177(76.6%)
	Female	38(16.5%)
	Both male and female	16(6.9%)

*Data are presented as median (25%-75%). **Data are presented as n (%).

statistically significantly higher than in the physical violence group ($p<0.001$). The ratio of persons affected by verbal violence was statistically significantly higher than that of those affected by physical violence ($p<0.001$).

The emergency service being the location of violence in the physical violence group was not statistically significant compared to the verbal violence group. Although the rate of physical violence in the emergency department was high among those exposed to physical violence (63.9%-51.2%), no statistically significant p-value was found ($p=0.086$). Verbal violence was the most commonly reported form of violence by the patient or a patient's relative. In contrast, physical violence was significantly more common in code white situations where the patient and the patient's relative were present ($p<0.001$). Detailed comparative data between groups can be found in Table 2.

DISCUSSION

In this study, we aimed to find the factors that trigger physical violence against healthcare professionals. The main findings of the study are; we determined that male gender is more exposed to physical violence and female gender is more likely to resort to verbal violence. We also found that verbal violence was used more frequently against physicians than physical violence.

One study mentioned that although verbal violence was more common than physical violence, physical violence was much more destructive. The classification was made according to the severity of violence, and it was found that as the frequency of exposure to physical violence increases, the extent of the person's exposure also increases, which reveals the destructiveness of physical violence (10,12-14).

To this end, we wanted to investigate possible causes that

Table 2. Comparison of verbal and physical violence

		Verbal violence (170)	Physical violence (61)	p-value
Age(years)*		33(27-40)	34(29-40)	0.357
The ratio of victims**	Male	77(45.3%)	43(70.5%)	0.001
	Female	93(54.7%)	18(29.5%)	
The ratio of physician victims**		91(53.5%)	11(18%)	<0.001
The ratio of emergency service as the location of violence**		87(51.2%)	39(63.9%)	0.086
Gender of perpetrators**	Male	133(78.2%)	44(72.1%)	<0.001
	Female	35(20.6%)	3(4.9%)	
	Both male and female	2(1.2%)	14(23%)	
Type of perpetrators**	Patient	73(42.9%)	28(45.9%)	<0.001
	Relative of patient	95(55.9%)	19(31.1%)	
	Both patient and relative of the patient	2(1.2%)	14(23%)	

*Data are presented as median (25%-75%). **Data are presented as n (%).

lead to an increase in physical violence. Similar to the literature, our study showed that emergency services are the areas where violence is most prevalent. We attribute this to the fact that emergency services provide 24-hour service, that people are in the emergency service when they are most agitated, that any request to the emergency service is considered a true emergency, and that more is expected. According to the results of our study, although more physical violence was observed in the emergency service, this difference was not statistically significant ($p=0.086$). There may be many reasons why physical violence is more common in the emergency services. The patient or a relative of the patient who commits physical violence may think that it is life-threatening (emergency) negligence. Our study found that men were more often exposed to physical violence, while women were more often victims of verbal violence. We think this is due to the prevailing notion in our society's customs that women should not be touched.

Studies have highlighted that physicians and nurses are more frequently exposed to violence; verbal violence is much more common than physical violence; and physical violence is more common in emergency services than other services (2,3). Also, in these studies, rates of physical violence were found to be about 1/5 of verbal violence. In another study, verbal violence was found to be 3–6 times more common than physical violence, and there were differences in physical violence between countries and races. Verbal and physical violence were found to be more common in Asian and Middle Eastern societies than in European societies, and violence decreased day by day, especially in America (3,15-18).

Many studies on healthcare workers have mentioned that nurses are exposed to higher levels of violence. They have been found to suffer three times more than other healthcare workers. In a study conducted in England, nurses (43.4%) and physicians (13.8%) were found to be the most frequent victims of violence (19). Another study examining the distribution of duties among victims of violence found that 66.67% of victims were nurses, 22.99% were healthcare workers, and 10.34% were paramedics (20). In another study, more than two-thirds of physicians reported exposure to violence throughout their careers, and no significant difference was found between nurses and physicians regarding exposure to violence (21). Studies conducted in Turkey found that the rate of health professionals being exposed to verbal violence was between 75% and 85%, while the rate of being exposed to physical violence was 7% to 26% during their careers. Also, contrary to the literature, as shown in these studies, physicians were exposed to violence at a higher rate than nurses and other healthcare workers (22,23). Another study reported findings that support this situation (24). In our study, most incidents of verbal violence were observed, which is consistent with the literature. Physicians were found to be numerically more exposed to violence. However, although exposure to violence is high, the rate of physical violence is lower than in other professions. Physicians have a lower rate despite the high number of victims of violence since the perpetrator does

not inflict physical violence on physicians with social status. However, since physicians are at risk for violence, they may have been exposed to it in large numbers. Almost all studies in the literature are survey studies, and the majority of participants are nurses and non-physician staff, which is why nurses are reported to be exposed to higher levels of violence in many studies of healthcare professionals. Our study is a retrospective study of white codes given and recorded in our hospital, which include real people. In this context, it was found that physicians in our hospital are exposed to higher levels of violence.

