MEDICAL RESEARCH REPORTS

EDITORIAL

Değerli Medical Research Reports Dergisi Okuyucuları,

Medical Research Reports Dergisinin 2024 yılı birinci sayısını sizlerle paylaşıyoruz. Bu sayıda üç araştırma makalesi, iki vaka raporu ve iki derleme olmak üzere çok değerli yedi bilimsel makale bulunmaktadır. Literatüre kazandırılan bu çalışmaların ilgi ile okunacağını ve başka araştırmalara referans oluşturacağını umuyoruz.

Hedefimiz ve çalışmalarımız; okunurluğu ve erişilebilirliği yüksek, uluslararası standartlara uygun bilimsel bir yayın olmak yönündedir. Yeni yılla birlikte daha fazla indekste yer almaya çalışacağız. Mevcut standartlarımız ve yayın süreçlerimiz buna uygun şekilde yapılandırılmıştır.

Meslektaşlarımızı çalışmalarını Medical Research Reports aracılığı ile bilim dünyasıyla paylaşmaya davet eder, saygılarımızı sunarız.

Doç. Dr. Mehmet Enes GÖKLER
Baş Editör

Doç. Dr. Tayyib KADAK
Doç. Dr. Egemen Ünal
Editörler

Dear Readers of the Journal of Medical Research Reports,

We share with you the first issue of the Medical Research Reports Journal for 2024. There are seven scientific articles in this issue, including three original studies, two case reports and two review. We hope that these studies brought to the literature will be read with interest and will serve as a reference for other studies.

Our goal and work; It aims to be a scientific publication with high readability and accessibility, in line with international standards. We will try to be included in more indexes with the new year. Our current standards and publication processes are structured accordingly.

We invite our colleagues to share their work with the scientific world through Medical Research Reports, and we present our respects.

Associate Professor Mehmet Enes GOKLER
Chief Editor

Associate Professor Tayyib KADAK
Associate Professor Egemen Unal
Editors

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e-ISSN: 2651-4184

MEDICAL RESEARCH REPORTS

Medical Research Reports

Year/Yıl: 2024 Volume/Cilt: 7 Issue/Sayı: 1 March/Mart 2024

Indexed in / Tarandığı indeksler

Türkiye Atıf Dizini, Türk Medline, CABİ, Index Copernicus

A peer-reviewed journal published three times a year. / Yılda üç kez yayınlanan hakemli bir dergidir.

MEDICAL RESEARCH REPORTS

Med Res Rep 2024;7(1):1-7
https://doi.org/10.55517/mrr.1328287

ORIGINAL ARTICLE

Factors Affecting the Risk of Developing Cervical Cage Malposition in Patients with Cervical Discectomy

Mustafa Cemil KILINÇ[1], Baran Can ALPERGİN[2], Ömer Mert ÖZPİŞKİN[2], Bekir TUNÇ[1], Ümit EROĞLU[2]

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ÖZET

Amaç: Dejeneratif servikal omurga hastalıklarının tedavisinde servikal diskektomi ve bir kafes yerleştirilerek füzyon sağlanması günümüzde en sık uygulanan yöntemlerden biridir. Bu cerrahi sonrası takiplerde görülebilen komplikasyonlardan biri servikal kafes çökmesidir. Bu çalışmada cerrahi sonrası erken dönemde çekilmiş olan servikal grafide görülebilecek olan son plak parlaklık kaybının, takiplerde servikal kafes çökmesi gelişmesi ile ilişkisi araştırılmıştır. **Yöntem:** 2013-2023 yılları arasında tek seviye servikal disk hernisi cerrahisi uygulanmış olan 100 hasta çalışmaya dahil edilmiştir. Hastalar cerrahi sonrası 60. gün kontrolünde çekilmiş olan servikal grafisinde kafes çökmesi olanlar ve olmayanlar olarak 2 gruba ayrılmıştır. Çalışmada yer alan tüm hastaların ameliyattan sonra ilk 24 saat içerisinde çekilmiş olan servikal grafi görüntülerinde kafese komşu omurlarda son plak parlaklık kaybı olup olmadığı incelenmiş ve elde edilen sonuçlar bu gruplar arasında kıyaslanmıştır. **Bulgular**: 89 hastada (%89) servikal kafes çökmesi saptanmazken, 11 hastada (%11) servikal kafes çökmesi geliştiği saptanmıştır. Kafes çökmesi gelişen 11 hastanın 8'inde (%72,7), kafes çökmesi meydana gelmeyen 89 hastanın ise10'unda (%11,2) son plak parlaklık kaybı tespit edilmiştir. Bu sonuçlar göstermektedir ki erken dönem grafide saptanan son plak parlaklık kaybı ile ileri takiplerde gelişen servikal kafes çökmesi arasında anlamlı bir ilişki vardır ve son plak parlaklık kaybı tespit edilenlerde servikal kafes çökmesi görülme oranı daha fazladır (p<0,001). **Sonuç:** Cerrahiden hemen sonrası çekilmiş erken dönem servikal grafide son plak kortikal parlaklık kaybı saptanması, takiplerde kafes çökmesi ile karşılaşılma sıklığını arttırmaktadır. Bu nedenle bu hastaların daha kısa takip aralığı ile dikkatle takip edilmesi düşünülebilir.

Anahtar kelimeler: Servikal disk hernisi, Servikal diskektomi, Servikal kafes çökmesi

ABSTRACT

Aim: Cervical discectomy followed by cage placement for fusion is nowadays a commonly used method for the treatment of degenerative cervical spine diseases. One of the complications that can be observed during postoperative follow-up is cervical cage subsidence. At this point, it is investigated in this study the relationship between the loss of endplate brightness observed on early postoperative cervical radiographs and the development of cervical cage subsidence during follow-up. **Methods:** 100 patients who underwent single-level cervical disc herniation surgery between 2013 and 2023 were selected. The patients were divided into two groups based on the presence or absence of cage subsidence in cervical radiographs taken at the 60-day postoperative follow-up. In all patients included in the study, the presence of endplate brightness loss in the cervical radiographs taken within the day 1 of post-surgery period in the vertebrae adjacent to the cage was evaluated and compared between groups. **Results:** Cage subsidence was detected in 11 patients (11%), while it was not observed in 89 patients (89%). Among the 11 patients with cage subsidence, endplate brightness loss was identified in 8 patients (72.7%), whereas it was found in 10 patients (11.2%) among the 89 patients without cage subsidence. These results indicate a significant relationship between the loss of endplate brightness observed on early radiographs and the occurrence of cervical cage subsidence during later follow-up (p<0.001). **Conclusion:** The identification of endplate cortical brightness loss on early postoperative cervical radiographs increases the likelihood of encountering cage subsidence during follow-up. Therefore, these patients may require shorter follow-up intervals.

Keywords: Cervical disc herniation, Cervical discectomy, Cervical cage subsidence

Cite this article as: Kılınç MC, Alpergin BC, Özpişkin ÖM, Tunç B, Eroğlu Ü. Factors Affecting the Risk of Developing Cervical Cage Malposition in Patients with Cervical Discectomy. Medical Research Reports 2024; 7(1): 1-7

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INTRODUCTION

Fusion by using a cage following cervical discectomy is a surgical method that is frequently performed in individuals with degenerative cervical spine disease (1). Titanium cages filled with autograft, polyetheretherketone (PEEK) cages or carbon cages are most commonly used in the fusion step following adequate decompression (2,3). Especially since the 1990s, the frequency of use of PEEK cages has increased due to its elasticity close to cortical bone, reducing stress on adjacent bone structures, radiolucent properties and high capacity to allow the development of bone fusion (3, 4). However, following the use of these implants, it may be encountered that a cage placed between two bones may be embedded in the adjacent bone over time in the postoperative period (5). Cervical cage collapse is defined as the embedment of the cage placed following cervical discectomy more than 2 millimeters (>2mm) into the adjacent cervical vertebra (6). As a result of this complication, instability in the cervical spine, recurrence of neurologic symptoms and loss of reconstruction may occur (7).

