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A rare bacterium isolated from a breast abscess on sebaceous cyst: *Gleimia europaea*

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ABSTRACT

Breast abscesses developing on pre-existing sebaceous cysts are exceptionally rare. Actinomyces species are infrequently isolated as primary pathogens in breast abscesses. As part of the human commensal flora, these bacteria can cause opportunistic chronic infections, often presenting with a granulomatous and slowly progressive clinical course. *Gleimia europaea* (formerly *Actinomyces europaeus*), a rare causative agent of actinomycosis, has been infrequently reported in clinical infections. In this case report, we discuss an unusual instance of a breast abscess caused by *G. europaea*, arising in the background of a pre-existing sebaceous cyst.

Keywords: *Actinomyces spp.*, *Breast Abscesses*, *Gleimia europaea*, *Sebaceous Cyst*

ÖZET

Önceden var olan bir sebace kist üzerinde gelişen meme apsesi son derece nadirdir. Actinomyces türleri, meme apselerinde primer patojen olarak nadiren izole edilir. İnsan kommensal florasının bir parçası olan bu bakteriler, genellikle granülomatöz ve yavaş ilerleyen bir klinik seyirle ortaya çıkan fırsatçı kronik enfeksiyonlara neden olabilir. *Gleimia europaea* (eski adıyla *Actinomyces europaeus*), aktinomikozun nadir görülen etkenlerinden biri olup klinik enfeksiyonlarda oldukça seyrek bildirilmiştir. Bu olgu sunumunda, önceden var olan bir sebace kist zemininde gelişen *G. europaea* kaynaklı nadir bir meme apsesi vakası irdelenmektedir.

Anahtar Kelimeler: *Actinomyces spp.*, *Gleimia europaea*, *Meme absesi*, *Sebase kist*.



INTRODUCTION

Actinomyces species are rarely isolated as primary pathogens in breast abscesses, with most reported cases occurring in premenopausal women (Silva et al 2011). These bacteria are part of the normal flora of the oropharynx, gastrointestinal tract, and genitourinary tract. More than 30 species have been identified as potential human pathogens, many of which are opportunistic and cause granulomatous infections typically follow a protracted and indolent clinical course (Wong, Turmezei and Weston, 2011). Actinomyces israelii is the most commonly isolated species, followed by A. turicensis, A. radingae, A. viscosus, A. neuii, and A. europaeus (Nielsen, 2015). Gleimia europaea, a rare causative agent of actinomycosis, has been infrequently reported in clinical infections. When it was first isolated as a causative infectious agent in humans back in 1997, it was named as Actinomyces europaeus (Funke et al., 1997). It was later classified as Gleimia by advanced genomic-based studies (Nouioui et al., 2018).

Breast abscesses are commonly caused by polymicrobial flora, with Staphylococcus aureus being the most frequent primary pathogen (Saboo and Bennett, 2018; Russell et al., 2020; Gollapalli et al., 2010). However, the development of a breast abscess on a pre-existing sebaceous cyst is highly uncommon. Risk factors for breast abscesses include smoking, diabetes mellitus, obesity, and nipple piercing.

In this case report, we present a rare instance of a breast abscess caused by G. europaea, which developed in the background of a pre-existing sebaceous cyst.

CASE

A 61-year-old woman applied to the General Surgery Clinic with complaints of pain and swelling in her right breast that had been increasing for approximately 5 days. On physical examination, fluctuation, tenderness, and swelling were observed. Blood tests and radiological examinations were requested for the patient with a preliminary diagnosis of

non-lactating mastitis. When risk factors such as smoking, obesity, and diabetes were questioned, no risk or comorbidity was detected except for a body mass index of 32.6 kg/cm². Blood count and biochemical parameters were within normal limits except for slightly elevated white blood cells (11.673/ μ L). But ultrasonographic evaluation of the right breast revealed a loculated cystic lesion, diagnosed as an abscess, possibly arising from an underlying sebaceous cyst. The patient was initially prescribed ciprofloxacin (2x500 mg oral); however, the treatment did not result in optimal clinical improvement. Subsequently, the abscess was surgically drained. Purulent fluid from the abscess and biopsy material from the suspected cyst were collected for microbiological and pathological evaluation.

For microbiological analysis, slides were prepared from the purulent sample for Gram-stained microscopic examination. The sample was inoculated onto 5% sheep blood agar, chocolate agar, and eosin methylene blue (EMB) agar under both aerobic and anaerobic conditions. Gram staining revealed numerous polymorphonuclear leukocytes and gram-positive filamentous coccobacilli. After 48 hours of incubation at 35–36°C under both aerobic and anaerobic conditions, smooth, transparent, gray-colored pure colonies were observed on the bacteriological plates.



Fig 1. Tiny, smooth, transparent gray colored colonies of *G. europaea*

Identification via mass spectrometry (bioMérieux, France) confirmed the bacterial species as *Gleimia europaea*. The European Committee on Antimicrobial Susceptibility Testing (EUCAST), which is widely followed in microbiology laboratories in our country, has not yet established specific antimicrobial breakpoints for *Gleimia* spp. Therefore, a gradient strip test (E-test, bioMérieux, France) was performed on Brucella agar containing 5% sheep blood under anaerobic incubation to determine susceptibility to various antibiotics, including penicillin, amoxicillin/clavulanate, piperacillin/tazobactam, clindamycin, erythromycin, and ciprofloxacin.

The isolate was found to be susceptible to amoxicillin/clavulanate and piperacillin/tazobactam but resistant to penicillin, clindamycin, erythromycin, and ciprofloxacin, based on comparative EUCAST criteria for other *Actinomyces* spp. and anaerobes (Wolff et al., 2022). Consequently, the patient's antibiotic regimen was adjusted to amoxicillin/clavulanate, leading to full recovery after 14 days of treatment. Histopathological analysis confirmed the diagnosis of a sebaceous cyst.

DISCUSSION

Breast abscesses are a serious condition associated with significant morbidity, particularly in lactating women, often leading to breastfeeding interruption and its associated consequences. A breast abscess is defined as a localized infection characterized by a walled-off collection of pus, often occurring as a severe complication of mastitis (Pileri et al., 2022). Besides lactating women, non-lactating mastitis and abscesses are relatively uncommon. Squamous metaplasia of the lactiferous duct epithelium, ductal ectasia, obstruction or dilation of lactiferous ducts can be responsible for the pathogenesis of the breast abscesses (Saboo and Bennett, 2018).

Several risk factors have been identified, including advanced maternal age at delivery, primiparity, post-term gestation (>41 weeks), previous mastitis, cracked nipples,

breastfeeding difficulties during hospitalization, and being a working mother (Pileri et al. 2022; Cobo, Guillot and Navarro-Marí, 2020). Treatment options for breast abscesses include antibiotic therapy, ultrasound-guided needle aspiration, and incision and drainage, though there remains no definitive consensus on the optimal treatment approach. However, prolonged hospital stay, poor wound healing, scarring, and poor cosmetic results are the drawbacks of surgical drainage. Recently, with the development of radiological imaging methods and cosmetic concerns, less invasive alternative methods such as ultrasound-guided needle aspiration have been used instead of surgical incision (Kang and Kim, 2016).

Routine bacteriological cultures remain the gold standard for identifying the causative microorganism (Cobo, Guillot and Navarro-Marí, 2020). However, breast abscesses caused by *Actinomyces* species are rare (Bing et al., 2015). Even more uncommon is an abscess developing on the background of a sebaceous cyst, as in this case.

As part of the human commensal flora, *Actinomyces* species can cause opportunistic chronic infections, often presenting with a granulomatous and slowly progressive clinical course (Valour et al. 2014; Wong, Turmezeian and Weston, 2011). The most commonly observed actinomycoses occur in the cervicofacial, thoracic, abdominopelvic, and central nervous system regions (Smith et al. 2005). However, the pathological role of *Actinomyces* species is often overlooked, and their accurate identification remains a challenge. Correctly identifying these rare species is crucial for initiating appropriate antimicrobial therapy. Routine bacteriological culture and phenotypic identification methods frequently fail to distinguish *Actinomyces* species, particularly less common ones like *Gleimia europaea*. The bacterium's complex nutritional requirements, slow growth, and strict anaerobic conditions further complicate its identification (Lynch, Gregson, Church, 2016). When bacterial colonies that grow as small, indistinct colonies are detected in 5% sheep blood agar medium under aerobic and especially

anaerobic conditions, and when gram-positive rod-shaped bacteria are observed in Gram-stained smears, *Actinomyces* species should be considered (Figure). The introduction of MALDI-TOF mass spectrometry in many clinical microbiology laboratories has improved identification rates compared to conventional techniques, though molecular methods remain superior (Lynch, Gregson, Church, 2016).

Infections arising from sebaceous cysts are highly uncommon, making the isolation of a rare bacterium like *G. europaea* in such an infection particularly remarkable. The clinical manifestations of *Actinomyces* infections often resemble fungal infections, which can lead to misdiagnosis and inappropriate antimicrobial therapy (Allen, James and Jain, 2021). Previously considered a low-virulence anaerobe, *G. europaea* has now been recognized as an emerging pathogen capable of causing severe infections such as necrotizing fasciitis (Anthony, Douthit, Foster, 2023). Additionally, this species has developed resistance to multiple antibiotics, increasing the likelihood of treatment failure. Standardized antimicrobial susceptibility breakpoints for *G. europaea* have yet to be established. However, as the number of reported infections increases, the determination of susceptibility standards will become essential for guiding empirical treatment strategies.

For anaerobic bacteria, EUCAST recommends agar dilution as the gold standard for antimicrobial susceptibility testing. However, this method is time-consuming and impractical for routine clinical use. The gradient test strip method provides a faster, relatively reliable alternative, though discrepancies have been reported due to the slow and inconsistent growth of *Actinomyces* species, which can make inhibition zones difficult to interpret (Wolff et al., 2022).

Beta-lactam antibiotics combined with beta-lactamase inhibitors are generally considered first-line therapy for *Actinomyces* infections. In vitro susceptibility testing of *G. europaea* isolates against 12 antimicrobial agents demonstrated resistance to tetracycline, ciprofloxacin, clindamycin, erythromycin, and piperacillin/tazobactam.

Additionally, high minimum inhibitory concentrations (MICs) of linezolid and ciprofloxacin suggest a risk of treatment failure with these agents (Smith et al., 2005). Chronic, densely inflamed abscess tissue often impedes antibiotic penetration, necessitating surgical drainage as an adjunct to antimicrobial therapy.

As a conclusion, in cases of abscesses developing on the basis of sebaceous cysts, rare pathogens should be kept in mind and advanced diagnostic methods should be used. Accurate identification and antimicrobial susceptibility testing are essential for achieving successful treatment outcomes. Amoxicillin/clavulanate appeared to be the most appropriate antimicrobial choice due to its beta-lactamase inhibitory activity and broad-spectrum efficacy against infectious agent in this case. When necessary, surgical drainage alternatively, ultrasound guided needle drainage should be performed to enhance treatment success.

Conflict of Interest

There are no any conflict of interest.

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Sağlık çalışanlarında 3. el sigara maruziyeti hakkında bilinç ve algı düzeylerinin değerlendirilmesi

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ÖZET

Dumanlı ortamlarda bulunmak, istemsiz sigara dumanına maruz kalmayı kaçınılmaz kılmaktadır. Son yıllarda yapılan çalışmalar, sigara dumanı kalıntılarının iç ortam maddeleriyle etkileşimi sonucu oluşan üçüncü el sigara dumanının da ciddi sistemik etkiler yarattığını göstermektedir. Bu çalışmada, sağlık çalışanlarının demografik özellikleri ile üçüncü el sigara dumanına ilişkin farkındalıkları arasındaki ilişki değerlendirildi. Tanımlayıcı nitelikteki bu çalışma, hastanemizde görev yapan 276 sağlık çalışanı ile yürütülmüştür. Çalışma öncesi etik kurul onayı alınmıştır (Necmettin Erbakan Üniversitesi, Karar no: 2024/5364). Katılımcılara pasif içicilik ve üçüncü el sigara dumanına ilişkin sorular içeren anket ve Üçüncü El Duman Hakkında İnançlar (BATHS) ölçeği uygulanmıştır. Yaş, cinsiyet, eğitim durumu, gelir düzeyi, ikamet yeri ve sigara kullanım bilgileri toplanmış; veriler SPSS programı ile analiz edilmiştir. Çalışmaya 276 sağlık çalışanı katılmış, katılımcıların çoğunluğu (%72,1) kadın ve %52,9'u sigara içmektedir. Sigara kullanımı en çok hemşirelerde görülmüştür. Katılımcıların çoğu 25-40 yaş aralığında, evli ve kendi evinde yaşamaktadır. Ekonomik durumunu "iyi" olarak değerlendirenlerin oranı en yüksektir. BATHS-T anketiyle değerlendirilen üçüncü el sigara farkındalığında, çoğu katılımcı sigara içilen ortamlardaki kalıcı dumanın zararlı olduğunu belirtmiştir. Farkındalık, sigara kullanım süresi, meslek grubu ve gelir düzeyiyle anlamlı ilişki göstermiştir. Hemşireler ve yüksek gelir grubundakiler daha yüksek farkındalık skoruna sahipken, yardımcı sağlık personelinde ve düşük gelir grubunda farkındalık düşüktür. Sağlık çalışanları üçüncü el sigara dumanının zararları ve çevresel kalıcılığı hakkında yüksek farkındalığa sahiptir. Bu farkındalık, bireylerin sigara içme durumlarından bağımsızdır.

Anahtar kelimeler: Sigara, Pasif Sigara İçimi, Sağlık Çalışanları.