The issue of risk factors for violence constituted the main idea of many studies. In the studies conducted, many authors found that healthcare workers under 40 years of age were in the highest risk group, that the group most likely to be victims of violence consisted of members of this age group, and that staff aged 42 years and older experienced less violence (3, 25-27). They stated that other important risk factors are gender and inexperience, especially female gender and insufficient experience, which pose a serious risk of violence, and that only male professionals are victims of physical violence more often than women when involved (26,28-30). They found that inexperienced physicians are exposed to more violence, especially in the emergency service, and that this is due to inexperience and a lack of training in communication skills (14). Another study found that female professionals with less experience working shifts were likelier to be workplace violence victims (31).

Guglielmetti et al. emphasized that male healthcare professionals were twice as likely to be victims of physical violence as female professionals (32). The study by Gerberich et al. highlighted that men were more likely to be exposed to violence than women (19.4% and 12.9%, respectively) (33). In an Italian study by Zampieron et al. (30) and a Turkish study by Ayranci et al., a large proportion of the victims of violence were women (34). In our study, similar to the literature, the age of the person exposed to violence included healthcare workers under 40. As mentioned in the literature, we think that young professionals are more likely to be victims of violence because of the staff's lack of experience and communication skills in cases of possible violence.

The male gender significantly more often perpetrates violent incidents. Many authors emphasized that male patients, in particular, tend to be more violent than their relatives (30,33,35). Almvik et al. found that physical violence perpetrated by male patients was significantly higher than that perpetrated by female patients (36). In our study, females were found to use more verbal violence. In our study, we found that in cases where the patient and their relatives used violence together, they used more physical violence. The reason why men use less verbal violence may be that men are more prone to physical violence.

Some studies have found that the white code system created by the Ministry of Health to protect staff is underutilized. One study mentioned that most health personnel know this code system, however, it is not known exactly in which situations it should be used. The same study also found that personnel who

know the white code system do not use it intentionally. It is also known that verbal or physical violence causes professional reluctance in employees. Reasons for this include the length of the procedures, ignoring the violence, the weariness of the healthcare professionals or the person's apology (37,38).

Another study found that the reports kept were not meaningful, and the white code was not reported since the legal procedures were not followed (28). Studies abroad have also shown that violence is not reported for similar reasons (2,3,10). We believe that the currently registered white codes are underreporting violence and that the number of white codes is insufficient for similar reasons.

The limitations of this study are that it is a retrospective, single-center study, and the number of cases is small for statistical analysis. The professional experience and experiential data of the person exposed to the violence are not collected, and the case-related reasons for the event that caused the violence are not recorded.

CONCLUSION

When examining the data on violence in health care, we find that the cases in which Code White was activated as a result of violence occurred primarily in the emergency service. Physicians were more affected by violence. Among perpetrators of violence, men tended to be more likely to use physical violence, while women tended to be more likely to use verbal violence. Physicians are at higher risk than other healthcare professionals for verbal violence.

Conflict of interest: A author declares that there is no conflict of interest between the authors of the article.

Financial conflict of interest: Author declares that he did not receive any financial support in this study.

Address correspondence to: Ali Avci, Karaman Training and Research Hospital, Department of Emergency Medicine Karaman, Türkiye