Many factors associated with the risk of cervical cage embedment have been discussed in the literature (7). Some of these risk factors include advanced age, female gender, presence of osteoporosis or low bone mineral densitometry values, too large a cage and excessive curettage of vertebral endplates (7-9). In this study, we studied the relation between the loss of brightness of the endplate, which can be seen on cervical radiographs taken in the early postoperative period, and the development of cervical cage collapse during follow-up.

MATERIAL AND METHODS

Between 2013 and 2023, 100 patients who underwent single level cervical discectomy followed by fusion surgery with PEEK cage by a single center and the same surgeon were included in the study. Demographics, symptoms and neurologic examination signs on admission, early postoperative cervical radiographs taken within the first 24 hours postoperatively, and control cervical radiographs taken on the 60th postoperative day were retrospectively reviewed.

On the cervical radiograph taken at the 60th postoperative day follow-up, cervical cage collapse was considered to occur when the cage was embedded more than 2 mm into the bone (Figure 1).

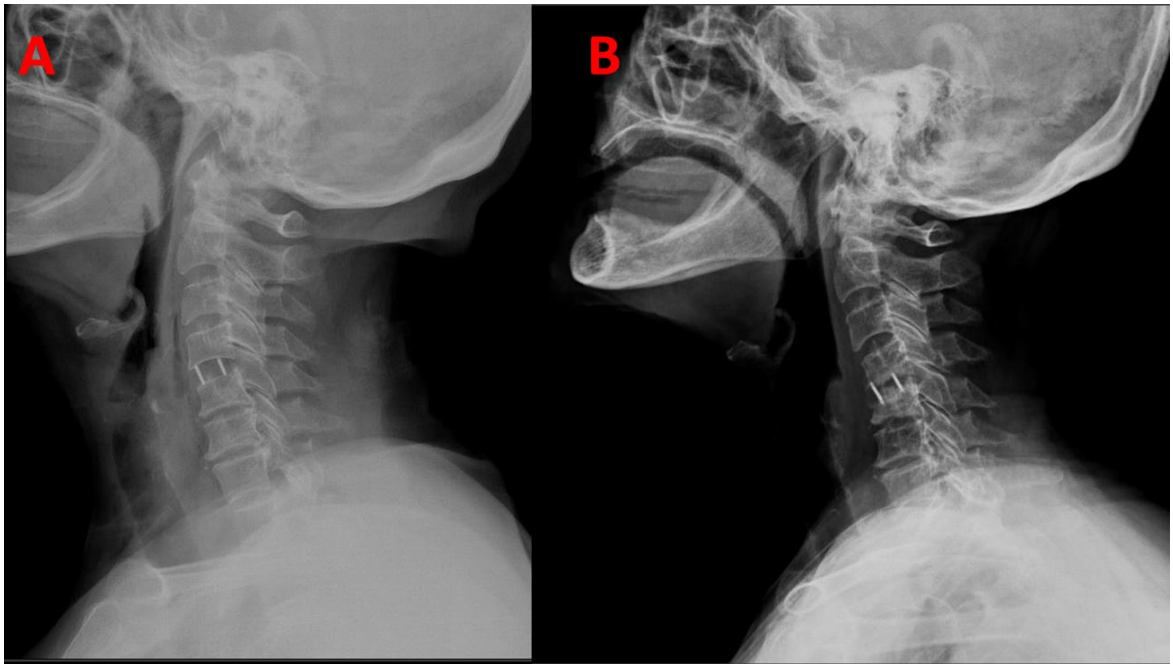

Figure 1A. Early postoperative radiograph of the PEEK cage placed after cervical discectomy taken within the first 24 hours postoperatively.

Figure 1B. Cervical radiograph taken on the 60th postoperative day shows that the cage has collapsed and the cage is embedded in the adjacent vertebra.

The total 100 patients are included and divided into 2 groups as those with and without cervical cage collapse at the 60th day control. The early postoperative cervical radiographs of each of the patients were scanned within the first postoperative day and the loss of endplate brightness in the cervical vertebrae adjacent to the cage was examined (Figure 2).

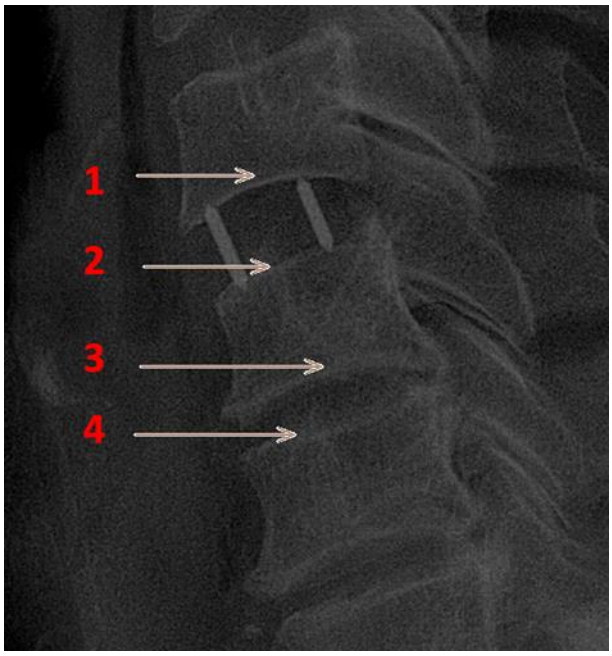

Figure 2. Early postoperative cervical radiograph of a patient with cervical cage collapse on postoperative day 60 control radiograph. In the vertebral endplates shown with arrows numbered as 1,3,4, cortical brightness is clearly seen, while the endplate shown with number 2 shows loss of cortical brightnes.

The correlation between loss of endplate brightness on early postoperative radiographs and cervical cage collapse on postoperative day 60 radiographs was investigated.

For the analysis of the categorical data set, SPSS version 22.0 software program for Windows was used along with Chi-square test. The results were evaluated at 95% confidence interval and $p<0.05$ was considered significant.

This retrospective CT study was approved by the Clinical Research Ethics Committee of Ankara University (Confirmation Number: I06-392-23, Date: 20/06/2023)

RESULTS

One hundred patients (59 males, 41 females) who underwent cervical discectomy plus fusion with PEEK cage were included into the protocol. The control cervical radiographs of these patients taken on the 60th postoperative day were analyzed, and it was determined that 11 patients (11%) developed cervical cage collapse and 89 patients (89%) did not develop cervical cage collapse. The mean age of the 11 patients (8 males, 3 females) who developed cervical cage collapse was 42.5 years (42.5± 6.9). The mean age of 89 patients (51 males, 38 females) who did not develop cervical cage collapse was 41.5 (41.5± 8.6).

Early postoperative cervical radiographs of these patients taken within the first 24 hours after surgery were analyzed. 18 (18%) of 100 patients had loss of brightness in at least one end plate adjacent to the cervical cage on early cervical radiographs. While 10 (11.2%) of 89 patients who did not develop cervical cage shrinkage had loss of endplate brightness, 8 (72.7%) of 11 patients who developed cervical cage collapse had loss of endplate brightness.

These results point out that there is a strong correlation between the loss of endplate brightness detected on early radiographs and cervical cage collapse in later follow-ups, and the rate of cervical cage collapse is higher in those with endplate brightness loss ($p<0.001$).

DISCUSSION

Cervical discectomy and fusion following an anterior cervical approach is currently the gold standard method for the treatment of degenerative cervical disc disease (6). However, in the long-term follow-up of these surgeries, complications such as displacement of the cages placed in the disc space for fusion, embedding into adjacent vertebrae, dislocation and consequently failure to develop fusion are frequently encountered (6, 10). In case of these complications, axial pain occurs as a result of spinal canal compression, nerve root compression and instability.