ABSTRACT

Being in smoky environments makes involuntary exposure to cigarette smoke inevitable. Recent studies have shown that third-hand smoke, which is formed by the interaction of cigarette smoke residues with indoor substances, also causes serious systemic effects. In this study, the relationship between demographic characteristics of healthcare workers and their awareness of third-hand smoke was evaluated. This descriptive study was conducted with 276 healthcare workers working in our hospital. Ethics committee approval was obtained before the study (Necmettin Erbakan University, Decision no: 2024/5364). Participants were administered a questionnaire containing questions about passive smoking and third-hand smoke and the Beliefs About Third-Hand Smoke (BATHS) scale. Information on age, gender, educational status, income level, place of residence and smoking were collected and the data were analysed with SPSS software. The study included 276 healthcare workers, the majority of whom were women (72.1%) and 52.9% were smokers. Smoking was most common among nurses. Most participants were between the ages of 25 and 40, married, and living in their own homes. The highest proportion rated their economic status as "good." According to the BATHS-T questionnaire assessing third-hand smoke awareness, most participants agreed that lingering smoke in previously smoked-in rooms is harmful. Awareness was significantly associated with smoking duration, profession, and income level. Nurses and those with higher income had higher awareness scores, while support staff and participants with lower income had lower levels of awareness. Healthcare workers were more aware of the harms of third-hand smoke and the environment.

Keywords: *Smoking, Passive Smoking, Healthcare Workers.*

GİRİŞ

Sigara kullanımı, günümüzde hâlâ önemli bir halk sağlığı sorunu olmaya devam etmektedir Dünya Sağlık Örgütü'nün (DSÖ) 2023 raporuna göre sigara kullanımı ciddi bir halk sağlığı tehdidi olmaya devam ediyor. Her yıl yaklaşık 7 milyon insanın ölümünün doğrudan sigaraya bağlı olduğu düşünülmekle beraber 8 milyon insanın toplamda sigaraya bağlı hastalıklar nedeniyle öldüğü düşünülmektedir (Dünya Sağlık Örgütü. Küresel Tütün Salgını Raporu 2023). Aktif sigara kullanımının yanı sıra, pasif ve üçüncü el sigara maruziyeti de ciddi sağlık riskleri taşımaktadır. Sigara dumanına doğrudan maruz kalmayan bireylerde bile, çevresel duman yoluyla solunum ve kardiyovasküler sistem başta olmak üzere birçok sistem etkilenmektedir (Salehi vd. 2021, Başaran vd. 2005).

Pasif içicilik, sigara içilen ortamlarda bulunan bireylerin istemsiz olarak dumanı solumasıdır. Bu durum hem kısa vadede irritatif semptomlara hem de uzun vadede ciddi hastalıklara yol açabilir (De Borja vd. 2014). Özellikle kapalı ortamlarda uzun süreli bulunma, bu maruziyetin etkilerini artırmaktadır (Mathre vd. 2004).

Üçüncü el sigara dumanı ise sigara içildikten sonra ortamdaki yüzeylere yerleşen zararlı kimyasalların birikimiyle oluşur (Olivieri vd. 2019). Bu maddeler, zamanla solunabilir hâle gelir veya cilt temasıyla vücuda alınabilir. Özellikle bebekler ve küçük çocuklar, bu maddelere karşı daha savunmasızdır (Winickoff vd. 2009, Drehmer vd. 2017).

Sağlık çalışanları, hem çalışma ortamlarında sigara içen bireylerle temas etmeleri hem de uzun süre kapalı alanlarda bulunmaları nedeniyle bu maruziyet türlerine daha fazla açık olabilirler. Buna rağmen, bu gruba yönelik yapılan araştırmalar oldukça sınırlıdır.

Bu çalışmanın amacı, sağlık çalışanlarında üçüncü el sigara maruziyeti ile ilgili farkındalık, risk algısı ve korunma davranışlarını değerlendirmek; mesleki maruziyet düzeylerinin bu durum üzerindeki etkisini incelemektir. Elde

edilecek verilerin hem literatüre katkı sunması hem de koruyucu stratejilerin geliştirilmesine temel oluşturması hedeflenmektedir.

MATERYAL VE METOT

Bu tanımlayıcı kesitsel çalışma, Özel Medicana Konya Hastanesi'nde 276 sağlık çalışanı ile yürütülmüştür. Tüm katılımcılar pasif sigara içiciliği maruziyetini sorgulamak için tasarlanmış anketi ve Üçüncü El Sigara Dumanı Farkındalık Ölçeği (BATHS) anketini tamamlamıştır. Yaş, cinsiyet, hastanedeki pozisyon, sigara içme geçmişi, ikametgâh gibi demografik veriler kaydedildi ve sigara kullanım durumu ile birlikte değerlendirildi. Pasif sigara içiciliği maruziyetini etkileyen faktörler, BATHS anketi değerlendirmesiyle 3. el sigara maruziyeti değerlendirildi.

Çalışma öncesi Necmettin Erbakan Üniversitesi Etik Kurulundan onay alınmıştır (Karar sayısı: 2024/5364).

Veri Toplama Yöntemleri

BATHS değerlendirmesi, Haardörfer ve ark. tarafından üçüncü el sigara dumanı maruziyeti hakkındaki inançları belirlemek için geliştirilmiştir. Bu çalışmada, Türk nüfusu için geçerli ve güvenilir olan BATHS anketinin Türkçe versiyonu (BATHS-T) kullanılmıştır. BATHS-T ölçeği 9 maddeden oluşmaktadır. Anket iki bölümden oluşmaktadır: sağlık etkilerinin değerlendirilmesi (maddeler 1, 2, 3, 7, 8); ve ortamda kalıcılık (maddeler 4, 5, 6, 9). Her maddenin 5 puanlık Likert tipi yanıtı vardır: 1) Kesinlikle katılmıyorum; 2) Katılmıyorum; 3) Kararsızım; 4) Katılıyorum ve 5) Kesinlikle katılıyorum.

Demografik Özellikler

Sosyodemografik bilgiler, yaş, cinsiyet, meslek, ikamet yeri (ev, aile evi), aile gelir düzeyi, sigara içme durumu ve pasif içicilik maruziyeti bilgileri ve çalışmadaki sağlık çalışanlarının BATHS-T ölçeği çevrimiçi bir anket kullanılarak değerlendirildi.

Çalışma katılımcılarının yaşları, çalışma popülasyonunda

ölçülen sürekli yaş değişkeninin dağılımını yaklaşık olarak belirlemek için kategorilere ayrıldı. Katılımcıların meslekleri hastane görevlerine göre kategorilere ayrıldı. Aile gelir düzeyi çok iyi, iyi, ortalama, ortalamanın altında ve düşük olarak tanımlandı. Konaklama, kendi evi ve aile yanı olarak tanımlandı. Daha önce sigara içmiş olanlara ayrıca son 30 günde hiç sigara içip içmedikleri soruldu. Sigara içme durumu hiç, eski (içmiş ancak son 30 günde içmemiş) ve mevcut (son 30 günde sigara içmiş) olarak tanımlandı.

İstatiksel Analiz

Çalışmada elde edilen veriler IBM SPSS Statistics for Windows, Version 25.0 programı kullanılarak analiz edilmiştir. Verilerin normal dağılıma uygunluğu Kolmogorov Smirnov testiyle değerlendirildi. Kategorik veriler, sayı ve yüzde şeklinde ve sürekli veriler ortalama, standart sapma ve minimum-maksimum değerleriyle birlikte verildi. Sigara içme yılı gibi sürekli değişkenlerin 3. el sigara dumanı maruziyeti farkındalığı ile ilişkisi Spearman korelasyon analiziyle değerlendirildi. Kategorik değişkenlerin (cinsiyet, sigara içme durumu) 3. el sigara dumanı maruziyeti farkındalığı açısından bağımsız ikili ve çoklu grup karşılaştırmaları sırasıyla Mann-Whitney U testi ve Kruskal-Wallis testi kullanılarak değerlendirildi. $p < 0.05$ anlamlılık düzeyi olarak kabul edildi.

BULGULAR

Çalışmaya toplam 276 kişi katıldı. Katılımcıların özellikleri Tablo 1'de sunulmaktadır. Çalışmaya katılanların 199'unun(%72,1) kadın ve 77'sinin (%27,9) erkek olduğu görüldü. Araştırmadaki sağlık çalışanlarının büyük çoğunluğu ($n=153$) 25-40 yaş arası gruptan oluşuyordu. Sağlık çalışanlarının yaşadıkları yer sorgulandığı zaman 196'ı (%71,1) kendi evinde, 80'i (%28,9) ailesi ile kaldığını belirtmişti. Medeni durumlarına bakıldığında 107'i (%38,8) bekar, 169'unun (%61,2) evli olduğu görüldü. Sigara kullanımı kadın çalışanlarda 123 (%62) daha yüksekti, erkek çalışanlarla arasında anlamlı fark saptanmadı.

Tablo 1. Katılımcıların Özellikleri

Yaş, yıl, ortalama \pm SD, (min-maks)	36.14 \pm 2.12 (18.0-66.0)
Cinsiyet, n(%)	
kadın	199 (72.1)
erkek	77 (27.9)
Meslek,n(%)	
Doktor	18 (4.9)
Hemşire	153 (42.2)
Tıbbi Sekreter	50 (13.8)
Yardımcı sağlık personeli	45 (12.4)
Diğer	10 (2.7)
Sigara içme durumu	
hayır	109 (39.49)
evet	146 (52.9)
eski (Sigara içmiş , ancak son 30 gün içinde değil)	15 (5.43)
Sigara içme yılı, ortalama \pm SD, (min-maks)	4.79 \pm 2.61 (0.0-25.0)
Kalınan yer, n(%)	
Kendi evi	196 (54)
Aile yanı	80 (46)
Sağlık sektöründe çalışma süresi,n(%)	
0-5 yıl	38.2
5-15 yıl	40.5
15-25 yıl	13,2
>25 yıl	8,1

Sağlık çalışanlarının ekonomik durumlarını sorguladığımız zaman 9'unun (%2,4) çok iyi, 168'inin (%46,3) iyi, 73'ünün (%20,1) orta, 32'sinin (%8,8) ortalamanın altında, 17'sinin (%4,6) düşük olduğu gözlemlendi. Sigara kullanımını incelediğimiz zaman katılımcıların 146'sının (%52.9) sigara kullanıldığı gözlemlendi. Sağlık çalışanları arasında sigara kullanan gruba baktığımızda 97(%63,3) kişi ile hemşireler en yüksek sigara içme oranlarına sahipti.

Sağlık çalışanlarının 3. el sigara dumanı maruziyeti hakkındaki görüşlerini değerlendiren BATHS-T anketinde, 'dün insanların sigara içtiği bir odada bugün hava solumak bebek ve çocukların sağlığına zararlı olabilir' ifadesine 202(%83,5) sağlık çalışanı tarafından 'Katılıyorum' ve 'Kesinlikle katılıyorum' şeklinde yanıtlar verildi. Sağlık

çalışanlarının büyük çoğunluğu 161(%58,2) ‘duman parçacıkları bir odada haftalarca kalabilir’ ifadesine katılıyorum ve kesinlikle katılıyorum şeklinde cevap verdi.

Tablo 2: Üçüncü El Sigara Dumanı Hakkında Farkındalık Ölçeği

Dün sigara içilmiş bir odada bugün hava solumak, bebek ve çocukların sağlığına zarar verebilir	1- 9 (%6.8) 2-29 (%7.9) 3-36 (%11.5) 4-87 (%31.8) 5-115 (% 41.7)
Dün sigara içilmiş bir odada bugün hava solumak, yetişkinlerin sağlığına zarar verebilir	1-5 (%2.1) 2-15 (%5.4) 3- 60 (%21.7) 4- 78 (%28.2) 5-118 (% 42.3)
Dün sigara içilmiş odadaki duman partikülleri kansere yol açabilir	1-6 (%2.5) 2- 28 (%10.1) 3- 75 (%27.5) 4- 103 (%37.3) 5-64 (% 22.4)
Sigara içilen bir odada duman partikülleri günlerce kalabilir.	1- 5 (%2.1) 2- 18 (%6.5) 3- 38 (%13.4) 4- 103 (%37.3) 5- 112(% 40.5)
Sigara içilen bir odada duman partikülleri haftalarca kalabilir.	1- 6 (%2.1) 2- 34 (%12.3) 3- 75 (%27.1) 4- 80 (%28.9) 5- 81 (% 29.3)
Sigara içilen odada duman partikülleri mobilya ve duvarların içine işler.	1- 4 (%1.4) 2- 10 (%3.9) 3- 19 (%6.5) 4- 105(%38) 5-138(% 50)
Sigara içtikten sonra deri, saç ve elbiselerin üzerinde kalan duman partikülleri, diğer insanlara dokunarak geçebilir.	1-4 (%1.4) 2- 25 (%8.4) 3- 64 (%23.1) 4-130 (%46.3) 5-50 (% 20.2)
Sigara dumanının çıktığı yüzeylere dokunduktan sonra, parçacıklar vücudumuza deri yoluyla girebilir	1- 7 (%3.6) 2- 39 (%13.7) 3- 108 (%39.1) 4- 60 (%21) 5- 62 (% 22.4)
Camları açmak veya klima kullanmak bir odadaki tüm duman partiküllerini ortadan kaldırmaz.	1- 9 (%5.2) 2-24 (%8.3) 3- 62 (%22.1) 4- 103 (%36.9) 5- 78 (% 27.5)

1-Kesinlikle katılmıyorum, 2-Katılmıyorum, 3-Kararsızım, 4-Katılıyorum, 5-Kesinlikle katılıyorum

Ankette en düşük oranda katılıyorum ve kesinlikle katılıyorum cevabı verilen madde (%43,4) ise ‘sigara dumanının çıktığı yüzeylere dokunduktan sonra, parçacıklar vücudumuza deri yoluyla girebilir’ idi.

3. el sigara dumanı maruziyeti farkındalığının sigara kullanım yılı ile arasında anlamlı bir ilişkisi varken yaş değişkeni ile 3. el sigara dumanı maruziyeti farkındalığı arasında herhangi bir ilişki yoktu ($p>0.05$). Yapılan analizlerde, meslek grupları arasında üçüncü el sigara farkındalık skorları açısından istatistiksel olarak anlamlı bir fark bulunmuştur ($p=0.05$). Hemşireler en yüksek farkındalık skoruna sahipken, yardımcı sağlık personelinin skorları daha düşük bulunmuştur (Figür 1).