e-mail: aliavci171@hotmail.com

REFERENCES

1. ALBashtawy M, Aljezawi M. Emergency nurses' perspective of workplace violence in Jordanian hospitals: A national survey. *Int Emerg Nurs* 2016;24:61-5.
2. Abou-ElWafa HS, El-Gilany A-H, Abd-El-Raouf SE, et al. Workplace violence against emergency versus non-emergency nurses in Mansoura university hospitals, Egypt. *J Interpers Violence* 2015;30(5):857-72.
3. Ferri P, Silvestri M, Artoni C, et al. Workplace violence in different settings and among various health professionals in an Italian general hospital: a cross-sectional study. *Psychology Research and Behavior Management* 2016;9:263-75.
4. Hedayati Emam G, Alimohammadi H, Zolfaghari Sadrabad A, et al. Workplace violence against residents in emergency department and reasons for not reporting them; a cross sectional study. *Emergency*. (2018) 6:e7.
5. Chen C, Huang C, Chen C. The relationship of health-related quality of life to workplace physical violence against nurses by psychiatric patients. *Qual Life Res* 2010;19:1155-61.
6. Pich J, Hazelton M, Sundin D, et al. Patient-related violence against emergency department nurses. *Nurs. Health Sci* 2010;12:268-74.
7. Esmaeilpour M, Salsali M, Ahmadi F. Workplace violence against Iranian nurses working in emergency departments. *International Nursing Review* 2011;58:130-7.
8. Erkol H, Gökdoğan MR, Erkol Z, et al. Aggression and violence towards health care providers—a problem in Turkey? *Journal of Forensic and Legal Medicine* 2007;14(7):423-8.
9. Taylor JL, Rew L. A systematic review of the literature: Workplace violence in the emergency department. *Journal of clinical nursing* 2011;20(7-8):1072-85.
10. Kumari A, Kaur T, Ranjan P, et al. Workplace violence against doctors: Characteristics, risk factors, and mitigation strategies. *J Postgrad Med* 2020; 66(3):149-54.
11. TC Sağlık Bakanlığı, "Beyaz kod kullanıcı kılavuzu", erişim: 7 Kasım 2023. <https://beyazkod.saglik.gov.tr/KullanımKilavuzu.pdf>
12. Ullah R, Siddiqui F, Zafar MS, et al. Bullying experiences of dental interns working at four dental institutions of a developing country: A cross-sectional study. *Work* 2018;61:91-100.
13. Arnetz JE, Hamblin L, Russell J, et al. Preventing patient-to-worker violence in hospitals: Outcome of a randomized controlled intervention. *J Occup Environ Med* 2017;59:18-27.
14. Singh G, Sharma S, Gautam PL, et al. Questionnaire-based evaluation of factors leading to patient-physician distrust and violence against healthcare workers. *Indian J Crit Care Med* 2019;23:302-9.
15. Jiao M, Ning N, Li Y, et al. Workplace violence against nurses in Chinese hospitals: a cross-sectional survey. *BMJ Open* 2015;5(3):e006719.
16. Park M, Cho SH, Hong HJ. Prevalence and perpetrators of workplace violence by nursing unit and the relationship between violence and the perceived work environment. *J Nurs Scholarsh* 2015;47(1):87-95.
17. Alameddine M, Mourad Y, Dimassi H. A national study on nurses' exposure to occupational violence in Lebanon: Prevalence, consequences and associated factors. *PLoS One* 2015;10(9):e0137105.
18. Liu J, Gan Y, Jiang H, et al. Prevalence of workplace violence against healthcare workers: A systematic review and meta-analysis. *Occup Environ Med* 2019;76:927-37.
19. Winstanley S. and Whittington R. Aggression towards Health Care Staff in a UK General Hospital: Variation among Professions and Departments. *Journal of Clinical Nursing* 2004;13(1): 3-10.
20. Şahin B, Gaygısız Ş, Balcı F, et al. Yardımcı Acil Sağlık Personeline Yönelik Şiddet. *Türkiye Acil Tıp Dergisi* 2011;11(3):110-4.
21. Kitaneh M, Hamdan M. Workplace violence against physicians and nurses in Palestinian public hospitals: a cross-sectional study. *BMC Health Serv Res* 2012;12:469.
22. Ergün FS, Karadakovan A. Violence towards nursing staff in emergency departments in one Turkish city. *International Nursing Review* 2005;52:154-60.
23. Bıçkıcı F. Sağlık Çalışanlarına Yönelik Şiddet ve Neden Olan Faktörler: Bir Devlet Hastanesi Örneği. *Sağlıkta Performans Ve Kalite Dergisi*, 2013;5(1), 43-56.
24. AbuAlRub RF, Al Khawaldeh AT. Workplace physical violence among hospital nurses and physicians in underserved areas in Jordan. *J Clin Nurs*.2014;23(13-14):1937-47.
25. Behnam M, Tillotson RD, Davis SM, et al. Violence in the emergency department: A national survey of emergency medicine residents and attending physicians. *J Emerg Med* 2011;40(5):565-79.