The embedment of a cage placed between two cervical vertebrae into the adjacent vertebra following cervical discectomy is called cervical cage collapse. Several methods have been described in the literature for the radiologic diagnosis of cervical cage collapse, one of which is a cervical segment collapse of more than 2 millimeters on a follow-up radiograph compared to a radiograph taken immediately after surgery (6). It should also be noted that such a cage collapse and embedment is often accompanied by a segmental kyphosis at the same level (11).

In the literature, many risk factors directly related to cervical cage collapse have been identified (12). Incorrect surgical technique and inappropriately sized cage selection, which may cause excessive distraction of the disc space, are the main risk factors (12,13). Improper preparation and

advanced curettage of the vertebral endplate is also a risk factor for cervical cage embedment and collapse (14). In addition, the presence of severe osteoporosis and the location of the surgical level between the 6th and 7th cervical vertebrae have also been pointed out as risk factors for cervical cage collapse (15,16). Moreover, research on implant selection indicates that cervical cage collapse occurs more frequently with titanium cages than with PEEK cages (17), due to the lower modulus of elasticity in PEEK cages. This results in a closer elasticity match to the adjacent cortical bone (18).

In order to prevent cervical cage collapse, the use of a cervical plaque in addition to a cage placed following discectomy has been considered and its results have been investigated (5). There are studies showing that cage collapse and embedment are less common when a cervical plaque is used (19,20). Besides, it has been shown that if the surgery is performed by placing a plate in addition to cage placement, the rate of fusion formation increases and the duration of fusion formation is shortened (21). In consideration of all these, it is recommended to use a cervical plaque as an additional adjunct to the cage, especially in cases where the removal of the last plate during surgery is highly recommended (5).

In this study with 100 patients, we found that the rate of cervical cage collapse was significantly increased in the case of loss of brightness of the end plate in the cervical radiograph taken in the early postoperative period, which is a finding that may be a warning sign for cervical cage collapse, and we concluded that the follow-up interval of these cases should be more frequent, and they require close monitoring and examination. The limitations of this study are that the total number of study population is relatively small, and the diagnosis of cage collapse was made with the radiograph taken on the 60th day after surgery. However, more meaningful results will be obtained in studies with larger patient groups and longer follow-ups.

CONCLUSION

There is a correlation between loss of cortical brightness in the endplates of the vertebrae adjacent to the cage on cervical radiographs taken after cervical discectomy surgery and the development of cervical cage collapse in follow-up, and cervical cage collapse is encountered more frequently. Therefore, the cervical radiograph taken in the early postoperative period should be carefully examined, the cortical brightness of the endplates of the vertebrae adjacent to the cage should be evaluated, and patients with a high probability of cage collapse should be followed up more closely and, if necessary, with a shorter follow-up interval.

Source(s) of financial support: None.

Conflicts of interest: The authors have no conflicts of interest to declare.

Ethical Statement: Confirmation Number: I06-392-23, Date: 20/06/2023

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MEDICAL RESEARCH REPORTS

Med Res Rep 2024;7(1):8-17
https://doi.org/10.55517/mrr.1342231

ORIGINAL ARTICLE

Türk Youtube Fenomenlerindeki Riskli Davranışların İncelenmesi, Video İçerik Analizi

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ÖZET

Amaç: İnternet kullanımında özellikle Youtube kullanımı, bugünün çocuklarının ve ergenlerinin en yaygın faaliyetlerinden biridir. Dünya pazarındaki etkileri nedeniyle YouTube fenomenlerinin videolarında farklı ticari ürünlere özendirme, madde kullanımı teşvik, beden algısına yönelik tutumlar ve siber zorbalık son dönemde dikkat çekmektedir. Bu çalışmanın amacı YouTube fenomenlerinin paylaştığı videoları incelemek ve riskli davranışlar açısından detaylı bir şekilde analiz etmektir. **Yöntem:** 2019 yılı Temmuz-Kasım ayları arasında gerçekleştirilmiş bu çalışmada Türkiye'deki en popüler ilk 15 YouTuberun video paylaşımları incelendi. Youtuberların isimleri ve hesapları gizlenerek her bir hesap rastgele numaralandırıldı ve fenomenler sahip oldukları abone sayısına göre sıralandı. Çalışmanın evreni videoları incelenen 15 youtuberların toplam 12.382 videosu olarak tespit edildi. Hesaplanan örneklem büyüklüğüne göre youtuberların toplam video sayılarına orantılı olarak en fazla izlenen 740 video (etki büyüklüğü=0.15; güç=0.90; α-0.05) incelendi. İncelenen tüm videolarda araştırmacılar tarafından belirlenmiş riskli davranışlar; kötü beslenme, küfür-argo kullanımı, fiziksel şiddet, sigara-alkol kullanımı, beden algılayışı ile ilgili olumsuz içerik, reklam ve ürün yerleştirme, okullara yönelik olumsuz içerik, ekran kullanımını öven içerik, ebeveynlerin fenomenliği övdüğü içerik ve siber zorbalık incelendi. **Bulgular:** Çalışmaya dahil edilen 740 videoda toplamda 2208 olumsuz içerik saptanmıştır. En sık rastlanan olumsuz içerik %58.0'ı (430) fiziksel şiddet, %55.1'i (408) küfür/argo, % 47.8 'i (354) ürün yerleştirme, %30.2'si (224) siber zorbalık ve azalan oranlarla diğer olumsuz içeriklerden oluşmaktaydı. Toplam olumsuz içeriklerin fenomenlere göre dağılımı ise şu şekildedir. Olumsuz içeriklerin %24.1'i (541) Fenomen 12, %20.15'i (445) Fenomen 2, %12.55'i (277) Fenomen 5, %10.42'si (230) Fenomen 10 ve azalan oranlarla diğer fenomenlere ait idi. **Sonuç:** Bu çalışmanın sonucuna dayanarak çocuk ve genç nüfusta YouTube kullanımının bu kadar yoğun olduğu bir dönemde YouTubelar tarafından oluşturulan paylaşımların beden ve ruh sağlığı üzerine sakıncaları olabileceği düşünülmüştür. Video paylaşım sitelerinin ve yasa koyucuların bu alanda sınırlama ve denetimlerinin çok önemli olduğu, bununla birlikte başta ebeveynlerin ve toplumdaki tüm bireylerin hassasiyet göstermeleri, uygun yönlendirmeler ve denetimler yapmaları gerektiği kanaatine varıldı.

Anahtar kelimeler: Fenomen, Riskli davranış, Video içeriği, Youtube, Youtuber

ABSTRACT

Aim: In the internet usage, especially the use of Youtube is one of the most common activities of today's children and adolescents. Due to its effects on the world market, the videos of YouTube phenomena have recently attracted attention to different commercial products, substance use incentives, attitudes towards body perception and cyberbullying. The aim of this study is to investigate the shared videos of youtube influencer and to analyze detailed in terms of risky behaviors. **Methods:** 2019 In this study was conducted between July and November has been viewed 15 Youtuber's most popular video sharing first in Turkey. The names and accounts of the Youtubers were hidden, each account was randomly numbered, and the phenomena were ranked according to the number of subscribers they had. The universe of the study was determined as a total of 12,382 videos of 15 youtubers whose videos were examined. **Results:** According to the calculated sample size, the 740 videos most watched (effect size = 0.15; power = 0.90; α-0.05) in proportion to the total number of videos of Youtubers were examined. Risky behaviors determined by the researchers in all the videos examined; Malnutrition, swearing-slang, physical violence, smoking and alcohol use, negative content about body perception, advertisement and product placement, negative content for schools, content praising screen use, content praised by parents for the phenomenon, and cyberbullying were analyzed. In 740 videos included in the study, a total of 2208 negative content was detected. The most common negative content was 58.0% (430) physical violence, 55.1% (408) swearing / slang, 47.8% (354) product placement, 30.2% (224) cyberbullying and other negative content with decreasing rates consisted of contents. The distribution of total negative content according to the phenomena is as follows. 24.1% of the negative contents (541) belonged to Phenomenon 12, 20.15% (445) to Phenomenon 2, 12.55% (277) to Phenomenon 5, 10.42% (230) to Phenomenon 10 and decreasing rates of other phenomena.