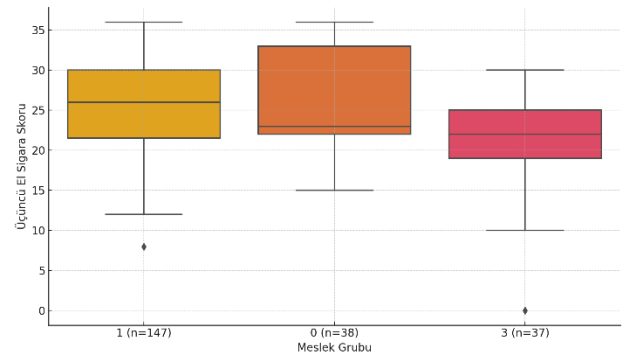
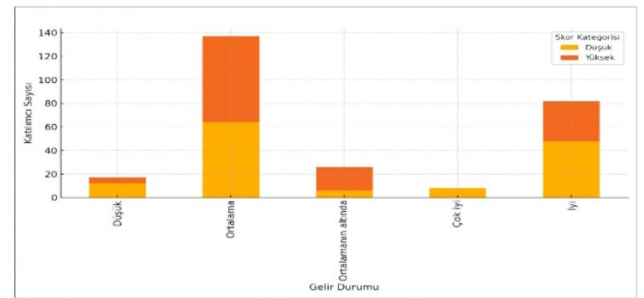


Fig 1. Meslek Gruplarına göre Farkındalık Skorları

0: Hekim; 1: Hemşire; 3: Sağlık memuru/Ebe

Gelir grupları ile üçüncü el sigara farkındalık skorları açısından istatistiksel olarak çok anlamlı bir fark bulunmuştur ($p<0.001$) (Figür 2) İyi gelir düzeyine sahip katılımcılar daha yüksek farkındalık skorlarına sahipken, ortalamasının altında gelir grubundakilerin skorları daha düşük bulunmuştur.



Figür 2: Gelir Durumuna Göre Üçüncü El Sigara Farkındalık Skorları Dağılımı

TARTIŞMA

Sigaranın sağlık üzerindeki etkileri yapılan çalışmalarda fazlasıyla ortaya konulmuştur. Bu nedenle sağlık çalışanlarının farkındalığını değerlendirmek önemlidir.

Günümüzde pasif içicilik daha bilinir olduğundan bu konuyla ilgili kapsamlı çalışmalar yapılmıştır. Fakat üçüncü el sigara dumanı maruziyeti ile yapılan çalışmalar daha az olmakla beraber özellikle sürekli hastane ortamında bulunan ve hastalarla teması olan sağlık çalışanlarının üçüncü el sigara dumanının zararlarına ilişkin farkındalık düzeyleri önemlidir.

Üçüncü el sigara dumanı maruziyeti, sigara dumanının aktif tüketim sonrası çevre yüzeylere birikimi ile ortaya çıkan toksik kalıntılara maruz kalmayı ifade eder. Bu maruziyetin temel kimyasal bileşenleri şunları içerir; Nikotin, tütün spesifik nitrozaminler, polisiklik aromatik hidrokarbonlar ve aldehitler. Nikotin, duvarlar, mobilyalar ve tekstil yüzeylerine kolayca bağlanır ve uzun süre bu yüzeylerde kalabilir. Nikotin, nitrozaminlerle reaksiyona girerek kanserojen maddelerin oluşumuna yol açabilir (Burton vd. 2011). Tütün Spesifik Nitrozaminler ise nikotinin, havada bulunan nitrojen oksitlerle reaksiyona girmesi sonucu oluşur. İnsanlarda potansiyel kanserojen olarak sınıflandırılmıştır (Matt vd. 2010). Bu kimyasallar, sigara dumanının çevresel yüzeylerde şeffaf bir kalıntı olarak birikmesine neden olur ve toksik etkileri uzun yıllar boyunca sürebilir.

Çocukların solunum sistemi gelişim aşamasında olduğu için toksik kimyasallara daha hassastır. Yüzeylere dokunduktan sonra ağzına temas yoluyla kimyasallara daha fazla maruz kalabilirler (Sleiman vd. 2010). Diğer taraftan kanser hastaları veya organ nakli hastaları gibi bağışıklığı baskılanmış bireyler, üçüncü el sigara maruziyetinden kaynaklanan kimyasalların toksik etkilerine karşı daha duyarlı olabilir. Bu nedenle hastane gibi alanlarda, bu maruziyeti azaltmaya yönelik daha etkili temizlik yöntemleri ve farkındalık eğitimleri gerekmektedir. Çocuklar ve bağışıklığı zayıf bireyler özel koruma altında olmalıdır. Hastane ortamlarında, üçüncü el sigara kalıntıları özellikle bekleme salonları, personel odaları ve sigara içilen alanların yakınında birikim yapabilir. Sigara dumanından kaynaklanan partiküller, havalandırma sistemleriyle taşınabilir ve bina genelinde dağılabilir. Perdeler, döşemeler ve plastik

ekipmanlar nikotini kolayca emer ve uzun süreli birikime neden olabilir (Mercan vd. 2023).

Daha önce 204 sağlık çalışanıyla yapılan bir çalışmada çalışanların %35'i anketi tamamlamadan önce üçüncü el sigara maruziyetini duymuştu ve yaklaşık %69'u bu konuya yeterince dikkat edilmediğine inanıyordu. Yapılan çalışmalar sağlık çalışanlarının sigara maruziyetine ilişkin bilgi ve algı düzeyleri, üçüncü el sigara dumanı konusundaki farkındalıklarının genel olarak düşük olduğunu göstermektedir (Darlow vd. 2016). Sağlık çalışanları arasında bu düşük farkındalık düzeyi, maruziyetin hastalar ve çalışanlar üzerindeki etkilerinin yeterince anlaşılmadığını ve bu konuda farkındalığın artırılması gerektiğini ortaya koymaktadır. Bizim de çalışmamızın sonucuna göre çalışanların %27,6'ı anketi tamamlamadan önce üçüncü el sigara maruziyetini duymuştu ve yaklaşık %71,8'i bu konuya yeterince dikkat edilmediğini düşünüyordu.

Sigara kullanımının her geçen gün artarak devam etmesi tüm ülkelerin ortak sorunları arasındadır (European Commission 2024). DSÖ' de son yıllarda bunun önüne geçilmesi ile ilgili çalışmalar yapmıştır. İlk olarak 1967 yılında düzenlenen bir konferans sonrası ve 1970 yılında rapor yayımlanmıştır. 1980 yılında DSÖ, Sigara ve Sağlık adlı projeyi geliştirmiştir. 1988 yılında ise 31 Mayıs "Dünya Tütünsüz Günü" ilan edilmiştir. 2003 yılında ise Tütün Kontrol Sözleşmesi imzalanmış ve bu doğrultuda 2008 yılında MPOWER ilkeleri hazırlanmıştır. Hazırlanan MPOWER ilkeleri; salgını ve koruyucu uygulamalarının izlenmesi, pasif sigara içiciliğinden toplumun korunması, sigaranın zararları hakkında toplumun bilinçlendirilmesi, reklam, tanıtım ve sponsorluğun kaldırılması, vergi ve fiyatlarının arttırılması olarak önemli ilkeleri kapsamaktadır. Bu ilkelerin uygulanmasıyla sigara kullanımına karşı daha duyarlı olunmasına yönelik önemli bir adım atılmış olup sigara kontrolünün daha iyi sağlanması amaçlanmıştır. DSÖ gibi uluslararası sağlık otoriteleri, üçüncü el sigara maruziyetini tütün kontrol politikalarının bir parçası olarak ele almaktadır. DSÖ, bu konuda farkındalığı artırmak için eğitim programları

ve toplum temelli kampanyalar önermekte, ev içi ve kamusal alanlarda sigara içilmemesini teşvik etmektedir. Avrupa Birliği'nde, üçüncü el sigara kalıntılarının azaltılmasına yönelik standart temizlik protokollerinin uygulanması önerilmektedir (Dünya Sağlık Örgütü, Küresel Tütün Salgını Raporu 2008).

Sigara kullanımının yaydığı olumsuz durumlar nedeniyle sigara bağımlılığının azaltılmasına ilişkin düzenlemelere rağmen ülkemizde de sigara tüketim miktarı giderek artmaktadır. Ulusal Tütün Kontrol Programında sigara tüketiminin engellenmesi amacıyla vergilerin arttırılması politikası benimsenmiştir Sigara vergileri yıllar itibarıyla genel olarak arttırılmıştır (Türkiye Cumhuriyeti Sağlık Bakanlığı. Ulusal Tütün Kontrol Programı ve Eylem Planı 2021-2025, 2021). Vergi oranlarının sigara kullanımını önemli derecede azaltmadığı ve devletin özel tüketim vergisi ile gelirlerini artırdığı görülmektedir. Sigara kullanmadığı halde çevredeki sigara dumanını solumak zorunda olan bireylerin sağlığı olumsuz yönden etkilenmekte ve negatif etkiler ortaya çıkmaktadır (Kostova vd. 2014).

Sigaraya bağlı ölümlerin artarak, 2030 yılında 8,4 milyona ulaşacağı öngörülmektedir (Mathers CD ve ark. 2006). Sigara kullanımının bu olumsuz etkileri bireysel ve toplumsal sağlık sorunlarının ötesine uzanmaktadır. Neden olduğu sağlık harcamaları ve iş gücü kaybı nedeniyle her yıl milyarlarca dolar harcanmaktadır. Başta sigara olmak üzere, tütün ve tütün ürünleri kullanımının insan sağlığı ve ekonomik sonuçları bilinmesine karşın hala önemli bir halk sağlığı sorunu olmaya devam etmektedir (Quispe-Cristóbal vd. 2022).

Ülkemizde hekim ve hemşirelerde sigara kullanma sıklığı topluma oranla daha yüksektir (Özvurmaz S, Yavaş S 2018). Bununla birlikte sağlık çalışanları sigara kontrolünde önemli role sahiptir. Çalışmamızda da sağlık çalışanları arasında sigara kullanan gruba baktığımızda 97(%63,3) kişi ile hemşireler en yüksek sigara içme oranlarına sahipti. Hemşirelerden sonra yardımcı sağlık personellerinin 26(%57,7) kişi ile ikinci sırada olduğu görüldü. Sağlık

profesyonelleri bireyin sigara içme durumunu değerlendirerek, sigaranın sağlık üzerine olan etkilerini anlatarak davranış değişim aşamalarında destekleyici görevler üstlenebilirler.

Eğitim düzeyi, bireylerin sağlık davranışları üzerinde önemli bir belirleyicidir; genellikle eğitim seviyesi yükseldikçe sağlıklı yaşam alışkanlıklarının benimsendiği ve yaşam süresinin uzadığı gözlemlenmektedir. Sigara kullanımı ise daha düşük eğitim düzeyine sahip bireylerde daha yaygın olup, bu durum sağlık eşitsizliklerinin derinleşmesine katkı sağlamaktadır. Bunun temel nedenlerinden biri, daha az eğitim almış bireylerin sigaranın zararları konusunda bilgiye erişim olanaklarının sınırlı olmasıdır (Maralani vd. 2014). Bu durum çalışmamızda da desteklenmiştir; farklı meslek gruplarının eğitim düzeyleri incelendiğinde, üçüncü el sigara dumanına yönelik farkındalığın en yüksek düzeyde doktorlar arasında olduğu tespit edilmiştir.

Çalışmamız, sağlık çalışanlarında üçüncü el sigara dumanı maruziyeti konusunda farkındalığı değerlendiren bir anket çalışması olarak literatüre katkı sağlamaktadır. Anketimizin kapsayıcı bir yapıya sahip olması ve özellikle üçüncü el sigara dumanı gibi nispeten daha az bilinen bir kavramı irdelemesi, çalışmamızın önemli bir güçlü yönüdür. Ayrıca, sağlık çalışanlarının meslekleri gereği sigara dumanına maruziyetin risklerini anlama düzeyini ortaya koyması, çalışma bulgularının halk sağlığı politikalarına yön verme potansiyelini artırmaktadır. Bununla birlikte, çalışmamızın bazı sınırlılıkları bulunmaktadır. Katılımcı sayısının az olması elde edilen bulguların genellenebilirliğini kısıtlamaktadır. Ayrıca, anket verilerinin öz-beyan yöntemiyle toplanması, sosyal istenirlik yanlılığına yol açarak sonuçlarımızı etkilemiş olabilir. Gelecekteki çalışmaların daha geniş örneklemelerle ve farklı veri toplama yöntemleriyle gerçekleştirilmesi, elde edilen sonuçların daha güvenilir ve genellenebilir olmasını sağlayabilir.

Araştırmada yer alan sağlık çalışanlarının, sigara dumanının zararları ve çevredeki kalıcılığı konusunda güçlü bir farkındalığa sahip olduğu tespit edilmiştir. Bu doğrultuda,

üçüncü el sigara dumanı maruziyeti ile ilgili eğitsel mesajların sağlık çalışanlarının eğitim programlarına veya mesleki gelişimlerine dahil edilmesi önerilmektedir. Üçüncü el sigara maruziyetiyle ilgili farkındalığı artırmak için günümüzde teknolojik araçlar etkin bir şekilde kullanılabilir. Mobil uygulamalar, kullanıcıların üçüncü el sigara hakkında bilgi edinmesini ve maruziyeti azaltacak adımlar atmasını sağlayabilir. Online eğitim platformları, bireylerin ve toplulukların bu konuda bilinçlenmesine yardımcı olurken, sosyal medya kampanyaları geniş bir kitleye ulaşarak üçüncü el sigaranın zararlarını ve korunma yollarını etkili bir şekilde yayabilir. Bu tür teknolojik çözümler, özellikle genç nesil ve sağlık profesyonelleri arasında farkındalık yaratmada güçlü bir araçtır. Bu tür bir yaklaşım hem bireysel farkındalığı artırabilir hem de toplum sağlığına yönelik etkili katkılar sağlayabilir.

Eğitim ve farkındalık artırma çalışmaları, sağlık çalışanlarının hem kendileri hem de hastaları için bu konuda daha bilinçli kararlar almasına katkı sağlayabilir. Eğitim programları, üçüncü el sigara dumanı maruziyetinin potansiyel zararları hakkında bilgi sunarak, sağlık çalışanlarının sigaraya bağlı risklerin azaltılmasında model olmalarını sağlayabilir. Bu tür programlar ayrıca, sağlık çalışanlarının topluma yönelik sağlık eğitimi çabalarını artırarak, genel halk sağlığına olumlu katkılar sunabilir.