26. Camerino D, Estryng-Behar M, Conway PM, et al. Work-related factors and violence among nursing staff in the European NEXT study: a longitudinal cohort study. *Int J Nurs Stud* 2008;45(1):35-50.
27. Hahn S, Müller M, Hantikainen V, et al. Risk factors associated with patient and visitor violence in general hospitals: Results of a multiple regression analysis. *Int J Nurs Stud* 2013;50(3):374-85.
28. Gillespie GL, Gates DM, Miller M, et al. Workplace violence in healthcare settings: risk factors and protective strategies. *Rehabil Nurs* 2010;35(5):177-84.
29. Hamdan M, Abu Hamra A. Workplace violence towards workers in the emergency departments of Palestinian hospitals: A cross-sectional study. *Hum Resour Health* 2015;13:28.
30. Zampieron A, Galeazzo M, Turra S, et al. Perceived aggression towards nurses: study in two Italian health institutions. *J Clin Nurs* 2010;19(15-16):2329-41.
31. Kumar M, Verma M, Das T, et al. A study of workplace violence experienced by doctors and associated risk factors in a tertiary care hospital of south Delhi, India. *J Clin Diagnostic Res* 2016;10:LC06-10.
32. Guglielmetti C, Gilardi S, Licata M, et al. The healthcare operators' experience with aggressive patients and their visitors: A cross-sectional study in four clinical departments. *Med Lav* 2016;107(3):223-34.
33. Gerberich SG, Church TR, McGovern PM, et al. An Epidemiological Study of the Magnitude and Consequences of Work Related Violence: The Minnesota Nurses' Study. *Occupational Environmental Medicine* 2004;61(6):495-503.
34. Ayrancı U, Yenilmez Ç, Balcı Y, et al. Identification of Violence in Turkish Health Care Settings. *Journal of Interpersonal Violence* 2006;21(2):276-96.
35. Pompeii LA, Schoenfisch AL, Lipscomb HJ et al. Physical assault, physical threat, and verbal abuse perpetrated against hospital workers by patients or visitors in six U.S. hospitals. *Am J Ind Med* 2015;58(11):1194-204.
36. Almvik R, Rasmussen K, Woods P. Challenging behaviour in the elderly-monitoring violent incidents. *Int J Geriatr Psychiatry* 2006;21(4):368-74.
37. Yıldız MS. Türkiye'de Sağlık Çalışanlarına Yönelik Şiddet: Ankara İlinde Araştırma. *Hacettepe Journal of Health Administration* 2019;22(1): 135-56
38. Naldan M E, Karayağmurlu A, Yayık M et al. Burnout, Job Satisfaction, Depression on the Healthcare Professionals Working in the Operation Room. *Selcuk Med J* 2019;35(3): 152-8.

A Rare Case of Multicentric Reticulohistiocytosis in An Elderly Male Patient

Yaşlı Erkek Hastada Nadir Bir Multisentrik Retikülohistiyositoz Vakası

📧 Rafael Everton Assunção Ribeiro da Costa¹, 📧 Gustavo Hugo de Souza Faria², 📧 Maria Júlia Andrade Pereira Soares³,
📧 Maria Clara Amorim Silva⁴, 📧 Raimundo Gerônimo da Silva Júnior⁵

¹Medicine Student, Health Science Center, State University of Piauí, Teresina, Brazil

²Medicine Student, Health Science Center, Federal University of Maranhão, Imperatriz, Brazil

³Medicine Student, Medicine Coordination, UNINOVAFAPÍ University Centre, Teresina, Brazil

⁴Medicine Student, Health Science Center, State University of Piauí, Teresina, Brazil

⁵Pathologist, Professor, Health Science Center, Federal University of Piauí, Teresina, Brazil

ÖZET

Multisentrik retikülohistiyositoz (MRH), Langerhans dışı hücrelerin nadir görülen sistemik proliferatif granümatöz bir hastalığıdır. Bu çalışmanın amacı klinik pratikte sıklıkla yanlış teşhis edilen bir multisentrik retikülohistiyositoz olgusunu sunmaktır. 74 yaşında bir erkek, altı aydır süren, sabah tutukluğu, eklem şişliği ve üst ve alt ekstremitte zayıflığının eşlik ettiği artralji şikayetiyle Aralık 2022'de Romatoloji ofisine başvurdu. Fizik muayenede proksimal interfalangeal eklemlerin dorsal yüzeyinde, burun tabanında ve sağ halluks lateral yüzeyinde papüller görüldü. Ayrıca sırtta hiperemi ve proksimal ve distal interfalangeal eklemlerde, bileklerde ve dizlerde ödem tespit edildi. Laboratuvar testlerinde ESR ve ANA'nın normal sınırlar içinde olduğu görüldü. Anti-Sm, Anti-RO, romatoid faktör, Anti-CCP, HIV ve HCV testleri negatifti. Göğüs BT taramasında sağ aksiller lenf düğümünde 2,7 cm boyutunda genişleme, ateromatöz aort ve alt lobda başka değişiklikler olmaksızın dağıntık atelektazili çizgiler görüldü. Abdominal ultrasonografi'de prostat büyümesi tespit edildi. Deri biyopsisinde immünohistokimyasal olarak atipik asiner proliferasyon tanımlandı. Hematoksilin-eozin boyalı cilt biyopsisinde histopatolojik olarak (Ocak 2023) yoğun bir histiyositik infiltrasyon görüldü. Histiyositlerde "buzlu cam" görünümü eozinofilik sitoplazma görüldü. İmmünohistokimyasal olarak, S100 ve CD34 için negatif, CD68 için pozitif bulundu. Son teşhis MRH olarak raporlandı. Hastaya ilaç tedavisi uygulandı. Sonuç olarak, romatoloji pratiğinde MRH'dekilere benzer şekilde romatizmal hastalıkların (örn. dermatomyozit ve romatoid artrit) belirti ve bulgularıyla birlikte, cilt ve eklem değişikliklerini içeren klinik semptomlar beklenmektedir. Ancak MRH'de hastalığın ilerlemesi hakkındaki bilgiler sınırlıdır. Bu yüzden, nadir görülmesi nedeniyle bu olgu sunulmuştur.