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Conclusion: In our study, we thought that such videos could be harmful to the physical and mental health of children and young people who watch youtubers' videos intensively. It was concluded that the limitations and controls of video sharing sites and legislators are very important in this area, however, especially parents and all individuals in the society should show sensitivity, make appropriate guidance and supervision.

Keywords: Phenomenon, Risk behavior, Video content, Youtube, Youtuber

Cite this article as: Tunç Uğur D, Gökler ME, Mollahaliloğlu S. Türk Youtube Fenomenlerinin Riskli Davranışların İncelenmesi, Video İçerik Analizi. Medical Research Reports 2024; 7(1):8-17

GİRİŞ

Teknolojinin giderek yaşamımızın her noktasında hayatımıza girmesi, özellikle son 20 yılda internetin yaygın ve yoğun kullanımı sağladığı kolaylıklar toplumda geri dönüşümsüz davranış değişikliklerine yol açmakta ve bu davranışlar çoğunlukla bağımlılığa neden olmaktadır. Bu bağımlılık türlerinin en sık karşılaşılanı olan internet bağımlılığı genel olarak internetin aşırı kullanılması isteğinin önüne geçilememesi, internete bağlı olmadan geçirilen zamanın önemini yitirmesi, yoksun kalındığında aşırı sinirlilik ve saldırganlık hali ile kişinin sosyal ve ailevi hayatının giderek bozulması olarak tanımlanabilir. İnternet kullanımında özellikle Youtube kullanımı, bugünün çocuklarının ve ergenlerinin en yaygın faaliyetlerinden biridir. ABD de, 2005 yılında video barındırma sitesi olarak kurulan YouTube 2019 rakamlarına göre; YouTube aylık 2 milyar kullanıcıya ulaşmıştır. Bir yılda yaklaşık 200 milyon aktif kullanıcı kazanan YouTube kullanımı, bir önceki yıla göre 70 milyon saat artarak aylık 250 milyon saate ulaşmıştır (1).

Youtube geleneksel medyanın aksine, sadece bir eğlence aracı olarak değil bireylerin kendilerine rol model buldukları, düşüncelerini paylaşabilecekleri, daha geniş kitlelere ulaşabilecekleri dünya çapında bir etkileşim ve iş birliği platformu haline gelmiştir (2). Yıllar geçtikçe, video içerik oluşturucuları ve yaptıkları işlemler kendi terminolojisi ile tanımlanmaya başladı. YouTube'a çok fazla zaman harcayan herhangi bir içerik oluşturanlara genellikle YouTuber adı verilirken, bunu daha ileri adıma taşıyabilmiş ve paylaşımlarını büyük kitlelere ulaştırılabilmiş ve beğenilerini almış bireyler artık Youtube fenomeni (YouTube video bloggers) olarak tanımlanmaya başlandı (3). Youtuber; video paylaşım ağı Youtube'u etkin olarak kullanan, video yükleyen, kanal oluşturarak video yayınlayan insanlara verilen ortak isimdir. Dünyada ve Türkiye'de YouTuber olarak birçok kişi video paylaşmaktadır.

YouTube fenomenleri videolarında birçok farklı ürünü takipçilerine önermektedir. Markalar ve fenomenler arasındaki iş birlikleri hızla büyüyen bir pazarlama tekniğidir (4). Bu pazarlama şeklinin sektör harcamalarını 2023 yılında 5-10 milyar dolara yükselteceği tahmin

edilmektedir (5). Pazarlamanın içerisinde özellikle yüksek yağ, tuz ve şeker içeren yiyecekler ile sigara ve alkol kullanımının özendirildiği görülmüştür (6). Youtube'da görüntülenen müzik videolarının incelendiği bir çalışmada videoların %45'inde alkol, %22'sinde tütün ve %2'sinde elektronik sigara içeriği bulunduğu tespit edilmiştir (7). Ayrıca Youtube videolarının yanlış beden algısına (8) ve siber zorbalığa neden olduğu bilinmektedir (9). Unutulmaması gereken bir diğer durum da gençlerin sosyal medya araçlarını yoğun kullanımının ailevi ilişkilerinin ve okul başarıları üzerine olan olumsuz etkisidir (2).

Benzer bir çalışmanın bu alanda ülkemizde bulunmaması, ülkemizde denetim ve yaptırımların olgunlaşmamış olması, araştırmamızın yurtdışındaki araştırmalara göre videoların daha kapsamlı riskli davranışlar belirlenerek analiz edilmesi temel amacımızı oluşturmaktadır. Bu nedenle Türk YouTube influencerının paylaştığı videoları incelemek ve riskli davranışlar açısından detaylı bir şekilde analiz etmek çalışmanın ana hedefidir.

GEREÇ VE YÖNTEM

Tanımlayıcı tipteki bu çalışma 2019 yılı Temmuz-Kasım ayları arasında gerçekleştirilmiştir. Çalışma öncesinde Ankara Yıldırım Beyazıt Üniversitesi Etik kurulundan 2019/38 Sayısı ile etik kurul izni alındı. Çalışmada Türkiye'deki en popüler ilk 15 Youtuber'un video paylaşımları incelendi. Çalışmamıza dahil edilen tüm Youtuber'lar 18 yaşından büyüktü. Youtuber'ların isimleri ve hesapları gizlenerek her bir hesap rastgele numaralandırıldı ve fenomenler sahip oldukları abone sayısına göre sıralandı. Çalışmanın evreni videoları incelenen 15 youtuberların toplam 12.382 videosu olarak tespit edildi. Hesaplanan örneklem büyüklüğüne göre Youtuberların toplam video sayılarına orantılı olarak en fazla izlenen 740 video (etki büyüklüğü=0.15; güç=0.90; α-0.05) incelendi. Tüm videolar alanında 3 uzman (çocuk ruh sağlığı uzmanı ve halk sağlığı ve hastalıkları uzmanı içeren) tarafından izlendi. İncelenen tüm videolarda araştırmacılar tarafından belirlenmiş riskli davranışlar; kötü beslenme, küfür-argo kullanımı, fiziksel şiddet, sigara-alkol kullanımı, beden algılayışı ile ilgili olumsuz içerik, reklam ve ürün yerleştirme, okullara yönelik olumsuz içerik, ekran kullanımını öven içerik, ebeveynlerin fenomenliği övdüğü içerik ve siber zorbalık incelendi. Ayrıca her bir videonun süresi, görüntülenme sayısı, beğeni sayısı, beğenilmeme sayısı, yorum sayısı ve konu içeriği de değerlendirildi. Veriler, IBM-SPSS (Versiyon 22.0) programı kullanılarak değerlendirildi. Tanımlayıcı istatistikler için sayı, yüzde, ortanca değerleri kullanıldı.

BULGULAR

En çok takipçi sayısına sahip ilk 15 YouTube fenomeni; 3 kadın 11 erkekten oluşmaktadır. En çok takipçisi olan Fenomen 5'in 10.655.043 sayıda abonesi, en az takipçisi olan Fenomen 7'nin ise 1.850.472 sayıda abonesi vardı. En çok video paylaşımı olan Fenomen 12'nin toplamda 2551, en az video

paylaşımı olan Fenomen 13'ün ise 64 video paylaşımı var idi. Fenomen 12 çalışmaya en çok videosu dahil edilen ve videoları izlenen fenomen olup 153 (%20.68) videosu izlenmiştir. Fenomen 14 ise çalışmaya en az videosu dahil edilen ve videosu izlenen fenomen olup 3 (%0.48) videosu izlenmiştir. Çalışma grubunun toplam abone sayısı, toplam video sayısı ve çalışmaya dahil edilen video sayıları Tablo 1'de verilmiştir.