TEŞEKKÜR

Özel Konya Medicana Hastanesi Başhekimliğine, Tarafımdan yürütülen “Sağlık Çalışanlarında Üçüncü El Sigara Dumanına Yönelik Farkındalık” konulu çalışmanın tüm aşamalarında göstermiş olduğunuz destek ve iş birliği için en içten teşekkürlerimi sunarım.

Araştırmanın planlanması, verilerin toplanması ve uygulama sürecinde hastane yönetiminin ve çalışanlarının sağladığı katkılar, çalışmamızın başarıyla tamamlanmasında büyük rol oynamıştır. Başta başhekimlik makamı olmak üzere, çalışmamıza gönüllü olarak katılan tüm sağlık çalışanlarına ve kurumunuzun değerli çalışanlarına teşekkür eder, bilimsel çalışmalara verdikleri destekten dolayı şükranlarımı sunarım.

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Graduate Approaches to Psychological Resilience in Sports: A Systematic Mapping of Theses between 2020-2025

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ABSTRACT

Psychological resilience refers to athletes' ability to cope with stress, adapt to adversity, and maintain performance under pressure. As a concept gaining increasing importance in the field of sports psychology, resilience plays a critical role in understanding the impact of mental processes on athletic performance. The growing academic interest in sports sciences in Turkey has led to a notable rise in studies focusing on psychological resilience. In this context, the present study aims to systematically examine postgraduate theses prepared in Turkey between 2020 and 2025 within the theme of psychological resilience in sports. The research was conducted using a systematic review design and was structured in accordance with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. A comprehensive search of the National Thesis Center of the Council of Higher Education (YÖK Tez) database yielded 31 relevant postgraduate theses, which were subjected to content analysis. The selected theses were categorized according to publication year, study type, sample group and size, research method, data collection tools, and key findings. The majority of the theses were conducted at the master's level and employed quantitative research methods. Most samples consisted of university-level athletes, although elite athletes, female athletes, and Paralympic individuals were also included. The most frequently used data collection instruments were the CD-RISC and the Psychological Resilience Scale. The findings indicate that while interest in psychological resilience in sports has grown significantly, there remains a need for increased theoretical depth and a greater number of qualitative studies to broaden the scope of research in this area.

Keywords: *Psychological resilience, sport psychology, athlete*

ÖZET

Psikolojik dayanıklılık, sporcuların stresle başa çıkma, zorluklara uyum sağlama ve baskı altında performanslarını sürdürebilme yetisini ifade eder. Spor psikolojisi alanında önemi giderek artan bir kavram olan dayanıklılık, zihinsel süreçlerin sportif performans üzerindeki etkisini anlamada kritik bir rol oynamaktadır. Türkiye’de spor bilimine yönelik akademik ilginin artması, psikolojik dayanıklılık konusuna odaklanan çalışmaların da sayısında kayda değer bir artışa yol açmıştır. Bu bağlamda, bu çalışma Türkiye’de 2020 ile 2025 yılları arasında spor alanında psikolojik dayanıklılık temasıyla hazırlanmış lisansüstü tezleri sistematik olarak incelemeyi amaçlamaktadır. Araştırma, sistematik derleme deseninde yürütülmüş ve PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) yönergeleri doğrultusunda yapılandırılmıştır. Yükseköğretim Kurulu (YÖK) Ulusal Tez Merkezi veri tabanında yapılan kapsamlı bir tarama sonucunda 31 uygun lisansüstü tez belirlenmiş ve bu tezler içerik analizine tabi tutulmuştur. Seçilen tezler; yayımlanma yılı, çalışma türü, örneklem grubu ve büyüklüğü, araştırma yöntemi, veri toplama araçları ve temel bulgulara göre kategorize edilmiştir. Tezlerin çoğunluğunun yüksek lisans düzeyinde olduğu ve nicel araştırma yöntemlerinin kullanıldığı tespit edilmiştir. Örneklem gruplarının çoğu üniversite düzeyindeki sporculardan oluşmakla birlikte elit sporcular, kadın sporcular ve paralimpik bireyler de çalışmalara dâhil edilmiştir. En sık kullanılan veri toplama araçları ise CD-RISC (Connor-Davidson Psikolojik Dayanıklılık Ölçeği) ve Psikolojik Dayanıklılık Ölçeği olmuştur. Bulgular, spor alanında psikolojik dayanıklılığa yönelik ilginin önemli ölçüde arttığını gösterse de bu alandaki araştırmaların kapsamının genişletilebilmesi için daha fazla kuramsal derinlik ve nitel çalışmaya ihtiyaç olduğunu ortaya koymaktadır.

Anahtar kelimeler: Psikolojik dayanıklılık, spor psikolojisi, sporcu

INTRODUCTION

Sport is a multidimensional activity that tests not only the physical capacity but also the mental and emotional resilience of individuals. Athletes at all levels, especially high performance athletes, are constantly exposed to stressors such as training loads, competitive pressure, injury risk, performance anxiety, and social environment expectations (Reche García et al., 2022). The ability of the individual to exhibit psychological resilience in the face of such stressors, not to be negatively affected by the difficulties experienced or to recover quickly from these effects is an important factor that makes success in sport sustainable. In this context, resilience has become an increasingly important concept in the sport sciences literature (Fletcher & Sarkar, 2012).

Psychological resilience is defined as the ability of individuals to develop a positive adaptation in the face of traumatic, stressful, or challenging life events (Masten & O'Connor, 1989). In a sport-specific context, this concept is considered a multidimensional construct encompassing an athlete's capacity to maintain psychological stability and recover effectively from setbacks such as performance declines, injuries, and pressure-filled environments. In the literature, resilience is reported to be closely linked with various psychological resources, including self-efficacy, self-regulation, intrinsic motivation, social support, and coping with stress (Galli & Gonzalez, 2015; Sarkar & Fletcher, 2014). In this regard, research has shown that athletes with high levels of psychological resilience tend to experience better psychological well-being and demonstrate more consistent and sustainable athletic performance over time (Fletcher & Sarkar, 2012; Gucciardi et al., 2015; Tamminen & Holt, 2012). In recent years, psychological resilience has been considered not only as an individual trait but also as a skill set that can be developed. In particular, it has been shown that structured training programs conducted by coaches, sport psychologists, and physical education teachers can increase psychological resilience in athletes (Sullivan et al., 2021). However, various studies have also shown that different

sports branches, age groups, gender, and athletic levels create variability in psychological resilience levels (Çelik et al., 2019; Galli & Vealey, 2008; Reche-García et al., 2022; Fletcher & Sarkar, 2012). This diversity increases the importance of investigating the contextual characteristics of the psychological resilience phenomenon, thus necessitating a systematic categorization of the information in the literature.

Although the concept of psychological resilience has received increasing attention in Turkey in recent years, international studies reveal that this phenomenon has long been integrated into athlete development programs, talent identification processes, and mental skills training. For instance, in countries such as the United States, the United Kingdom, and Australia, resilience training is widely embedded in both elite athlete pathways and collegiate sport programs, supported by structured psychological support systems (Sarkar & Fletcher, 2014; Galli & Gonzalez, 2015; Reardon et al., 2019). These countries also exhibit a higher frequency of research that adopts mixed and longitudinal designs to explore how resilience develops over time and in response to real-life performance challenges. In contrast, research from developing contexts, including Turkey, is often limited to cross-sectional designs and relatively narrow sample profiles, such as university athletes. Therefore, evaluating Turkish postgraduate research within a broader international framework not only reveals the current state of academic output but also highlights areas that require methodological and theoretical advancement. In Turkey, particularly after 2020, the concept of psychological resilience has attracted growing academic interest and has been frequently explored in postgraduate theses in the fields of sport sciences, educational sciences, and psychology. This trend reflects both the increased emphasis on mental well-being in performance settings and the expansion of research capacity within Turkish universities (Çicek, 2021). These theses have generally been conducted on diverse participant groups, including university student athletes, national athletes, amateur or professional athletes, physical education teachers, and

referees, and have utilized a variety of methodological approaches including quantitative, qualitative, and mixed methods (Çiçek, 2025; Ateş, 2023). In most of these studies, reliable and valid measurement tools such as the Connor-Davidson Resilience Scale (CD-RISC), the Psychological Resilience Scale, and the Adult Resilience Scale were employed to assess resilience (Connor & Davidson, 2003; Karairmak, 2010). Additionally, psychological resilience was often analyzed in relation to variables such as coping with stress, self-confidence, academic achievement, social support, motivation, and emotional burnout (Gürsoy, 2022; Duran, 2022).

However, since most of the theses are published in scattered and unsystematic ways, it is difficult to interpret the findings in a holistic framework. Evaluating these studies conducted in different institutions in a common perspective is necessary both to enrich the literature and to provide more functional and guiding information for practitioners. In particular, analyses conducted within the framework of systematic review standards such as the PRISMA protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) provide direction for future studies by revealing trends, gaps and repetitive structures in the literature (Page et al., 2021).

In this context, the main purpose of this study is to systematically analyze postgraduate theses focusing on psychological resilience in sport, which were prepared at various universities in Turkey between 2020 and 2025. Within the scope of the analysis, the methodological characteristics of the theses, the profile of the sample groups, the psychological measurement tools employed, and other variables associated with resilience are evaluated. Based on the findings, the study also aims to offer evidence-based recommendations that contribute to the academic literature and provide guidance for researchers and practitioners working in the field of sport psychology.

MATERIALS AND METHODS

This research is a systematic review conducted within the scope of documentary review model. In the study,

postgraduate theses on psychological resilience in the context of sport in Turkish universities between 2020 and 2025 were analyzed. The review process was structured in line with PRISMA 2020 principles and carried out in accordance with a systematic screening, selection and analysis plan (Page et al., 2021).

Research Model

Document analysis, one of the qualitative research methods, was used in the study. Document analysis allows the systematic evaluation of a certain phenomenon by collecting data from existing documents (Yıldırım & Şimşek, 2021). In this study, the documents consisted of graduate theses published in the National Thesis Center of the Council of Higher Education (YÖK). The data obtained were analyzed by content analysis technique and the findings were presented by descriptive method.

Sample

The sample of the study consists of 31 postgraduate theses published between 2020 and May 2025 and addressing the topic of psychological resilience in sport. These theses were selected from master's and doctoral theses prepared in different universities in Turkey and available in full text in the YÖK National Thesis Center. Purposive sampling technique was adopted in the selection of theses; only studies that met certain content and context criteria were included in the analysis.

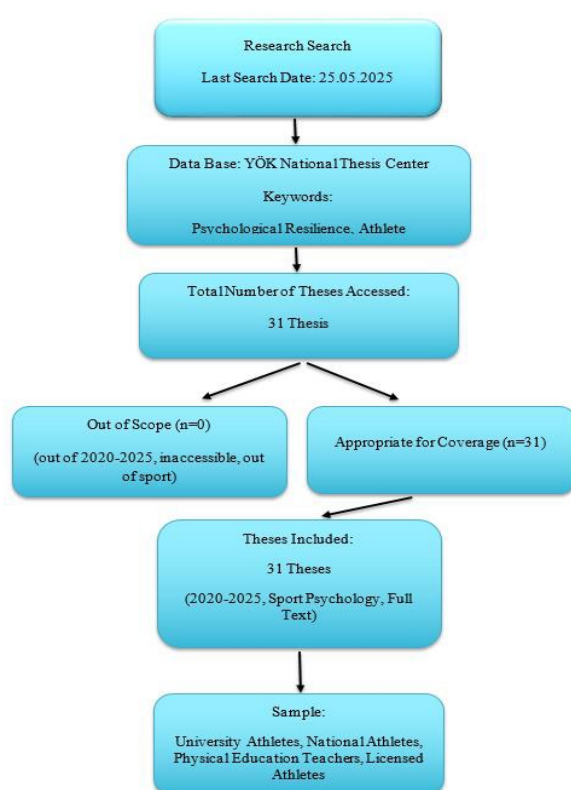
Data Collection Process

The data collection process was carried out between April 1, 2025, and May 10, 2025. An online search was conducted using the YÖK National Thesis Center (<https://tez.yok.gov.tr>). The following keywords were used during the search process: “psychological resilience,” “mental toughness,” “athlete,” “sport psychology,” and “resilience.” In order to focus on the sport-related context, additional filtering terms such as “sport,” “elite athlete,” “soccer player,” “basketball player,” and “physical education” were applied. As a result of the initial screening process, 31 postgraduate theses that met the inclusion

criteria were identified and included in the study. All theses were found to be directly related to the scope of the research; therefore, no exclusions were made.

The study followed the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure transparency and replicability in the selection process. The identification, screening, eligibility, and inclusion stages are illustrated in the PRISMA flow diagram below:

PRISMA Flowchart



Data Collection Tool

A thesis review form was developed as a data collection tool. In this form, the following variables were coded for each thesis:

- Year of the thesis, university and institute,
- Thesis type (master's/doctorate),
- Research model and method (quantitative, qualitative, mixed),
- Sample characteristics (sport branch, age group, gender),

- The psychological resilience scale used,
- Other variables associated with resilience,
- Main findings and conclusions.

All theses were systematically analyzed through this structured form.

Data Analysis

The data obtained were evaluated with descriptive analysis and content analysis techniques. The coded variables were categorized according to frequency and percentage values and the findings were supported by graphs. Methodological differences, sample diversity, usage rates of measurement tools and conceptual tendencies were analyzed thematically. Qualitative contents were compared with the theoretical frameworks in the literature and served as the basis for the discussion section.

Limitations of the Study

The limitations of this systematic review are as follows:

- Only theses published between 2020-2025 were analyzed.
- Only theses written in universities in Turkey and made available for open access in YÖK Thesis Center were included.
- Articles, proceedings and international publications were not included in the study.
- The accuracy of the methods used in the theses is based on the statements of the original authors; the depth of analysis may be limited in this context.
- Only studies conducted in the context of sport were included; general individual contexts of psychological resilience were excluded.

Validity and Reliability

In order to ensure content validity in the study, the analysis criteria of the included theses were predetermined and each thesis was evaluated according to the same structured form. The coding process was carried out carefully, and descriptive consistency was ensured by examining all theses one-to-one. In addition, a selection process in accordance with the PRISMA 2020 protocol was followed, thus maintaining systematic consistency. Reliability was enhanced through

cross-validations and a high overlap rate was achieved in descriptive categories.