Anahtar Kelimeler: Langerhans Dışı Hücreli Histiyositoz, Patoloji, Mutisentrik Retikülohistiyositoz, Romatolojik Hastalıklar

ABSTRACT

Multicentric reticulohistiocytosis (MRH) is a rare systemic proliferative granulomatous disease of non-Langerhans cells. The aim of this study is to report a case of multicentric reticulohistiocytosis that is easily misdiagnosed in clinical practice. A 74-year-old man sought the Rheumatology office in December 2022 with a main complaint of arthralgia for six months, associated with morning stiffness, joint swelling, and upper and lower limb weakness. On physical examination, papules on the dorsal surface of the proximal interphalangeal joints, base of the nose, and lateral surface of the right hallux were observed. Hyperemia was also identified on the back, and edema of the proximal and distal interphalangeal joints, wrists and knees. Laboratory tests revealed ESR and ANA within normal limits. Tests were negative for Anti-Sm, Anti-RO, rheumatoid factor, Anti-CCP, HIV, and HCV. Chest CT-scan showed right axillary lymph node enlargement, measuring 2.7 cm, atheromatous aorta, and streaks with scattered atelectasis in the lower lobe, without other changes. On total abdominal ultrasound, prostate enlargement was detected. Immunohistochemistry of skin biopsy identified atypical acinar proliferation. Histopathology skin biopsy stained with hematoxylin-eosin (January 2023) showed a dense histiocytic infiltrate. Detail of the histiocytic component displayed "ground glass" eosinophilic cytoplasm. Immunohistochemistry was negative for S100 and CD34 and positive for CD68. Final diagnosis was MRH. The patient underwent treatment with drugs. In conclusion, clinical manifestations, including skin and joint changes, with signs and symptoms of rheumatic disorders (e.g. dermatomyositis and rheumatoid arthritis) similar to those of MRH are expected in rheumatology practice. However, knowledge about disease progression in MRH is limited. Therefore, this case report is described due to its rarity

Keywords: Non-Langerhans-Cell Histiocytosis, Pathology, Muticentric Reticulohistiocytosis, Rheumatological Diseases

Geliş Tarihi/Received: 16 Şubat/February 2024 **Kabul Tarihi/Accepted:** 16 Mart/March 2024 **Yayın Tarihi/Published Online:** 25 Mart/March 2024

Sorumlu Yazar/Corresponding Author: Rafael Everton Assunção Ribeiro da Costa, Medicine Student, Health Science Center, State University of Piauí, Teresina, Brazil
e-mail: rafaelearcosta@gmail.com

Atif yapmak için/ Cite this article as: Assunção Ribeiro da Costa RE, de Souza Faria GH, Andrade Pereira Soares MJ, Amorim Silva MC, da Silva Júnior RG. A Rare Case of Multicentric Reticulohistiocytosis in An Elderly Male Patient. Selcuk Med J 2024;40(1): 45-48

Disclosure: Author has not a financial interest in any of the products, devices, or drugs mentioned in this article. The research was not sponsored by an outside organization. Author has agreed to allow full access to the primary data and to allow the journal to review the data if requested.

"This article is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/) (CC BY-NC 4.0)"



INTRODUCTION

Multicentric reticulohistiocytosis (MRH) is a rare systemic proliferative granulomatous disease of non-Langerhans cells, characterized by symmetrical polyarthritides with papulonodular skin lesions with a craniocaudal distribution. MRH is a disease of unknown etiology and unpredictable course. Typically, it presents with periods of exacerbation that can vary over time, spontaneous regression despite some joint and dermatological involvement. Internal organs can also be involved, causing pleural and pericardial effusion. On histology, a dense histiocyte infiltrate, containing typical multinucleated cells at the site of the lesion, is identified. The prevalence of MRH is not fully known, and approximately 300 cases worldwide have been reported to date. Several case reports have demonstrated an association between MRH and malignancies, such as lung and breast cancer. The diagnosis of MRH requires a clinical, radiological, and histopathological approach. Treatment is challenging due to the lack of knowledge about the etiology (1–4).