Tablo 1. Fenomenlerin abone ve video sayıları ile çalışmada izlenen video sayıları

	Toplam Abone Sayısı	Toplam Video Sayısı	İzlenen Video Sayısı N (%)	Youtube Kanal Kurulum Tarihi
Fenomen 1	3.466.012	200	12 (1.62)	31.05.2015
Fenomen 2	3.168.341	2053	126 (17.03)	12.06.2012
Fenomen 3	2.186.388	130	8 (1.08)	11.11.2016
Fenomen 4	1.954.679	722	45 (6.08)	12.09.2014
Fenomen 5	**10.655.043**	1780	110 (14.86)	20.01.2013
Fenomen 6	3.219.026	634	39 (5.27)	13.04.2015
Fenomen 7	**1.850.472**	412	25 (3.38)	14.03.2013
Fenomen 8	5.707.832	200	12 (1.62)	15.07.2014
Fenomen 9	2.321.872	267	16 (2.16)	08.08.2014
Fenomen 10	1.898.480	981	60 (8.11)	08.05.2013
Fenomen 11	6.614.927	1255	77 (10.41)	24.11.2010
Fenomen 12	5.378.135	**2551**	**153 (20.68)**	02.06.2014
Fenomen 13	4.643.443	**63**	4 (0.54)	26.01.2017
Fenomen 14	3.714.348	300	**3 (0.41)**	15.11.2012
Fenomen 15	2.507.616	834	50 (6.76)	02.06.2014
Toplam	59.286.614	12.382	740 (%100.00)	

Fenomen 13'ün ortanca değerler açısından paylaşımlarının video görüntülenme sayısı 134.000.000, video beğeni sayısı 2.000.000 ve video yorum sayısı 268.000 olduğu saptandı. Fenomen 13'ün bu kategorilerde en üst sırada olduğu, Fenomen 1'in ise video beğenmeme kategorisinde 13500 sayısı ile bu kategoride en üst sırada olduğu saptanmıştır. Fenomenlerin paylaşımlarının video görüntülenme, video beğeni, video beğenmeme ve video yorum sayılarının ortanca değerleri Tablo 2'de gösterilmiştir.

Tablo 2. Fenomenlere ait video paylaşımlarının istatistikî değerleri

	Video Görüntülenme Sayısı Ortanca (25-75 Çeyreklik)	Video Beğeni Sayısı Ortanca (25-75 Çeyreklik)	Video Beğenmeme Sayısı Ortanca (25-75 Çeyreklik)	Video Yorum Sayısı Ortanca (25-75 Çeyreklik)
Fenomen 1	10.000.000 (8.400.000-120.000.000)	283.000 (248.000- 399.500)	**13.500** (10.500- 16.000)	0 (0- 21.500)

Fenomen 2	2.100.000 (1.600.000- 2.700.000)	20.500 (14.000- 29.000)	1300 (921- 11450)	2500 (1700- 3900)
Fenomen 3	5.250.000 (4.650.000- 7.050.000)	117.500 (107.500- 166.500)	8700 (7250- 11.450)	5450 (1850- 3900)
Fenomen 4	3300000 (2.600.000- 4.400.000)	52000 (38.000- 70.000)	3600 (2400- 4900)	7200 (5500- 13.000)
Fenomen 5	5.000.000 (3.000.000- 13.000.000)	193.500 (151.000- 261.000)	14.500 (10.000- 23.000)	21.000 (15.000- 31.000)
Fenomen 6	818000 (400.000- 2.300.000)	37000 (18.000- 73.000)	1700 (885- 3300)	3031 (1431- 6962)
Fenomen 7	4.200.000 (3.600.000-5.900.000)	78.000 (53.000- 105.000)	3400 (1800- 6800)	3000 (1400- 9500)
Fenomen 8	2.800.000 (1.950.000- 3.800.000)	177.500 (124.000- 222.500)	7050 (4850- 9350)	6805 (5445- 11.820)
Fenomen 9	4.650.000 (4300.000- 5.500.000)	103.500 (82.000- 121.000)	5000 (3500- 9000)	11.500 (8300- 14.000)
Fenomen 10	730.500 (346.500- 1.500.000)	32.500 (16.000- 56.000)	1600 (637- 3950)	2921 (1512- 4995)
Fenomen 11	7.300.000 (6.000.000- 9.000.000)	189.000 (142.000- 266.000)	10.000 (6000- 17.000)	15.000 (9500- 23.000)
Fenomen 12	3.700.000 (3.400.000- 4.700.000)	52000 (31.000- 66.000)	2000 (1400- 3000)	861 (576- 1300)
Fenomen 13	**134.000.000** (62.500.000- 225.000.000)	**2.000.000** (1.100.000- 3.100.000)	147.000 (71.500- 220.000)	**268.500** (135.000- 447.000)
Fenomen 14	1.200.000 (1.000.000- 1.400.000)	52000 (52.000- 184.000)	2100 (1100- 2500)	2232 (1986- 491.000)
Fenomen 15	2.500.000 (2.100.000- 2.900.000)	45.000 (33.000- 61.000)	2600 (1800- 3200)	3500 (2400- 4500)
Toplam	3.500.000 (2.100.000- 5.800.000)	59.000 (29.000- 150.000)	3100 (1500- 10.000)	3858 (1400- 12.000)

Ortanca (çeyrekler arası değer)

Çalışmaya dahil edilen 740 videoda toplamda 2208 olumsuz içerik saptanmıştır. En sık rastlanan olumsuz içerik %58.0'ı (430) fiziksel şiddet, %55.1'i (408) küfür/argo, % 47.8 'i (354) ürün yerleştirme, %30.2'si (224) siber zorbalık ve azalan oranlarla diğer olumsuz içeriklerden oluşmaktaydı. Çalışma kapsamında YouTube fenomenlerinin video paylaşımları olumsuz örnek içerikleri açısından değerlendirilmiş ve Tablo 3'te bulgular gösterilmiştir.