RESULTS

In this section of the study, the findings obtained for the determined research questions, and descriptive and thematic explanations regarding these findings are presented. Thirty-one postgraduate theses on psychological resilience in sport prepared in universities in Turkey between 2020 and 2025 were systematically analyzed according to the inclusion criteria. As a result of the screening process, it was determined that all theses were directly related to the scope of the research and were included in the study without any exclusion. The findings are organized under both descriptive and thematic categories to reflect the trends, methodological approaches, and focal variables identified across the reviewed studies.

When the distribution of theses is examined, it is seen that there were 2 theses in 2020, 5 theses in 2021, 8 theses in 2022, 9 theses in 2023, 5 theses in 2024 and 2 theses in the first five months of 2025, totaling 31 theses. This finding shows that academic interest in psychological resilience increased especially in 2022 and 2023.

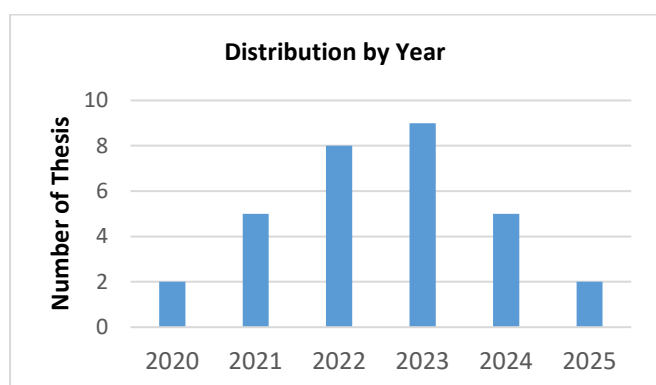


Fig 1. Distribution of Theses by Years

Among the theses, 27 were conducted at the master's level and 4 at the PhD level. Most of the theses were completed at universities located in Istanbul, Ankara, and Konya. Notably, Gazi University, Marmara University, and Selçuk University were among the most frequently represented institutions.

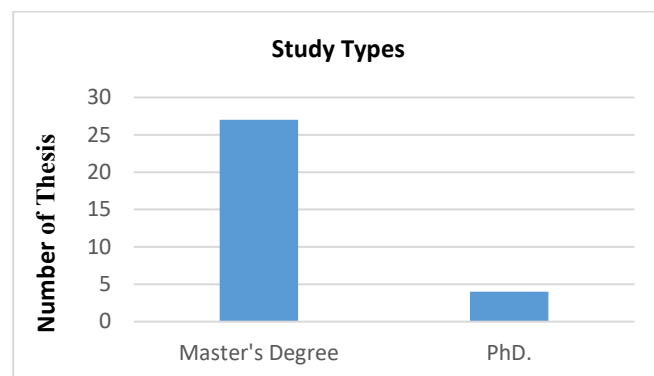


Fig 2. Distribution by Thesis Types and Universities

23 of the theses were prepared using quantitative method, 5 were prepared using mixed method and 3 were prepared using qualitative method. Relational survey model was generally preferred in quantitative studies. Mixed studies were supported by semi-structured interviews to contribute to an in-depth understanding of psychological resilience.

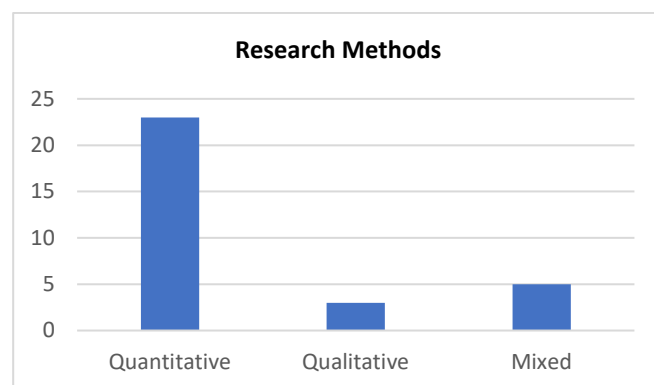


Fig 3. Research Methods

The samples used in theses are mostly composed of university student athletes. Other frequently used groups:

- National level athletes (8 theses)
- Physical education teacher candidates (5 theses)
- Licensed amateur athletes (9 theses)
- Referees, coaches and physical education teachers (4 theses in total)

In terms of sports branches, football (42%), basketball (23%), volleyball (13%), swimming, athletics and combat sports are included.

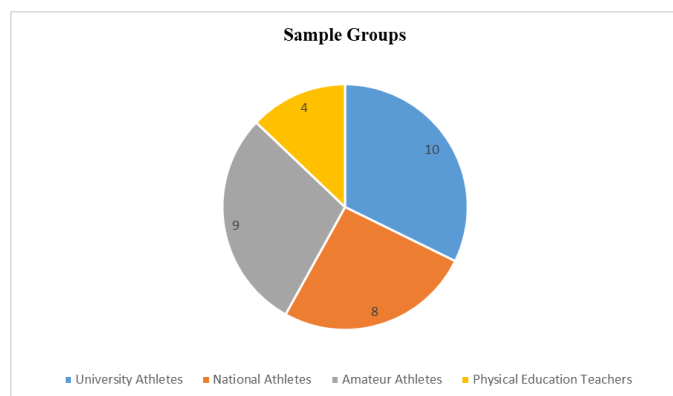


Fig 4. Sample Groups

The sample sizes used in the 31 graduate theses examined within the scope of this research are distributed in different ranges. The most preferred sample range is 101-200 people and there are 10 theses in this group. There are 8 theses in the 201-300 person range, and 5 theses each in the 0-100 person and 301-500 person ranges. There are 3 theses with 500 or more participants.

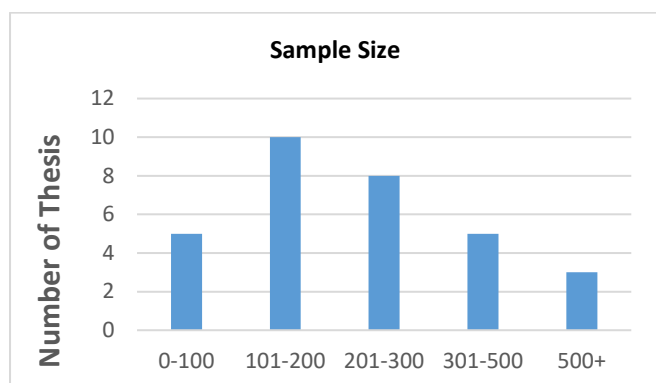


Fig 5. Number of Thesis (Sample Size)

The following scales were used to measure psychological resilience in the majority of the theses:

- Connor-Davidson Resilience Scale (CD-RISC): Used in 19 theses.
- Adult Psychological Resilience Scale (APRS): Preferred in 7 theses.
- Psychological Resilience Scale: It was included in 3 theses.
- In the remaining theses, scales developed or adapted by the researcher were used.

Valid versions of most of the scales that were adapted into Turkish and tested for their psychometric properties were used.

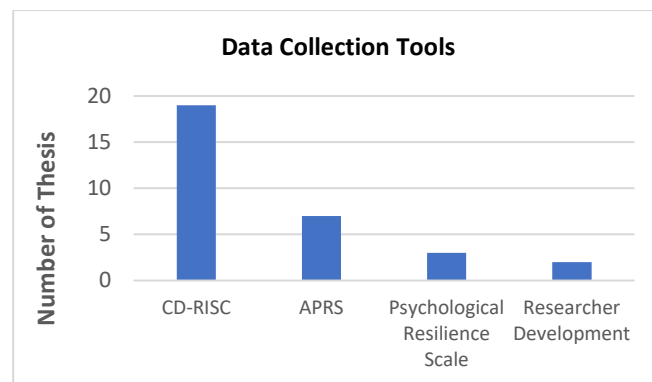


Fig 6. Measurement Tools Used

Variables Related to Psychological Resilience

The main variables analyzed together with psychological resilience in the theses are as follows:

- Self-efficacy (11 theses)
- Coping with stress (9 theses)
- Academic achievement (4 theses)
- Perception of social support (6 theses)
- Self-confidence (5 theses)
- Motivation (3 theses)
- Psychological well-being (2 theses)

In most of the theses, it was found that psychological resilience showed significant positive relationships with these variables. In particular, self-efficacy and coping skills with stress were reported as strong predictors of resilience.

Thematic Findings

The themes that stand out in the theses in the content analysis are as follows:

- Psychological resilience is closely related to mental toughness.
- Female athletes show lower resilience scores than males in some studies; this shows that the gender factor is a controversial variable.
- Psychological resilience increases as the perception of social support increases in individuals practicing team sports.

In Table 1 presents the 31 postgraduate theses included in the study based on the established criteria. Each thesis is

numbered, and its research topic and main findings are briefly summarized.

It has been suggested in some theses that the communication style and leadership skills of coaches have an effect on the level of psychological resilience in athletes.

Table 1. Main Research Topics and Findings of the Analyzed Graduate Theses

No	Topic/Purpose	Results
1	An Investigation of Psychological Resilience and Perceived Stress Among Futsal Players (Abbas, 2020)	Futsal players exhibited higher levels of psychological resilience compared to their perceived stress levels. The gender variable did not produce a statistically significant difference.
2	An Examination of the Role of Perceived Social Support on the Self-Confidence and Psychological Resilience of Combat Sport Athletes (Çoruh, 2020)	As perceived social support increases, combat sport athletes' self-confidence and psychological resilience also improve.
3	An Examination of the Psychological Resilience Levels of Wrestlers in Athlete Training Centers (Köklü, 2020)	The psychological resilience levels of wrestlers vary significantly based on family income, paternal attitude, and years of athletic experience. No significant differences were found with respect to other demographic variables.
4	An Examination of Psychological Resilience and Creativity Levels Among Individuals Participating in Indoor and Outdoor Recreational Activities (Gevişen, 2020)	Individuals participating in outdoor recreational activities exhibit higher levels of psychological resilience and creativity compared to those engaged in indoor activities.
5	An Examination of Psychological Resilience, Emotion Regulation Skills, and Psychological Symptoms in National Swimmers of a Sports Club (Yüce, 2021)	National swimmers demonstrate higher levels of psychological resilience and emotion regulation skills compared to non-athletes. However, they also exhibit higher scores in psychological symptom
6	Correctional Officers' Engagement in Sportive Leisure Activities and Their Levels of Psychological Resilience (Aydın, 2021)	Correctional officers with higher engagement in sportive leisure activities also exhibit higher levels of psychological resilience.
7	An Examination of Psychological Resilience and Decision-Making Styles of Football Referees Based on Their Classification Levels (Ulutaş, 2021)	The psychological resilience and decision-making styles of football referees did not show a statistically significant difference based on their classification levels. However, decision-making skills significantly improved with increasing years of refereeing experience.
8	Relationships Among Internet Addiction, Social Isolation, Psychological Resilience, and Organizational Citizenship Behavior in Physical Education and Sports Teachers (Çutuk, 2022)	Internet addiction and social isolation among physical education teachers reduce psychological resilience, whereas higher psychological resilience enhances organizational citizenship behavior.
9	An Examination of Psychological Resilience and Decision-Making Levels in Table Tennis Athletes (Kudaybergenova, 2022)	The psychological resilience and decision-making levels of table tennis athletes vary according to factors such as harmful habits, age, educational background, place of residence, and occupation.
10	An Examination of Psychological Resilience Levels in Physically Disabled Individuals Who Do and Do Not Engage in Sports (Gür, 2022)	Physically disabled individuals who engage in sports exhibit higher levels of psychological resilience compared to those who do not participate in sports.
11	An Examination of Job Stress and Psychological Resilience in Physical Education and Sports Teachers (The Case of Ağrı and Iğdır Provinces) (Söğüt, 2022)	Physical education and sports teachers exhibit high levels of psychological resilience and low levels of overall job stress. The challenge dimension is strongly correlated with psychological
12	An Examination of the Effects of Personality Traits and Psychological Resilience on Mood States in Performance Athletes (Çakıroğlu, 2022)	The personality traits and psychological resilience of performance athletes significantly influence their mood states.
13	The Effect of Home-Based Training During the Covid-19 Pandemic on Psychological Resilience and Mental Well-Being in Football Players (Yavuz, 2022)	Home-based training during the Covid-19 pandemic had a positive impact on football players' psychological resilience and mental well-being.
14	The Effect of Psychological Resilience on Academic Achievement Among Students of Faculties of Sports Sciences: A Case Study in the Aegean Region (Günay, 2022)	Students of sports sciences with higher levels of psychological resilience demonstrated greater academic achievement.
15	An Examination of Psychological Resilience and Emotion Regulation Difficulties in Coaches Working in Local Governments During the Covid-19 Pandemic (Aygün, 2022)	During the pandemic, coaches employed by local governments were found to have low psychological resilience and high levels of emotion regulation difficulties.
16	An Examination of Psychological Resilience Among Elite Athletes and Sedentary Individuals During the Covid-19 Pandemic (Urgan, 2022)	During the pandemic, elite athletes exhibited significantly higher levels of psychological resilience compared to sedentary individuals.
17	The Effect of Exercise Addiction on Psychological Resilience in Swimmers (Yıldızdal, 2022)	As exercise addiction increases, swimmers' levels of psychological resilience also rise.
18	The Relationship Between Psychological Resilience and Aggression Tendencies in Sports High School Students (Sakaliuzun, 2023)	Sports high school students with higher psychological resilience demonstrate lower levels of aggression tendencies.
19	An Examination of Mindfulness and Psychological Resilience Levels in Students of Faculties of Sports Sciences (Karadeniz, 2023)	A positive and statistically significant relationship was found between mindfulness and psychological resilience among sports sciences students.
20	An Examination of the Relationship Between Multifactor Leadership Orientations and Psychological Resilience Levels in Physical Education and Sports Teachers (Kurt, 2023)	A significant and positive relationship exists between multifactor leadership orientations and psychological resilience in physical education and sports teachers.