The aim of this study is to report a case of multicentric reticulohistiocytosis that is easily misdiagnosed in clinical practice.

CASE

A 74-year-old man arrived at the Rheumatology office in December 2022, complaining of arthralgia for six months on the proximal interphalangeal joint (PIP), distal interphalangeal joint (DIP), and wrists, elbow, and knees, associated with morning stiffness, joint edema, and weakness in the upper and lower limbs. The patient reported cutaneous papules on the extensor surface of the hand and nail fold joints; hyperemia on the dorsal region; and asthenia in the upper and lower limbs. He lost 12 kg in 6 months, complained of insomnia and denied fever, lung and intestinal symptoms, alcoholism, and smoking. Prior history included systemic arterial hypertension, diabetes mellitus, glaucoma, and benign prostatic hyperplasia. Metformin 500 mg, losartan 50 mg, and glibenclamide 5 mg were used. Prednisone had also been prescribed 20 mg for four months.

On physical examination, papules on the dorsal surface of the PIP, base of the nose and lateral side of the right hallux were observed. Hyperemia on the back and edema of the PIP and DIP joints, wrist and knees were also identified, as shown in Figures 1 and 2.

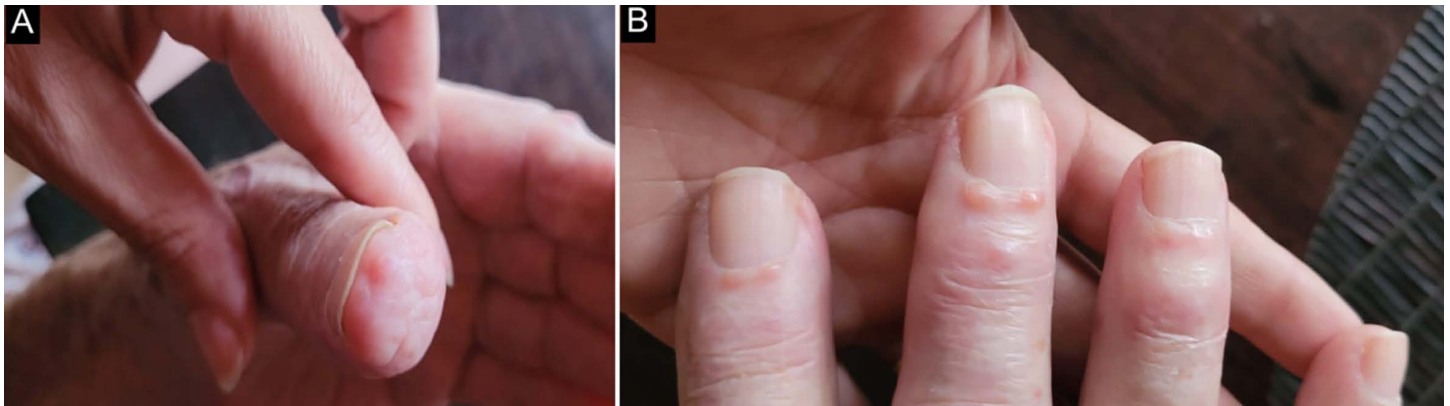


Figure 1 (A, B). Papules of the nail fold region observed at first consultation.



Figure 2. The patient had cutaneous papules on the extensor surface of the PIP and DIP joints (A) and base of the nose (B).

Laboratory tests revealed erythrocyte sedimentation time (ESR) and anti nuclear antibody (ANA) values within normal limits. Tests were negative for rheumatoid factor, Anti-Sm, Anti-Ro, Anti-CCP, HIV, and HCV. Chest tomography showed right axillary lymph node enlargement, measuring 2.7 cm, atheromatous aorta, and streaks with scattered atelectasis in the lower lobe, without other changes. On total abdominal

ultrasound, prostate enlargement was identified. A skin biopsy with immunohistochemistry detected atypical acinar proliferation. Histopathological analysis of skin biopsy stained in hematoxylin-eosin (January 2023) showed dense histiocytic infiltrate in the skin (Figure 1A). Detail of the histiocytic component displayed a "ground glass" eosinophilic cytoplasm (Figure 1B). Immunohistochemistry study of the skin was