Tablo 3.Fenomenlerin olumsuz video içeriklerine göre değerlendirilmesi

Fenomen	Olumsuz içerik tipi varlığı N (%)*											
	Kötü Beslenme	Küfür/ Argo	Fiziksel Şiddet	Sigara	Alkol	Siber Zorbalık	Yanlış beden algısı	Ürün yerleştirme	Olumsuz okul algısı	Ekran kullanımının özendirilmesi	Fenomenliği öven ebeveyn	Toplam**
Fenomen 1	-	6 (50,00)	6 (50,00)	3 (25,00)	2 (16,70)	7 (58,30)	2 (16,70)	6 (50,00)	2 (16,70)	1 (8,30)	**5 (41,70)**	40 (1,81)
Fenomen 2	22 (17,60)	**118 (93,70)**	89 (70,60)	17 (13,50)	**31 (24,60)**	30 (23,80)	54 (42,90)	76 (60,30)	2 (1,60)	5 (4,00)	1 (0,80)	445 (20,15)
Fenomen 3	3 (37,50)	7 (87,50)	2 (25,00)	-	1 (12,50)	**8 (100,00)**	**7 (87,50)**	**8 (100,00)**	4 (50,00)	3 (37,50)	-	**43 (1,95)**
Fenomen 4	7 (15,60)	9 (20,00)	21 (46,70)	-	-	18 (40,00)	17 (37,80)	18 (40,00)	7 (15,60)	**25 (55,60)**	1 (2,20)	123 (5,57)
Fenomen 5	**43 (39,10)**	74 (67,30)	44 (40,00)	2 (1,80)	1 (0,90)	21 (19,10)	6 (5,50)	53 (48,20)	2 (1,80)	29 (26,40)	2 (1,80)	277 (12,55)
Fenomen 6	3 (7,70)	20 (51,30)	32 (82,10)	-	-	10 (25,60)	4 (10,30)	7 (17,90)	**32 (82,10)**	5 (12,80)	-	113 (5,12)
Fenomen 7	3 (12,00)	14 (56,00)	8 (32,00)	1 (4,00)	1 (4,00)	14 (56,00)	4 (16,00)	16 (64,00)	1 (4,00)	-	-	62 (2,81)
Fenomen8	-	6 (50,00)	8 (66,70)	-	1 (8,30)	2 (16,70)	-	2 (16,70)	8 (66,70)	1 (8,30)	-	28 (1,27)
Fenomen 9	6 (37,50)	4 (25,00)	9 (56,30)	-	-	6 (37,50)	5 (31,30)	6 (37,50)	2 (12,50)	4 (25,00)	1 (6,30)	43 (1,95)
Fenomen10	13 (21,70)	36 (60,00)	**51 (85,00)**	5 (8,30)	5 (8,30)	20 (33,30)	20 (33,30)	19 (31,70)	47 (78,30)	12 (20,00)	2 (3,30)	230 (10,42)
Fenomen11	7 (9,10)	17 (22,10)	32 (41,60)	-	-	1 (1,30)	6 (7,80)	12 (15,60)	1 (1,30)	21 (27,30)	-	97 (4,39)
Fenomen12	60 (39,20)	65 (42,50)	93 (60,80)	4 (2,60)	4 (2,60)	67 (43,80)	76 (49,70)	84 (54,90)	28 (18,30)	60 (39,20)	-	541 (24,5)
Fenomen13	1 (25,00)	2 (50,00)	2 (50,00)	**2 (50,00)**	-	1 (25,00)	1 (25,00)	2 (50,00)	-	-	-	11 (0,50)
Fenomen14	-	-	1 (33,30)	-	-	1 (33,30)	-	-	1 (33,30)	-	-	**3 (0,14)**
Fenomen 15	8 (15,70)	30 (58,80)	32 (62,70)	-	-	18 (35,80)	11 (21,60)	45 (88,20)	2 (3,90)	-	6 (11,80)	152 (6,88)
TOPLAM	176 (23,80)	**408 (55,10)**	**430 (58,00)**	34 (4,60)	46 (6,20)	224 (30,20)	213 (28,70)	354 (47,80)	139 (18,80)	166 (22,40)	18 (2,40)	2208 (100,00)

*İzlenen toplam video sayısına göre olumsuz içerik bulunma yüzdesi.
** Toplam olumsuz içeriğin fenomenlere göre dağılımı.

TARTIŞMA

Sosyal medyanın artan çeşitliliği ve kullanımı, gençlere sunulan sağlık bilgisi kaynaklarını artırmıştır. Çalışmamızda youtube fenomenlerinin en fazla beğenilen ve izlenen paylaşımlarımda başta fiziksel şiddet (N:430-%58), küfür/argo (N:408-%55.1) ve ürün yerleştirme (N:354-%47.8) gibi olumsuz video içeriklerinin daha yoğun olduğu bulunmuştur. Bununla birlikte özellikle bazı fenomenlerin en fazla beğenilen ve izlenen paylaşımlarının neredeyse dörtte birinde olumsuz video içeriği saptanmıştır (fenomen 2=%20.15; fenomen 12=%24.5).

Kanada da yapılan bir çalışmada YouTube maruziyetinin yangın çıkarma davranışını uygunsuz ve tehlikeli davranışlara özendirme yaparak tetiklediği raporlanmıştır (10). Kanada da yapılan başka bir araştırmada da yüzlerce uygunsuz YouTube videolarının gençler arasında yüksek riskli araba kullanmayı yaygınlaştırdığı ve sorunu farklı boyutlara taşıdığı bildirilmiştir (11). Çalışmamızda da fiziksel şiddet (%58) başta olmak üzere pek çok zararlı ve riskli davranışın oldukça yoğun ve yaygın olarak video paylaşımlarında yer verildiği saptanmıştır.

Gençlerde alkol ve madde kullanımı gelecek nesilleri tehdit eden önemli problemler arasındadır. Yetişkinlik rollerinin öğrenildiği, erken yetişkinlik döneminin yaşandığı ergenlik dönemi, zihinsel ve duygusal olgunlaşmanın tam olarak kazanılmamasından dolayı alkol ve madde kullanımına başlamak için zemin oluşturabiliyor (12). Benzer olarak gençlerde zararlı etkilere yol açan marihuana sarmalarının/purolarının/sigaralarının YouTube videolarınca kolayca tariflenmesi ve teşvik edilmesinin riskleri bildirilmiştir (13). Bizim çalışmamızda da fenomenlerin yarısının en sık izlenen paylaşımlarında sigara (34 video) ve alkole (46 video) oldukça sık yer vermesi dikkat çekici bulunmuştur.

Çalışmamızda fenomenlerin video içeriklerinde ürün yerleştirmeyi (%47.8) oldukça sık kullandıkları belirlenmiştir. İspanya'da ve İngiltere'de birbirinden bağımsız olarak yapılan araştırmalarda özellikle çocuk ve genç youtuberların videolarında yiyecek-içecek reklamcılığı-özendirici davranışlara oldukça yüksek oranda yer verdiği ve bu durumun çocuk ve gençlerde obeziteyi ve sağlıksız beslenmeyi teşvik edebileceği gösterilmiştir (14,15). Bir çalışmada Twitch, Facebook Gaming ve YouTube Gaming'de alkol, şeker, enerji içeceği, atıştırmalık, gazoz ve restoran marka ve ürün pazarlamasının hızla artış göstermesinin özellikle çocukları etkilediği gösterilmiştir (16).

Fenomen videolarının gerek ürün yerleştirme gerekse sedanter yaşama teşvik etmesi çağımızın en büyük sorunlarından biri olan obezite için önemli bir risk oluşturmaktadır (15).

UNICEF (United Nations Children's Fund) siber zorbalığı dijital teknolojiler kullanılarak gerçekleştirilen zorbalık olarak

tanımlamaktadır (17). Hedef seçilen kişileri korkutmaya, kızdırmaya ya da utandırmaya yönelik olarak tekrarlanan bu tür zorbalıklar sosyal medyada, mesajlaşma platformlarında, oyun platformlarında ve cep telefonlarında görülebilir. 2018 yılında yapılan bir çalışmada gençlerin siber zorbalığa maruz kalma oranı %33,8 bulunmuş ayrıca gençler arasında hayatlarında en az bir defa başkalarına siber zorbalık yapma oranı %11.5 saptanmıştır (18). Çalışmamızda fenomenlerin siber zorbalığı (%30.2) video paylaşımlarında legal ve normal bir durummuş gibi gösterdikleri saptanmıştır. Mevcut durumu aynalayan çocuk ve gençler, davranış bozukluğu geliştirmeye ve akran zorbalığının giderek yaygınlaşmasına zemin hazırlayabilir. Bu durum bireylerin öz benliğinin gelişiminde de önemli riskler içerebilir.

İngiltere merkezli bir çalışmada YouTuber'ların çeşitli sağlık içeriği üreten platformdaki en önemli etkileyiciler oldukları gösterilmiş ve bu durumun gençler üzerinde uygun bir şekilde kullanılması gerektiği savunulmuştur (19). Fransa'da bir YouTuber Covid pandemisi sırasında insanların ilgilendikleri konuları YouTube verileri üzerinden analiz etmiş ve halkı duyarlı kılabilmenin ve yönlendirebilmenin önemini vurgulanmıştır (20). Fenomenlerin Youtube aracılığıyla halk üzerindeki olumlu etkileri gösterdikleri bu çalışmanın yanı sıra, İtalya'da yapılmış bir çalışmada bu durumun tam tersinin de olabileceği vurgulanmıştır. İtalya'da 560 YouTube videosu incelenmiş ve videolarda aşının otizme sebep olduğu ya da ağır ciddi hastalıkları/yan etkileri vurgusu saptanmıştır. Yaygın ve sık izlenen bu uygunsuz videolar nedeniyle toplumun %48'i yanlış bilgilerle olumsuz yönde etkilendikleri raporlanmıştır (21).