21	An Examination of Psychological Resilience Levels in Volleyball Club Players (Kimsün, 2023)	Volleyball players' psychological resilience levels vary significantly by age, education level, years of sports participation, and income, while no significant differences were found with respect to gender or parental education level.
22	The Effect of State Anxiety Levels on Mental Well-Being and Psychological Resilience in Athletes Participating in the Eurohockey Indoor Club 2022 Men's Tournament (Ceylan, 2023)	As state anxiety levels increase, athletes' mental well-being and psychological resilience decrease.
23	An Examination of Mindfulness and Psychological Resilience Levels in Individuals Engaged in Fitness Activities (Acıbuca, 2023)	As mindfulness increases, psychological resilience decreases. Variables such as gender, age, and duration of fitness participation significantly affect resilience.
24	An Examination of the Relationship Between Psychological Resilience and Self-Esteem in Individuals Engaged in Fitness: The Case of Van Province (Akkuş, 2024)	There is a positive and significant relationship between psychological resilience and self-esteem among individuals who engage in fitness. Differences are also observed based on demographic variables.
25	An Investigation of the Relationships Among Sport Commitment, Athletic Identity, and Psychological Resilience in Track and Field Athletes in Relation to Performance Levels and Event Types (Aslan, 2024)	Significant relationships were found among psychological resilience, sport commitment, and athletic identity in track and field athletes, varying by performance level and event type.
26	A Comparative Study on the Relationship Between Psychological Resilience, Achievement Motivation, and Anxiety Levels in Swimmers (Özdemir, 2024)	Psychological resilience is positively related to achievement motivation and negatively related to trait anxiety. Demographic variables also create significant differences.
27	An Examination of the Effect of Playfulness and Psychological Resilience on Competition Performance in 10–14-Year-Old Orienteering Athletes (İşler, 2024)	Increased playfulness and psychological resilience positively influence competition performance.
28	The Effect of Psychological Hardiness and Mental Training on Perceived Performance in Adolescent Basketball Players Who Engage in Basketball as a Serious Leisure Activity (Özcan, 2024)	Psychological hardiness and mental training positively affect perceived performance in adolescent basketball players.
29	Relationships Between Psychological Resilience, Meaning in Life, and Hope Levels, and Internet and Smartphone Addiction in Students Receiving Sports Education (Dalo, 2024)	Psychological resilience, meaning in life, and hope are negatively associated with internet and smartphone addiction.
30	The Effect of Clinical Reformer Pilates on Menstrual Symptoms and Psychological Resilience (Şahin, 2024)	Clinical reformer Pilates exercises reduce menstrual symptoms and increase psychological resilience.
31	An Examination of Psychological Resilience Levels and Decision-Making Strategies Among Basketball Referees of Different Classifications (Çelik, 2025)	There are significant relationships between basketball referees' psychological resilience levels and their decision-making strategies. Resilience increases with classification level.

DISCUSSION

Within the scope of this systematic review, 31 postgraduate theses conducted in Turkey between 2020 and 2025 were examined. The findings reveal that the topic of psychological resilience has been addressed with increasing interest in the sport psychology literature. The majority of the studies emphasize that psychological resilience is a determinant of athletes' performance, psychological well-being, stress coping capacity, and social relationships. Studies such as those by Galli and Vealey (2008), Gucciardi et al. (2015), and more recent theses (e.g., Demirtaş, 2024; Duran, 2022) show that psychological resilience contributes positively not only to athletic performance but also to intrinsic motivation, self-confidence, and an athlete's intention to persist in sport. These findings are consistent with the work of pioneering researchers, indicating that athletes with high psychological resilience tend to perform more consistently under pressure and recover more effectively from setbacks.

A common trend observed among the reviewed theses is the frequent use of university-level athletes as the main sample group. This approach facilitates easier access to participants and a more manageable research process. However, the limited inclusion of special populations such as elite athletes, Paralympic athletes, and younger athletes is a notable gap. This situation suggests that the diversity of participant profiles in the field is restricted, which in turn limits the generalizability of findings. Thus, future research should aim to involve broader and more varied athletic populations in order to capture the complexity of psychological resilience across different contexts. In terms of data collection tools, the Connor-Davidson Resilience Scale (CD-RISC) was identified as the most frequently utilized instrument in the examined theses. This prevalence can be attributed to the scale's well-established validity and reliability. However, an overreliance on a single measurement tool risks constraining the multidimensional understanding of resilience.

Alternative instruments such as the Brief Resilience Scale and the Resilience Scale for Adults can offer different perspectives and contribute to a richer and more comprehensive evaluation of the construct. One of the noteworthy findings is that psychological resilience was generally higher among team athletes than individual athletes. This suggests that the inherently social and collaborative environment of team sports—characterized by shared goals, social support, and a sense of belonging—may foster greater resilience. This interpretation aligns with the findings of Tamminen and Holt (2012), who emphasized the importance of team dynamics in the development of psychological resilience. Therefore, the context of athletic participation (individual vs. team-based) appears to be a relevant factor in resilience-related outcomes. Lastly, the reviewed studies overwhelmingly favored quantitative research methods, indicating a tendency to prioritize objective measurement and statistical analysis. While this approach provides valuable insights, it also presents limitations in understanding the deeper psychological and experiential dimensions of resilience. Given that psychological resilience is a complex and dynamic construct, future studies should increasingly incorporate qualitative and mixed methods designs. These approaches would enable researchers to explore athletes' lived experiences, meaning-making processes, and contextual challenges with greater depth and nuance.

CONCLUSION

In this systematic review, 31 postgraduate theses on psychological resilience in sport were analyzed. The findings revealed that psychological resilience in athletes is significantly associated with several factors such as coping with stress, self-confidence, motivation, self-awareness, and academic achievement. It was observed that university-level individuals constitute the majority of the sample groups, while research focusing on elite athletes and special populations remains limited. Additionally, the psychological resilience levels of team athletes were generally found to be higher than those of individual athletes. Although some

studies reported no significant difference between male and female athletes in terms of resilience, others indicated that gender may be a determining factor. In terms of data collection tools, the Connor-Davidson Resilience Scale (CD-RISC) was predominantly used, while the utilization rate of other scales remained quite low. Furthermore, the reviewed theses largely relied on quantitative methods, with qualitative approaches being notably underrepresented. These results collectively underscore the need for more diverse, inclusive, and methodologically varied research to comprehensively understand the multidimensional nature of psychological resilience in athletes.

Based on the findings of this systematic review, several recommendations are offered for advancing research and practice in sport psychology. First, more studies should be conducted on underrepresented groups, such as elite athletes and Paralympic competitors, to ensure broader inclusivity. Incorporating qualitative and mixed-method approaches may yield deeper insights into the development of psychological resilience. Coaches and sport psychologists are encouraged to implement structured interventions to foster resilience. Additionally, using diverse and reliable measurement tools will enhance the multidimensional understanding of the concept. Future research should also explore resilience beyond performance outcomes, including areas like injury recovery, career transitions, and overall well-being. Finally, resilience should be examined not only at the individual level but also within team dynamics and leadership contexts.

Conflict of Interest

There are not any conflict of interest.

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Neutrophil/Lymphocyte And Platelet/Lymphocyte Ratios In Systemic Lupus Erythematosus

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ABSTRACT

Systemic lupus erythematosus (SLE) can affect all organs and tissues in the organism. SLE shows systemic involvement and its etiology is not fully known. This study aimed to examine the neutrophil-lymphocyte ratio (NLR) and platelet-lymphocyte ratio (PLR) values, which are thought to have a possible effect of systemic inflammation in SLE. The study consists of patients admitted between 01.01.2019 and 30.06.2020. The data used in the study were obtained retrospectively through the hospital information management system (HIMS). To the control group; Those with diabetes mellitus, rheumatic disease, those diagnosed with cancer, those with a chronic disease, those with active infection and those with any allergic disease were excluded. Of the 49 SLE patients who met the study criteria, 5 (10%) were male and 44 (90%) were female. The mean age of the patients was 36.33 ± 7.84 years. In the control group, 6 (12%) of 49 cases were male and 43 (88%) were female. The mean age was determined as 37.69 ± 6.67 . The NLR of the SLE patients was 2.09 ± 1.21 , while the PLR was 147.58 ± 36.99 , the NLR of the control group was 1.81 ± 0.99 , and the PLR was 103.61 ± 22.69 . When compared with the control group, NLR and PLR values of the patient group were determined ($p < 0.039$) and ($p < 0.043$), respectively, and it was found to be statistically significant. It was determined that there was an increase in NLR and PLR values in SLE patients. The test parameters we examined show that they are important in the diagnosis and follow-up of SLE.

Keywords: Systemic lupus erythematosus, neutrophil lymphocyte ratio, platelet lymphocyte ratio

INTRODUCTION

SLE can affect all organs and tissues in the body. Its etiology is not fully known. It is an autoimmune disease with systemic involvement. Clinical and laboratory findings vary. SLE is usually seen in women of young reproductive age. The disease is seen at an early age and is often diagnosed between the ages of 15-35. The prevalence of the disease varies between 4-250/100.000 (Sofulu et al., 2017). In those with genetic predisposition, some viral infections, hormonal changes, smoking and environmental factors can trigger autoimmune response. The disease has a chronic course, with periods of activation and remission (Tsokos, 2012). Epstein Barr virus (EBV) has been the most accused virus due to the data obtained among viral agents. The prevalence of EBV infection among viral infections seen in the world and its persistence throughout life after the infection has been suggested to be a risk factor for the development of SLE. It is thought that the basic pathology seen in tissues and organs in SLE develops due to damage caused by autoantibodies and immune complexes (Esen and İnanç, 2005). It has been stated that ultraviolet rays, foods and drugs are among the most important environmental factors affecting the pathogenesis of SLE (Huggins et al., 2005). SLE patients are lost in the early stages due to infections. Late deaths are usually due to atherosclerotic diseases. It has been reported that women with SLE under the age of 55 have a 5-8 times higher risk of coronary artery disease when compared to the general population (Er, 2013). SLE is an autoimmune disease that is most commonly seen in women and especially in those of childbearing age (Manzi, 2003). The disease usually begins between the ages of 20-40. The age of onset is seen at an early age in women and is lower than in men. It differs according to the races that change with the geographical location. The female-male ratio is 2:1 in children and those with advanced age onset. In reproductive periods, it can reach up to 12:1 (McCarty, 1995).

The increase in neutrophil counts is a parameter that shows the response to systemic inflammation. The decrease in

lymphocyte counts are the parameters showing that the cellular immunity is insufficient in general. The ratio of the parameters to each other shows the insufficiency of the cellular immune response against the infectious event despite the severity of the infection. It has been reported that the neutrophil-lymphocyte ratio (NLR) is an indicator of the immune response capacity in infected patients. NLR indicates a poor prognosis. This is due to the fact that the predominance of neutrophils can suppress cytotoxic T cells. It shows that NLR values increase when infection, especially sepsis, is present and the prognosis of the disease worsens (Faria, Fernandes and Silva, 2016).

Platelets are produced in the bone marrow and are the most important blood elements that play a role in coagulation. Besides coagulation, platelets secrete very important mediators for infectious agents. These mediators secreted by platelets play a role in the process of chemotaxis and phagocytosis. In addition to these effects, platelets also regulate inflammatory cell movements. In cases where the production of platelets in the bone marrow is absent or insufficient, it causes a delay in the migration of leukocytes to the inflammation area. These tasks it undertakes show that the functions of platelets are very important (Yeaman, 2014), (De Stoppelaar et al., 2014). There is no study investigating NLR and PLR in SLE patients. Therefore, this study is the first study conducted in SLE patients and aims to reveal NLR and PLR in SLE patients.

MATERIALS AND METHODS

Ethical Approval

For this study, permission was obtained from the Sakarya University Training and Research Hospital Ethics Committee with the letter dated 29/01/2021 and numbered E.6051, and the Helsinki Declaration criteria were taken into consideration.

Sample Preparation

The data of the patients included in the study consisted of those who applied between 01.01.2019 and 30.06.2020 and were diagnosed with SLE. Patient data were obtained from HIMS. Of 49 SLE patients, 5 were male and 44 were female. The control group consisted of 49 healthy individuals, 6 men and 43 women. To the control group; Those with diabetes mellitus, rheumatic disease, cancer diagnosis, chronic disease, active infection, and any allergic disease were excluded. In our study, the relationship and differences between the patient group and the control group were investigated.

Hematological Analysis

Neutrophil, platelet and lymphocyte parameters of the patient and control groups were analyzed on the CELL-DYN 3700 (ABBOTT, USA).

Statistical analysis

SPSS 20.0 (SPSS, Chicago, USA) was used for the statistical analysis of the data in this study. Student's t test was used for comparisons between the patient group and the control group. The data of the patient and control groups were accepted as mean±standard deviation, and $p < 0.05$ values were considered significant in all of the results.

RESULTS

Of the 49 SLE patients included in the study, 5 (10%) were male and 44 (90%) were female. The mean age of the patients was 36.33 ± 7.84 years. In the control group, 6 (12%) of 49 cases were male and 43 (88%) were female. The mean age is 37.69 ± 6.67 . NLR of SLE patients was 2.09 ± 1.21 and PLR was 147.58 ± 36.99 . NLR of the control group was 1.81 ± 0.99 , PLR was 103.61 ± 22.69 . When compared with the control group, NLR and PLR values of the patient group were determined ($p < 0.039$) and ($p < 0.043$), respectively, and it was found to be statistically significant. (Table 1).