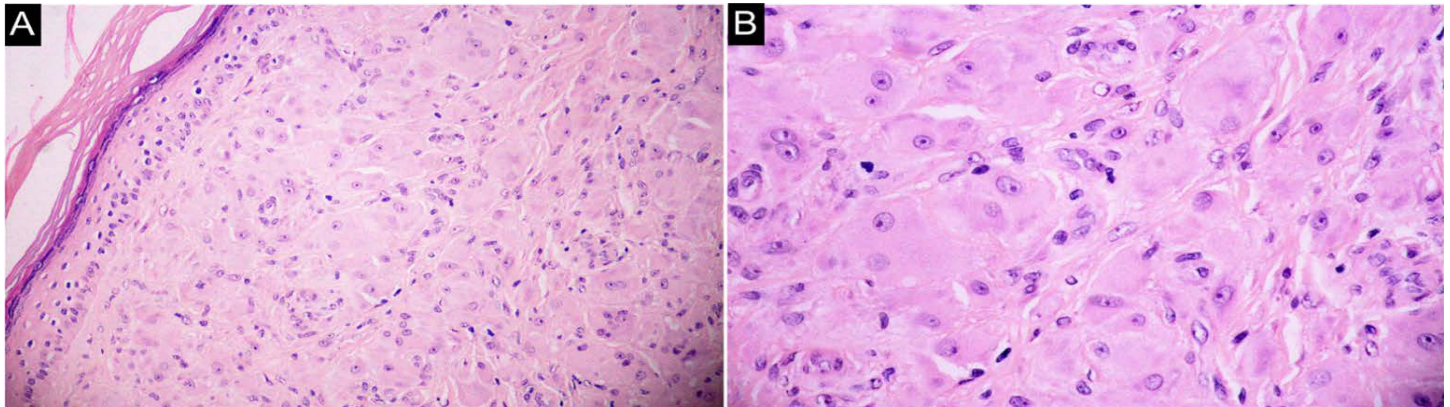


Figure 3. Histopathology of skin biopsy stained in hematoxylin-eosin. (A): 200x Magnification. (B): 400x Magnification.

negative for S100 and CD34 and positive for CD68. The final diagnosis was MRH. The patient initiated treatment with methotrexate 15 mg, increasing the dose to 20 mg after one month. Folic acid and risedronate were given and prednisone was maintained.

On telemedicine reassessment on February 17, 2023, the patient reported continuous pain on the metatarsophalangeal joints, wrist, elbow, and right shoulder; knee pain and redness. His weight had stabilized at 61 kg and he denied cough, fever or urinary changes. On physical examination, he presented limited flexion of his fingers and rotation of his right shoulder, knee arthritis, and a right armpit lymph node. He was emaciated, eupneic, acyanotic, and had papular skin lesions on his fingers. Management included maintenance of prednisone 20mg, with initiation of celecoxib and tramadol 2x/day. The patient remains under rheumatological care to monitor disease progression and therapeutic efficacy.

The patient authorized the publication of this case and signed the Free and Informed Consent Form (FICF).

DISCUSSION

MRH is a rare, severe, multisystemic disease that corresponds to an inflammatory response to stimuli of unknown origin. The most frequently affected age group is 43 years old. Caucasian women between the fifth and sixth decades of life are more commonly affected, as described in the literature. In contrast, this case report shows a 74-year-old male

patient. The condition is marked by severe polyarthritis and mucocutaneous eruptions. Histopathology reveals histiocytes with a "ground glass" appearance, PAS-positive cytoplasm and resistant diastasis due to the autophagy-lysosomal pathway (5–8).

The severity of the disease lies in disfiguring lesions on the face and mutilating arthritis that affect up to 45% of cases, resulting in the loss of quality of life. The entity can be classified in the group of non-X histioses, along with juvenile and adult xanthogranulomas; and benign cephalic and sinus histiocytosis, for example. Before the term multicentric reticulohistiocytosis was coined in 1954 by Goltz and Laymon, many other terms were used to characterize this nosocomial entity. However, MRH is differentiated from other reticuloendothelial diseases and its systemic nature has been defined (6,7). In 1969, 33 patients were studied by Barow and Holubar and malignancies were associated with 15% of cases. Other diseases such as diabetes mellitus, tuberculosis (active phase) and thyroid disorders, as well as autoimmune disorders were also associated with MRH. It has been hypothesized that MRH is a paraneoplastic condition. However, progression of MRH is not linked to cancer itself and does not change when the latter is excluded. Among members of the same family, there is a 12% association with MRH manifestations, invalidating the hypothesis of a hereditary cause (8).

The natural history of the disease is marked by periods of flare-ups and remissions of subcutaneous nodules. There

are periods of improvement interspersed with worsening of arthritis, which can be disabling. Arthritis is the most prominent disease manifestation, occurring in up to 45% of cases. Onset is usually insidious and progressive. Involvement of distal interphalangeal joints can lead to the "accordion hand" deformity, which is also found in rheumatoid arthritis and psoriatic arthritis (6).