Çalışmamızın bazı sınırlılıkları vardır. Çalışmamızdaki metodoloji, gelecekteki çalışmalarda doğrulama ve onay gerektirmektedir. Çalışmada kaynak olarak tek video paylaşım platformu kullanılmıştır. Popüler videoların sahibi dışında olumsuz içerik üreten başka Youtuber'lar analize dahil edilmedi. Ayrıca Youtube reklamlarının olumsuz içerikleri analiz edilmemiştir. Çalışmamıza hiçbir gelişimsel veya davranışsal değerlendirme aracı veya ebeveyn veya gençlerin görüşleri dahil edilmemiştir. Çalışmada sonuçlar ne kadar vurgulanırsa vurgulansın, çocuklar ve gençler üzerindeki fiziksel ve ruhsal sağlık üzerindeki dezavantajlar doğrudan veya dolaylı olarak gösterilememiştir. Youtube politikaları gereği izleyicilerin yaş aralıkları bilgilerine tam olarak ulaşılamamıştır ancak paylaşım yorumlarından hedef kitlenin 18 yaş altı olduğu anlaşılmaktadır. Yine de bu durum mevcut sonuçların yorumlanması için bir sınırlama olarak görülmüştür.

Bu çalışmada çocuk ve genç nüfusta YouTube kullanımının bu kadar yoğun olduğu bir dönemde YouTuberlar tarafından oluşturulan paylaşımların beden ve ruh sağlığı üzerine sakıncaları araştırılmıştır. Mevcut verilerimiz ışığında paylaşım içeriklerindeki riskli bileşenler ortaya konularak tartışılmıştır. Bu nedenle video paylaşım sitelerinin ve yasa koyucuların bu alanda sınırlama ve denetimlerinin çok önemli olabileceği, bununla

birlikte başta ebeveynlerin ve toplumdaki tüm bireylerin hassasiyet göstermelerinin, uygun yönlendirmeler ve denetimler yapmalarının gençler üzerine faydalı olabileceği düşünülmüştür.

Finansal destek: Yok.

Çıkar çatışması: Yazarlar arasında çıkar çatışması yoktur.

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MEDICAL RESEARCH REPORTS

Med Res Rep 2024;7(1):18-33
https://doi.org/10.55517/mrr.1374119

ORIGINAL ARTICLE

Assessing Sarcopenic Obesity Risk in Children During the COVID-19 Pandemic: Grip-to-BMI Ratio

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ÖZET

Amaç: Bu çalışma, COVID-19 pandemisi sırasında 6-10 yaş arasındaki Türk çocuklarında sarkopenik obezite sıklığını incelemeyi ve tanısal yöntemleri karşılaştırmayı amaçlamaktadır. **Yöntem:** : Bu çalışmaya toplam 431 sağlıklı çocuk (230 kız, 201 erkek) dahil edildi. Boy, kilo ve beden kitle indeksi (BKİ) gibi çeşitli antropometrik ölçümler alındı. Ayrıca, vücut bileşimi, yağ kütlesi, iskelet kas kütlesi ve kas-yağ oranını (KYO) belirlemek için biyoelektrik empedans analizi (BİA) kullanılarak değerlendirildi. Ek olarak, kavrama gücü ölçüldü ve kavrama gücü/BKİ oranı belirlendi. Sarkopenik obeziteyi tanımlamak için McCarthy'nin yöntemi kullanılarak KYO eşik değerleri belirlendi. ROC eğrileri ile, kavrama gücü/BKİ oranının sarkopenik obezite riskini belirlemek için uygulandı. **Bulgular:** Kız çocuklarında sarkopenik obezite sıklığı %8,7, erkek çocuklarda %10,4 olarak bulundu. Kas/yağ oranı (KYO) ile karşılaştırıldığında, kavrama gücü/BKİ indeksi oranının sarkopenik obezite riskini saptamada önemli duyarlılık gösterdiği görüldü. 6-8 yaş grubundaki erkek ve kız çocuklarında kavrama gücü/BKİ oranı ile KYO arasındaki korelasyon zayıf (erkeklerde r=0,363, kızlarda r=0,458, p<0,001) iken, 9-10 yaş grubundaki erkek ve kız çocuklarında bu ilişki güçlü bulundu (Erkeklerde r=0,628, p<0,001; kızlarda r=0,612, p<0,001). 6-8 yaş grubu kız çocuklarında KYO'nın 3. kuintilde BKİ ile belirlenen kesme değeri ≤0,81, 9-10 yaş grubu kız çocuklarında ise ≤0,78 olarak saptandı. 6-8 yaş grubu erkek çocuklarında kesme değeri ≤0,96, 9-10 yaş grubu erkek çocuklarında ise ≤0,61 olarak bulundu. Kavrama gücü/BKİ oranı, sarkopenik obezite riskini tanımlamak için optimal kesme değerleri belirlemede başarıyla kullanıldı. Yaşa göre düzeltilmiş ikili regresyon modelinde, kız çocukları için OR (%95 GA): 11,833 (3,353-41,757) p<0,001; erkek çocuklar için OR (%95 GA): 11,705 (3,318-41,290) p<0,001 olarak hesaplandı. **Sonuç:** Bu araştırma, COVID-19 pandemisinin çocuk sağlığı üzerindeki etkilerini aydınlatmaktadır. Özellikle sokağa çıkma yasakları ve okul kapanmaları nedeniyle egzersiz fırsatlarının azalması ve bu dönemde beslenme alışkanlıklarındaki değişiklikler, çocukların vücut kompozisyonunu olumsuz etkilemiş olabilir. Çocuklarda vücut kompozisyonu göstergelerini tahmin etmek için BIA kullanılması bu çalışmada değerli bilgiler sunmaktadır. Çalışma, sarkopenik obezite riskini belirlemek için kavrama gücü/BKİ oranının dikkate alınması gerektiğini önermektedir ve kavrama gücü/BKİ çocuk vakalarda bir tarama ölçüsü olarak kullanılabilir.

Anahtar kelimeler: Biyoelektrik impedans analizi, COVID-19 pandemisi, Çocuklar, Sarkopenik obezite, Vücut kompozisyonu

ABSTRACT

Aim: The present investigation aimed to examine the prevalence of sarcopenic obesity in Turkish children aged 6-10 years during the COVID-19 pandemic, while also conducting a comparison of diagnostic methods. **Methods:** A total of 431 healthy children (230 females, 201 males) were recruited for this study. Various anthropometric measurements, including height, weight, and body mass index (BMI), were collected. Furthermore, body composition was assessed through the utilization of bioelectrical impedance analysis (BIA) to ascertain fat mass, skeletal muscle mass, and the muscle-to-fat ratio (MFR). Additionally, grip strength was measured to determine the grip strength-to-BMI ratio. McCarthy's framework was employed to define sarcopenic obesity based on MFR cut-offs. Receiver operating characteristic curves were implemented to evaluate the efficacy of the grip strength-to-BMI ratio in identifying the risk of sarcopenic obesity. **Results:** The prevalence of sarcopenic obesity was found to be 8.7% in females and 10.4% in males. In comparison to the MFR, the grip strength-to-BMI ratio exhibited considerable sensitivity in detecting the risk of sarcopenic obesity. The correlation between the ratio of grip strength to BMI and the muscle-to-fat ratio (MFR) was found to be weak among boys and girls aged 6-8 years (r=0.363, r=0.458, p<0.001), while it was strong among boys and girls aged 9-10 years (boys: r=0.628, p<0.001; girls: r=0.612, p<0.001).