Table 1. Data of the patient and control groups

	Patient (n=49) (Mean±SD)	Control (n=49) (Mean±SD)	p
Age	36.33±7.84	37.69±6.67	>0.854
Hb (gr/dl)	12.99±1.09	13.09±1.33	>0.849
Htc (%)	38.09±2.67	39.21±2.39	>0.796
Erythrocyte (M/uL)	4.77±1.09	5.84±1.62	>0.910
NLR	2.09±1.21	1.81±0.99	<0.039
TLR	147.58±36.99	103.61±22.69	<0.043

Hb: Hemoglobin, Htc: Hematocrit, NLR: Neutrophil Lymphocyte Ratio, TLR: Platelet Lymphocyte Ratio

DISCUSSION

Clinical and laboratory findings in SLE patients are very diverse and variable. It is one of the autoimmune connective tissue diseases that affect organs and systems, the etiology of the disease is unknown, accompanied by immunological disorders (Sofulu et al., 2017). Neutrophils, lymphocytes and platelets show changes in blood levels in cases of inflammation. These blood cells are widely used in clinics and can be measured from peripheral blood and are parameters that are easy to access. Today, it is used in many infectious diseases as well as in tumoral formations (Özdin, 2020). A correlation was found between the increase in NLR values and the increase in mortality (Bhat, 2013). Studies have shown an increase in NLR values in infectious diseases, as well as in patients with Bell's palsy and cardiovascular system diseases (Bucak et al., 2014). In studies conducted on diabetics, significant increases in NLR values were reported between the patient group and the control group (Shiny et al., 2014). NLR and PLR values were found to be high in patients with colorectal carcinoma, which is among the

malignant diseases and has an important place among the causes of mortality. It has also been reported that these high values may be a biomarker in patients with colorectal carcinoma (Ofllazoğlu et al., 2017). NLR values were found to be high in patients with another malignant disease, pancreatic cancer, and it was found that patients with increased NLR values had a poor prognosis and reduced survival (Demirci and Erdem, 2017). NLR and PLR values were found to be high in 77 rheumatoid arthritis patients (Kılıç et al., 2016). In a study conducted in patients with nasal polyps, NLR and platelet values were shown to be high (Atan et al., 2015). It has been reported that the NLR values of those who have COVID-19 infection and who are hospitalized are higher (Harbalioğlu, Genc and Yıldırım, 2020). Elevated PLR may reflect increased platelet activation, which has been implicated in the pathogenesis of diabetic complications. Activated platelets can release proinflammatory mediators and growth factors that may contribute to nerve damage and impaired regeneration in diabetic neuroathy (Özdin, Yazar and Mundan, 2022). NLR and PLR values of 131 ulcerative colitis patients followed in clinics were found to be high (Kamış, Çetin, Ugar, and Beyazıt, 2020). Studies conducted in diabetics with microvascular complications have shown that NLR and PLR values are high (Şiranlı, 2019). In a study, it was reported that NLR and PLR values were high in Sjögren's patients (Özdin, 2021). Platelets are blood cells synthesized in the bone marrow and involved in coagulation. Thrombocytosis is seen in some types of cancer. The same situation is observed in coronary artery diseases, infectious diseases and peripheral vascular diseases (Bhat et al., 2013), (Wang et al., 2013).

CONCLUSION

In this study conducted in SLE patients; It was revealed that the NLR and PLR values of the patients were increased and it was statistically significant compared to the healthy control group.

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İnme ile presente olan genç hastada mitral kapak posterioruna tutunmuş papiller fibroelastom olgu sunumu

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***Sorumlu Yazar**

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ÖZET

Papiller fibroelastom nadir görülen neoplazmlardır. Etiyolojisi tam olarak bilinmemektedir. Papiller fibroelastomlar benign kardiyak tümörler olup nadir olarak mitral kapağı tutabilmektedir. Çoğunlukla insidental tanı almaktadır. Klinik olarak iskemik atak, felçler, miyokard infarktüsü ve ani ölümlerle karşımıza çıkabilmektedir. Papiller fibroelastomların tedavisi tartışmalı ve tek bir görüş birliği olmamakla birlikte cerrahi ile total eksizyon önerilen tedavi şeklidir. Cerrahide sağ atriotomi veya sol atriotomi ile yaklaşım mevcut olup triküspit kapağı da kontrol etmek amacı ile sağ atriotomi tercih edilebilmektedir. Bu olgu sunumunda serebro vasküler olay ile presente olan, mitral kapakta 1,1*1,2 cm boyutlarında kitle saptanan, 41 yaşında erkek hasta sunuldu. Eksize edilen cerrahi materyalin patoloji sonucu fibroelastom olarak rapor edildi. Olgunun genç yaşta inme ile prezente olması, mitral kapağın posterior leafletine nadir yerleşimi ve cerrahi görüntülerin özgünlüğü nedeniyle paylaşılması uygun görülmüştür.

Anahtar kelimeler: *Papiller fibroelastom, mitral kapak, serebrovasküler olay, kardiyak tümör, cerrahi eksizyon.*

ABSTRACT

Papillary fibroelastomas are rare neoplasms with an unclear etiology. They are benign cardiac tumors that can occasionally involve the mitral valve. Most cases are diagnosed incidentally. Clinically, they may present with ischemic attacks, stroke, myocardial infarction, or sudden cardiac death. Although the treatment of papillary fibroelastomas remains controversial and lacks a universal consensus, complete surgical excision is generally the recommended approach. Surgical access can be achieved via either right or left atriotomy; however, right atriotomy may be preferred to allow for inspection of the tricuspid valve. In this case report, we present a 41-year-old male patient who was admitted with a cerebrovascular event and was found to have a 1.1 × 1.2 cm mass on the mitral valve. The mass was surgically excised, and pathological examination confirmed the diagnosis of papillary fibroelastoma. This case is presented due to the patient's young age, the rare localization of the tumor on the posterior leaflet of the mitral valve, and the uniqueness of the intraoperative findings.

Keywords: *Papillary fibroelastoma, mitral valve, cerebrovascular event, cardiac tumor, surgical excision.*

GİRİŞ

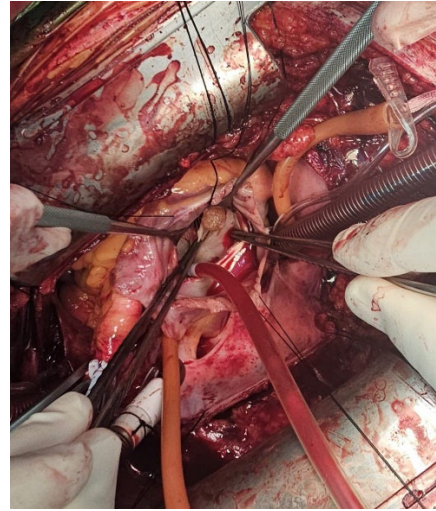
Primer kardiyak tümörler nadir görülen neoplazmlardır ve genellikle benign özelliktedirler. Papiller fibroelastom ve miksomal primer kardiyak tümörlerin en sık rastlanan tipleridir. Papiller fibroelastom en yaygın aort kapakta (%43,63) olmak üzere, mitral kapakta (%35,22), triküspit kapakta (%12,72) ve pulmoner kapakta (%8,41) da görülmektedir. Geçici iskemik atak, felçler, miyokard infarktüsü ve ani ölümlerin potansiyel sebebidirler. Etiyolojisi tam olarak bilinmemektedir. Çoğunlukla kapak endokardiyumundan kaynaklanırlar ve kapak endotelinde hasarın olduğu bölgeden ortaya çıktığı düşünülmektedir. Genellikle cerrahi eksizyon, kontrendikasyon olmadığı sürece primer tedavi seçeneği olarak önerilir. Bu olgu sunumunda serebro vasküler olay (SVO) ile presente olan, mitral kapakta 1,1*1,2 cm boyutlarında kitle saptanan, cerrahi tedavi uygulanan, 41 yaşında erkek hasta sunulmaktadır. Eksize edilen cerrahi materyalin patoloji sonucu fibroelastom olarak rapor edildi. Patolojinin genç yaşta SVO'ya sebep olması, mitral kapağın posteriorunda nadir tutulumu ve ilginç cerrahi görüntüleri sebebiyle vaka paylaşılmak istendi.

OLGU SUNUMU

41 yaşında erkek hasta, enseden başlayıp başın tamamına yayılan keçeleşme, sol elde uyuşukluk, bilişsel fonksiyonda bozulma ve konfüzyon ile acil servise başvurmuş. Difüzyon MR da oksipital lobda akut kortikal infarkt saptanmıştır. Genç yaşta SVO etiyolojisini araştırmak için ekokardiyografi yapılmış ve mitral kapakta kitle saptanmıştır. Ekokardiyografide EF % 60, TY: min PAB: 20+5:25 MMHG, MY: min -1 MAL de kapağın atriya bakan tarafında 1,1*1,2 cm sınırları düzenli kitle izlendi. Sağ kalp boşlukları normal. Preop koroner anjiyografi ile koroner arterler normal

görüntülendi. Kalp ve Damar Cerrahisi-Kardiyoloji konseyinde değerlendirilip cerrahi kararı verilmiştir.

Hasta SVO üzerinden 15 gün geçtikten sonra operasyona alındı. Operasyonda median sternotomi sonrası Sağ atriotomi yapılarak triküspit kapak değerlendirildi. Triküspit kapakta kitle ve koaptasyon kusuru izlenmedi. Septotomi ile mitral kapağa ulaşıldı. Mitral posterior leaflette P3 segmenti kordal birleşimine tutunmuş, 1 cm*1 cm çapında saplı yumuşak kitle izlendi (Resim 1).



Resim 1. Mitral kapağa tutunmuş kitle imajı

Kitle sapı ile birlikte eksize edildi (resim 2).



Resim 2. Eksize edilen kitlenin görüntüsü

Mitral kapakta elongasyon olması nedeni ile A3 ve P3 kordal shortening, A3-P3 sliding anuloplasty, P2-P3 edge to edge anuloplasty yapıldı. Kapak salin testi ile test edildi. Yeterli koaptasyon görüldü. Kross klemp kaldırıldıktan sonra uygun kan basıncında intraoperatif TEE ile değerlendirildi, MY minimal olduğu görüldü. Hasta KPB dan sorunsuz ayrıldı.

Postop 9. Saatte ekstübe edildi, 1. Günde servise alındı. Postop dönemde medikal tedavide asetil salisilik asit 100 mg/gün, furosemid 40 mg /gün, spironolakton 25 mg/gün, bisoprolol 5 mg/gün ve erken dönemde enoxaparin sodyum 100 IU/kg/12hr verildi. Postoperatif 4. Gün kontrol ekokardiyografi yapıldı. Minimal mitral yetmezliği dışında patolojik ekokardiyografi bulgusu yoktu. Postop 5. günde sorunsuz taburcu edildi. Patoloji sonucu ile fibroelastoma tanısı koyuldu (Resim 3).



Resim 3. Kitlenin patolojik görüntüsü (Histokimyasal Elastik Van Gieson boyama (Sarı ok: Elastik lifler), x40)

TARTIŞMA

Papiller fibroelastomlar nadir görülen ve çoğunlukla insidental (ekokardiyografide, cerrahi esnasında ve otopsilerde) saptanan tümörlerdir [Deepali vd., 2010, Devanabanda vd., 2025]. Kardiyak tümörler içerisinde kalp kapakçıklarında en sık görüleni papiller fibroelastomadır, valvüler tümörler arasında %75 sıklıkta görülür. (Alahmadi vd., 2025) Etkilenen hastaların %55 inin erkek olduğu görülmüştür (Devanabanda ve Lee, 2023). En sık 60'lı yaşlarda görülse de her yaş gurubunda rastlanabilmektedir (Jain vd., 2010). Kökeni kesin olarak bilinmemekle birlikte mikrotrombüs teorisi öne sürülmektedir. Bu teoriye göre kapakçıkta erode olan bir alanda papiller fibroelastomların mikrotrombüs olarak başladığı öne sürülmüştür (Gopaldas vd., 2009).

Kalbin sol tarafındaki fibroelastomalar sistemik embolizmle presente olabilmektedir (Işık vd., 2025). Bu olgudaki hastamız da daha önce herhangi bir semptom olmaksızın

genç yaşta serebral infarkt ile presente olmuş, etiyojoloji araştırması esnasında tanı almıştır.

Papiller fibroelastomların tedavisi tartışmalı ve tek bir görüş birliği olmamakla birlikte cerrahi ile total eksizyon genellikle önerilmektedir. Cerrahi yapılamayan hastalarda medikal tedavide antikoagülan ve antiagregan tedavilerin etkinliği tartışmalı olsa da alternatiftir (Zoltowska vd., 2021). Semptomatik, pedinküllü, çapı 1cm den büyük olan veya hareketli yapıda olan tümörler için cerrahi rezeksiyon yapılması güçlü olarak önerilmektedir (Alahmadi vd. 2025; Işık vd. 2025). Total eksizyon sonrası kapakçığın erode olduğu alanlara onarım yapılması ve gerekli ise kapak replasmanı önerilmektedir. Tümörün saplı yapıda olması nedeni ile çoğunlukla tamir yeterli olmakla birlikte nadiren replasman gereksinimi olan vakalar bildirilmiştir (Deepali vd. 2010; Gopaldas vd. 2009). Bu hastanın genç olması, tamir ile koaptasyon sağlanması nedeni ile kapak replasmanı yerine onarım seçeneği tercih edildi.

Mitral kapağa cerrahi ulaşım açısından sol ve sağ atriotomi yapılabilmeyle birlikte, triküspit kapağı da değerlendirmek ve posterior leaflette tutunan kitleyi daha iyi görüş açısı sağlanması açısından sağ atriotomi yapıldı. Leafletlere minimal hasar verecek şekilde eksizyon önerilse de rekürrensi önlemek için gerekli olması halinde leafletleri de içerecek şekilde rezidü tümör dokusu kalmayacak geniş eksizyon önerilmektedir. Total eksizyon sonrası rekürrens nadir olarak raporlanmıştır. Rekürrens olması halinde ilk cerrahiden kalan rezidü tümöre bağlı olabileceği bildirilmiştir (Devanabanda & Lee, 2023). Dekanülasyon öncesi kalbin mutlaka TEE ile değerlendirilmesi önerilir (Devanabanda & Lee, 2023). Sunulan vakada da dekanülasyon öncesi TEE ile değerlendirme yapılmış, anormallik görülmemesi sonucu kardiyopulmoner bypass sonlandırılmıştır.

Sonuç olarak SVO ileri yaş hastalığı olsa da, genç yaşta görülmesi durumunda kardiyak kökenli tümörler akılda tutulmalı, buna yönelik incelemeler yapılmalıdır. Tedavisinde majör cerrahi gerekli olsa da sonuçları yüz güldürücüdür.