Nodules can range from a few millimeters to 2 cm, with a craniocaudal progression. Cutaneous lesions that acquire a convalescent nature on the face are referred to as leonine facies. As described in this case report, MRH prefers the hands, juxta-articular areas, and face. Anal and genital mucous membranes are spared, unlike the lips, gums, and nasal septum (7). On histopathology, lymphocytes and giant cells are replaced by fibrosis, with the presence of fibroblasts. On immunohistochemistry, similar to this case study, the marker for Langerhans cells S100, for example, dermal dendrocytes type I (Factor XIIIa) and type II CD34 were negative. The test was positive for the monocyte/macrophage marker CD68, which occurs in around 100% of cases in the literature (8). Therefore, with the evidence above, it can be concluded that MRH has a probable monocyte-macrophage origin (CD45+, CD68+). It originates from a histiocyte between dermal and articular tissues. The main differential diagnoses, apart from psoriatic and rheumatoid arthritis, are lepromatous leprosy, disseminated xanthomas, and fibroxanthomas, tumor stage of mycosis fungoides, cutaneous lymphomas, and cutaneous sarcoidosis (7).

Internal organs, such as the heart (causing pericardial effusion, and heart failure); pleura, and lungs can be affected (8). The course of the disease is usually five to eight years until facial involvement and joint limitation occur. Nevertheless, a combination of methotrexate, cyclophosphamide, steroids, and other immunomodulators has proven effective for disease remission. It is worth highlighting that anti-TNF agents can be added to treat resistant MRH. Once the diagnosis of MRH is made, it is also necessary to screen for cancer, since around 1/3 of patients metachronously and synchronously develop cancer (6). A study has shown that approximately one-third of analyzed patients (n = 24) had autoimmune disorders, and about twenty-five percent of these patients had an associated malignancy (9). It is important to note that this disease can mimic and even coexist with rheumatic conditions. Patients may seek rheumatology or dermatology consultations, and inadvertently be diagnosed with rheumatoid arthritis or dermatomyositis, potentially resulting in misdiagnosis or missed underlying cancers.

In conclusion, clinical manifestations, including skin and joint changes, with signs and symptoms of rheumatic disorders (e.g. dermatomyositis and rheumatoid arthritis) similar to those of MRH are expected in rheumatology practice. However, knowledge about disease progression in MRH is limited. Therefore, this case report is described due to its rarity. Furthermore, specialists need to know the importance of early detection of the disease by clinical examination and histopathology, differentiating MRH from other rheumatic

diseases.

Conflict of interest: Author declares that there is no conflict of interest between the authors of the article.

Financial conflict of interest: Author declares that he did not receive any financial support in this study.

Address correspondence to: Rafael Everton Assunção Ribeiro da Costa, Medicine Student, Health Science Center, State University of Piauí, Teresina, Brazil

e-mail: rafaelearcosta@gmail.com

REFERENCES

1. Rezuş E, Burlui MA, Cardoneanu A, et al. Multicentric Reticulohistiocytosis Exhibiting Positive HLA-B*07 and HLA-B*08: A Case Report. *Medicine (Kaunas)* 2020;56(9):456.
2. Farokhi A, van Vugt RM, Hoekzema R, et al. Multicentric reticulohistiocytosis: a case report. *BMC Res Notes* 2018;11(1):647.
3. Baek IW, Yoo SH, Yang H, et al. A case of multicentric reticulohistiocytosis. *Mod Rheumatol* 2017;27(1):165-8.
4. Tajirian AL, Malik MK, Robinson-Bostom L, et al. Multicentric reticulohistiocytosis. *Clin Dermatol* 2006;24(6):486-92.
5. Barrow MV, Sunderman FW Jr, Hackett RL, et al. Identification of tissue lipids in lipid dermatoarthritis (multicentric reticulohistiocytosis). *Am J Clin Pathol* 1967;47(3):312-25.
6. Barrow MV. The nails in multicentric reticulohistiocytosis. (Lipoid dermatitis). *Arch Dermatol* 1967;95(2):200-1.
7. Luz FB, Gaspar NK. Multicentric reticulohistiocytosis. *An. Bras. Dermatol* 1999;74(5):497-503.
8. Mariotti EB, Corrà A, Lemmi E, et al. Multicentric Reticulohistiocytosis Associated with an Early Form of Systemic Lupus Erythematosus: A Case Report of a Rare Disease, with Mini Review of the Literature. *J Clin Med* 2022;11(21):6529.
9. Sanchez-Alvarez C, Sandhu AS, Crowson CS, et al. Multicentric reticulohistiocytosis: the Mayo Clinic experience (1980-2017). *Rheumatology (Oxford)* 2020;59(8):1898-905.