KAYNAKÇA

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The Hidden Danger on Social Media: A Case Series of Methanol Intoxication

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ABSTRACT

This case series highlights the public health risks posed by the unregulated sale of methanol via social media platforms, where it is often misrepresented as ethanol. We present four patients admitted to our tertiary emergency department in Türkiye following methanol intoxication from alcohol purchased online. The patients, ranging in age from 17 to 43, experienced symptoms such as vision loss, metabolic acidosis, and altered consciousness. In three cases, timely diagnosis and treatment—including intravenous ethanol administration and hemodialysis—resulted in full recovery without long-term complications. However, one patient succumbed to fatal outcomes due to delayed admission to the emergency department. This series underscores the growing threat of methanol poisoning, exacerbated by the widespread availability of illicit alcohol products through social media. The findings emphasize the need for stringent regulatory controls, public awareness campaigns, and more effective preventive measures to reduce the incidence of such preventable intoxications. Methanol intoxication is a critical yet preventable condition requiring a coordinated response from healthcare professionals, toxicologists, legal authorities, and social media regulators. Further research into the regulation of online alcohol sales and early intervention protocols for methanol intoxication is urgently needed to safeguard public health.

Keywords: *Methanol, ethanol, social media, case report, emergency department*

ÖZET

Bu olgu serisi, metanolün sosyal medya platformları aracılığıyla düzensiz satışının yol açtığı ve sıklıkla etanol olarak yanlış tanıtıldığı halk sağlığı risklerini vurgulamaktadır. Çalışmamızda, çevrimiçi satın alınan alkol sonrası metanol zehirlenmesiyle Türkiye'deki 3. basamak acil servisimize başvuran dört hasta sunulmaktadır. Yaşları 17 ila 43 arasında değişen hastalar, görme kaybı, metabolik asidoz ve bilinç değişikliği gibi semptomlar yaşamıştır. Üç vaka, intravenöz etanol uygulaması ve hemodiyaliz dahil olmak üzere zamanında tanı ve tedavi ile uzun vadeli komplikasyonlar olmaksızın tam iyileşme ile sonuçlanmıştır. Ancak, bir hasta acil servise geç başvuru nedeniyle ölümcül sonuçla karşılaşmıştır. Bu seri, yasa dışı alkol ürünlerinin sosyal medyada yaygın olarak bulunabilirliği ile şiddetlenen metanol zehirlenmesi tehdidinin arttığını vurgulamaktadır. Bulgular, bu tür önlenabilir zehirlenmelerin sıklığını azaltmak için sıkı düzenleyici kontrollere, halkı bilinçlendirme kampanyalarına ve daha etkili önleyici tedbirlere ihtiyaç duyulduğunu vurgulamaktadır. Metanol zehirlenmesi, sağlık profesyonelleri, toksikologlar, yasal otoriteler ve sosyal medya düzenleyicilerinden koordineli bir yanıt gerektiren kritik, ancak önlenabilir bir durumdur. Halk sağlığını korumak için çevrimiçi alkol satışlarının düzenlenmesi ve metanol zehirlenmesi için erken müdahale protokolleri üzerine daha fazla araştırmaya acil ihtiyaç duyulmaktadır.

Anahtar kelimeler: *Metanol, etanol, sosyal medya, olgu sunumu, acil servis*

INTRODUCTION

The rise of social media has revolutionized access to goods and services, but it has also introduced significant risks by providing a platform for the unregulated sale of dangerous substances. In recent years, the availability of illicit alcohol through these channels has become a growing public health concern. Although reports of alcohol sales via social media have emerged, documented cases of methanol intoxication resulting from these purchases remain rare in medical literature (Kuntsche et al., 2020). This highlights a critical gap in our understanding of the risks associated with social media-facilitated alcohol distribution.

Methanol poisoning can occur due to accidental or intentional ingestion, inhalation, dermal exposure, or through self-preparation via home-distillation, as methanol, also referred to as methyl alcohol, is a volatile and colorless substance (Güler and Üçöz Kocaşaban, 2024). Methanol itself is not inherently toxic, but it becomes highly dangerous when metabolized by the enzyme alcohol dehydrogenase into formaldehyde and formic acid, which are responsible for the severe toxic effects. These metabolites can cause life-threatening complications, such as high anion gap metabolic acidosis, basal ganglia damage, optic neuropathy, and irreversible retinal injury. The accumulation of formic acid, in particular, disrupts mitochondrial function by inhibiting cytochrome c oxidase, leading to cellular hypoxia and potentially permanent vision loss (Ross et al., 2022; Sadeghi et al., 2023). Diagnosing methanol intoxication can be challenging, as decreased consciousness may be the initial symptom, hindering the patient's ability to provide a comprehensive medical history (Tabatabaei et al., 2023).

Methanol toxicity outbreaks often occur when methanol is illicitly added to alcoholic beverages as a cost-effective substitute for ethanol (Room and O'Brien, 2021). Given the increasing prevalence of methanol intoxication through alcohol purchased on unregulated online platforms, there is an urgent need for heightened awareness and regulatory measures. In this case series, we present four patients

admitted to our tertiary emergency department with methanol intoxication after consuming alcohol bought via social media. These cases not only illustrate the potentially fatal consequences of methanol poisoning but also emphasize the need for stricter oversight and intervention strategies to prevent similar incidents in the future. Our findings aim to shed light on this emerging public health threat and advocate for multidisciplinary efforts to mitigate the dangers posed by unregulated alcohol sales through social media channels.

Case Reports

Case 1: In December 2024, a 17-year-old female presented to the emergency department with complaints of fatigue, weakness, and vision loss. Her vital signs were stable, with a blood pressure (BP) of 110/70 mmHg, heart rate (HR) of 89 bpm, temperature of 36.6°C, and respiratory rate (RR) of 16 breaths/min. A detailed history revealed that she had consumed three glasses of whisky purchased via a social media network 48 hours prior. The patient had no significant medical history or medication use. Laboratory tests showed a pH of 7.07, PCO₂ of 21.4 mmHg, PO₂ of 32.6 mmHg, and HCO₃ of 6.4 mmol/L. Her blood ethanol level was 0, while the blood methanol level was 85 mg/dL. Given the sudden vision loss, history of alcohol consumption from an unreliable source, metabolic acidosis with an increased anion gap (26.6 mmol/L), and elevated methanol levels, a diagnosis of methanol intoxication was made. Treatment was initiated with a loading dose of 10 ml/kg of 10% ethanol intravenously (IV) followed by an infusion at 1.5 ml/kg/hour, and hemodialysis was performed. Her blood gas parameters improved, and she was admitted to the ICU, subsequently being discharged in good health after 5 days. Since the patient was conscious, her statement was taken by law enforcement while still in the emergency department. The case was reported to the judicial authorities through law enforcement as a legal obligation.

Case 2: In December 2024, an 18-year-old male presented to the emergency department with agitation, vision loss, and

restlessness. Initial vital signs included a BP of 100/60 mmHg, HR of 110 bpm, temperature of 36.8°C, and RR of 18 breaths/min. He had a Glasgow Coma Scale (GCS) score of 8 and required elective intubation. The patient had consumed an unspecified amount of whisky purchased via a social media network the previous day. Laboratory findings indicated a pH of 7.20, PCO2 of 21.4 mmHg, PO2 of 89 mmHg, and HCO3 of 18.5 mmol/L, with blood methanol levels reaching 150 mg/dL. The patient received IV ethanol therapy and underwent hemodialysis. His condition improved, and he was admitted to the ICU, later being discharged in good health after a 9-day stay. The case was referred to the judicial authorities via law enforcement in accordance with legal obligations.

Case 3: In January 2025, a 43-year-old male arrived at the emergency department in an agitated state, with a BP of 90/60 mmHg, HR of 115 bpm, temperature of 36.8°C, and RR of 19 breaths/min. He was intubated with a GCS score of 7. His relative (Case 4) reported consuming alcohol together, purchased from social media, over the past 2-3 days. Laboratory tests revealed a pH of 6.88, PCO2 of 75 mmHg, PO2 of 90 mmHg, and HCO3 of 9.3 mmol/L, indicating severe metabolic acidosis with an increased anion gap (32 mmol/L). IV ethanol therapy was administered along with hemodialysis; however, the patient suffered cardiac arrest twice and, despite resuscitation efforts, passed away 16 hours after ICU admission. The case was reported to the judicial authorities through law enforcement as a legal obligation, and notification was made for an autopsy.

Case 4: In January 2025, a 38-year-old male presented with vision loss. His vital signs were BP 110/60 mmHg, HR 110 bpm, temperature 36.8°C, and RR 17 breaths/min. He had consumed 200 cc of rakı purchased via a social media network 12 hours earlier. Laboratory results showed pH 7.30, PCO2 21.4 mmHg, PO2 89 mmHg, HCO3 20 mmol/L, with a blood methanol level of 55 mg/dL. The diagnosis of methanol intoxication was confirmed. Treatment involved IV

ethanol administration and hemodialysis. He was admitted to the ICU and discharged in good health after 6 days. Since the patient was conscious, law enforcement obtained his statement while he was still in the emergency department. In compliance with legal obligations, the case was reported to the judicial authorities through law enforcement.

DISCUSSION

In these case series (Table 1), we highlight the growing public health threat posed by the unregulated sale of methanol through social media platforms.

Table 1. Clinical Characteristics and Outcomes of Methanol Intoxication Cases

Characteristic	Case 1 (17Y, F)	Case 2 (18Y, M)	Case 3 (43Y, M)	Case 4 (38Y, M)
Admission Date	Dec 2024	Dec 2024	January 2025	January 2025
Complaints	Fatigue, weakness, vision loss	Agitation, vision loss, restlessness	Agitation	Vision loss
Consumed Product & Source	Whisky (3 glasses) via social media	Whisky (unspecified amount) via social media	Alcohol (shared with Case 4) via social media	Rakı (200 cc) via social media
Time Since Ingestion	48 hours prior	Previous day	Past 2-3 days	12 hours earlier
GCS	15	8	7 (intubated)	15
pH (Arterial Blood Gas)	7.07	7.20	6.88	7.30
HCO3 (mmol/L)	6.4	18.5	9.3	20
Anion Gap (mmol/L)	26.6	-	32	-
Blood Methanol	85	150	-	55

Level (mg/dL)				
Treatment	IV Ethanol, Hemodialysis	IV Ethanol, Hemodialysis	IV Ethanol, Hemodialysis	IV Ethanol, Hemodialysis
Outcome	Full recovery; discharged after 5 days	Full recovery; discharged after 9 days	Fatal; succumbed 16 hours after ICU admission	Full recovery; discharged after 6 days

Sellers increasingly prefer social media due to cost advantages and the ability to reach a broad audience (Jormand et al., 2020). Despite legal restrictions on alcohol sales via the internet in Türkiye, social media has facilitated access to methanol, which, although cheaper, is significantly more toxic than ethanol (Gulen et al., 2020). Economic factors further drive individuals with alcohol dependence to seek out tax-free and low-cost methanol (Room and O'Brien, 2021). Addressing this issue requires enhancing social media literacy, implementing stricter sales controls, strengthening counseling services for those struggling with addiction, and enforcing severe penalties for illegal methanol production.

During the COVID-19 pandemic, as people were confined to their homes, social mobility decreased, and curfews were enforced, increased alcohol consumption driven by anxiety and fear, combined with misleading messages on social media, led to a mass methanol poisoning outbreak (Güler and Üçöz Kocaşaban, 2024; Soltaninejad, 2020). Alcohol consumption tends to increase during holidays and the New Year, amplifying the risk of intentional or unintentional methanol ingestion (Barták et al., 2023). As observed in our cases, methanol obtained from unregulated platforms poses a serious health risk during these periods. Therefore, intensifying monitoring efforts, especially during peak consumption times, and adopting regulatory measures similar to those implemented in other countries may effectively reduce such poisoning incidents.

The broad accessibility of social media not only facilitates the sale of methanol but also enables the distribution of counterfeit and other toxic substances. In all cases we presented, patients had obtained alcohol through social media networks, underscoring the urgency for immediate action. In these cases, the victims unknowingly purchased alcohol adulterated with methanol, believing it to be ethanol-based beverages. The sellers falsely advertised the products as safe for consumption, emphasizing authenticity through social media marketing tactics.

Rapid identification and prompt treatment—such as intravenous ethanol administration and hemodialysis—are crucial for patient survival in emergency departments. However, due to the unavailability of methanol level testing in many hospitals, thorough history-taking and blood gas analysis are essential for timely diagnosis. Early intervention is key to reducing mortality and morbidity rates.

Methanol poisoning can lead to severe complications, including permanent vision loss and neurological deficits, significantly impacting survivors' quality of life. As an antidote treatment, patients were administered either fomepizole or intravenous (IV) ethanol (10%). In cases where fomepizole could not be provided, IV ethanol was used to maintain blood ethanol levels within the range of 100 to 150 mg/dL (Güler and Üçöz Kocaşaban, 2024). In this case series, while three patients recovered without sequelae, one unfortunately did not survive, underscoring the life-threatening nature of methanol intoxication.

The uncontrolled widespread use of social media for selling toxic substances poses a significant public health challenge. Preventive strategies should encompass public awareness campaigns, educational initiatives, and informative publications by healthcare institutions to educate the public about the dangers of methanol. Additionally, monitoring social media can help identify sources of illicit sales, thereby preventing further poisoning cases. A multidisciplinary approach involving emergency medicine specialists, toxicologists, public health experts, legal authorities, and law

enforcement agencies is crucial to effectively combat this emerging threat. Policymakers must re-evaluate existing regulations on the sale of toxic substances like methanol and enforce stringent controls to safeguard public health.

Abbreviations

- ED: Emergency Department
- ICU: Intensive Care Unit
- IV: Intravenous
- GCS: Glasgow Coma Scale
- BE: Base Excess

Conflict of Interest

The authors declare that they have no conflict of interest.

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Ethics Approval

Given the nature of this submission as a case report, formal ethical approval was not required. However, all procedures involving human participants were conducted in accordance with the ethical standards of the 1964 Helsinki Declaration and its later amendments or comparable ethical standards regarding patient care and confidentiality.

Informed Consent

Consent for publication was obtained from all patients or their legal guardians.

Author Contributions

MÇ conceptualized the study and led the data collection and analysis process. MÇ, AEG, MG contributed to drafting the manuscript and interpreting the data. All authors critically revised the manuscript for important intellectual content. All authors approved the final version of the manuscript and agree to be accountable for all aspects of the work.

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