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For girls aged 6-8 years, the cut-off value for the MFR in the 3rd quintile, as determined by the BMI, was found to be ≤0.81, while for girls aged 9-10 years, it was ≤0.78. For boys aged 6-8 years, the cut-off value was ≤0.96, and for boys aged 9-10 years, it was ≤0.61. The grip strength-to-BMI ratio was successfully used to establish optimal cut-off points for defining the risk of sarcopenic obesity. In the age-adjusted binary regression model, the odds ratio (OR) for girls was: 11,833 %95 CI (3,353-41,757) p<0,001, while for boys, it was OR 11,705, CI (3,318-41,290) with p<0.001.

Conclusion: The research sheds light on the effects of the COVID-19 pandemic on child wellness. Specifically, reduced opportunities for exercise due to lockdowns and school closures, coupled with potential changes in nutrition during this period, could have negatively impacted body composition in children. By applying BIA to estimate body composition indicators amongst a sample of young participants, the study provides valuable insights. It suggests the grip-BMI ratio warrants consideration as a screening metric to identify at-risk pediatric demographics.

Keywords: Bioelectrical impedance analysis, COVID-19 pandemic, Children, Sarcopenic obesity, Body composition

Cite this article as: Öztelcan Gündüz B, Duyan Çamurdan A, Yıldız M, Baran Aksakal FN, Ünsal EN. Assessing Sarcopenic Obesity Risk in Children During the COVID-19 Pandemic: Grip-to-BMI Ratio. Medical Research Reports 2024; 7(1):18-33

INTRODUCTION

Excess weight gain among youth has emerged as a significant worldwide health issue. Data from the World Health Organization (WHO) in 2016 indicates that around 340 million children and adolescents between the ages of 5-19 were classified as either overweight or obese. The statistics from the WHO highlight the scale of the challenge posed by pediatric obesity on a global scale (1). The alarming rise in obesity rates on a global level is further underscored by these statistics. Specifically, data shows that between 1975 and 2016, the prevalence of overweight increased considerably among both boys and girls - rising from 0.7% to 5.6% for boys and 0.9% to 7.8% for girls (1). Nationally, statistics from Turkey reveal that as of 2016 obesity levels were 8.5% among girls and 9.9% among boys according to COSI-TR-2016 data (2). These findings highlight the concerning trends in pediatric weight status both internationally and domestically within Turkey over recent decades (2).

However, given unique events such as the COVID-19 pandemic, there is concern that obesity rates may increase even more (3). The pandemic has caused notable shifts in the daily routines of children. These changes include reduced physical activity, increased screen time, and alterations in dietary habits, all of which are consequences of the COVID-19 pandemic (3,4). Research conducted during this period indicates an increase in weight among children and adolescents (5). Reduced physical activity during the pandemic is a cause for concern as it can lead to more cases of obesity and overweight. The lockdown has disrupted children's daily routines, leading to decreased physical activity and changes in eating habits. These factors may contribute to the increase in obesity. Therefore, it's essential to thoroughly investigate childhood obesity during the COVID-19 pandemic and comprehend the factors involved.

Sarcopenic obesity (SO) is now a recognized condition among adults, characterized by increased body fat and low muscle mass (6). This term combines obesity (excess body fat) and sarcopenia (insufficient muscle mass) and has gained popularity in recent years (7,8,9). Sarcopenia, typically associated with the elderly, has also been observed in children recently (10). In the pediatric population, SO is characterized by increased body fat and reduced muscle mass, often accompanied by limitations in physical fitness.

The situation becomes more complex due to the worldwide prevalence of obesity. It's unclear whether the lack of muscle mass in children leads to obesity or if obesity contributes to the development of sarcopenia, resulting in 'sarcopenic obesity (8). Studies indicate that sarcopenia in children and adolescents is linked to a range of health concerns, including insulin resistance and high-risk metabolic conditions such as Type 2 Diabetes Mellitus (DM), which can result in various health complications. (11).

As children go through growth and developmental factors such as adolescence, which can impact muscle mass and strength, it's crucial to employ standardized measures to account for these variables. The identification of sarcopenic obesity in children poses a challenge. Therefore, the development of a diagnostic tool for the detection of sarcopenic obesity in children would be highly valuable in addressing underlying conditions during childhood and potentially preventing future health issues.

Various methods are employed to estimate muscle mass, with computed tomography (CT) and magnetic resonance imaging (MRI) considered gold standards due to their high accuracy (12). However, there are limitations to routine clinical use of these imaging techniques, including high costs, limited access to equipment, radiation exposure, and contraindications for scanning (13).

Children mature and develop at varying rates. To account for this, McCarthy et al. (13) introduced the muscle-fat ratio (MFR), determined by the ratio of skeletal muscle mass (SMM) to body fat mass (BFM). McCarthy and colleagues also established MFR cut-off values, using a combination of body mass index (BMI) and MFR. Building upon this research, Kim et al. (14) proposed applying McCarthy's method to identify children at risk of sarcopenia.

In clinical practice, assessing muscle strength, particularly hand grip strength, is a common approach for diagnosing conditions such as sarcopenia. Cruz-Jentoft et al. (12) recommended hand grip strength as an indicator of sarcopenia due to its advantages for quick and field-based assessments. To accommodate variations in maturation and body size among children, grip strength is typically expressed relative to other measures. In this context, the grip-to-BMI ratio has been proposed as a relative hand grip strength measure for diagnosing sarcopenia in the elderly (15). However, there is limited available information concerning the

relationship between the grip-to-BMI ratio and the muscle-fat ratio (MFR) in children (13).

This study aims to investigate the development of sarcopenic obesity (SO) in children during the COVID-19 pandemic-induced closure period and compare two diagnostic methods for SO. By addressing this important aspect of children's health, this research seeks to enhance our understanding of the impact of the COVID-19 pandemic on health.

MATERIAL AND METHODS

Design

The study was conducted prospectively with children aged 6 to 10 years who visited the General Pediatrics Department of Gülhane Training and Research Hospital for routine check-ups between December 16, 2021, and March 16, 2022.

Population and Sample

A total of 432 participants were initially included. However, one participant was diagnosed with Celiac disease and was subsequently excluded from the study. Therefore, the study was completed with 431 participants.

Inclusion Criteria

During the study, a physical activity questionnaire (16) was employed to assess the mobility status of completely healthy children between the ages of 6 and 10. Informed consent forms were obtained from the families who agreed to participate in the study.

Exclusion criteria

Individuals with chronic illnesses, premature births, diagnosed and treated eating disorders, those unable to follow instructions, those who have entered puberty, those who presented after a full meal and in the afternoon, and those with symptoms such as diarrhea, vomiting, and fever that could lead to dehydration were not included in the study.

Data Collection

A survey consisting of a total of 78 questions was completed for the research. The first 24 questions of the form included participants' demographic information, while questions 24-50 covered details about the participants' families, such as their type, place of residence, school-related characteristics, nutrition, sleep, screen time, step counts, sitting durations, and more. Questions 51-78 in the survey pertained to anthropometric measurements conducted by the researchers. Patient measurements were taken in the morning, on an empty bladder. These measurements were conducted by the same trained individual, an experienced pediatrician, and a pediatric dietitian, using standardized instruments. All measurements were performed using the same device for each patient.

Data Collection Instruments

Height measurements were obtained with a precision of 0.1 cm, while the patients stood upright with their heads held straight and their eyes looking forward, and they were without shoes. The instrument used for this purpose was the (SECA 767 height gauge from Hamburg, Germany). Body weight

measurements were taken with (SECA 767 scales from Hamburg, Germany), while ensuring that the children wore only their undergarments, and measurements were recorded to the nearest 0.1 kg. Following the anthropometric measurements of the enrolled patients, total body composition measurements were conducted using the Tanita BC 418 device (TANITA Corporation, Maeno-Cho, Itabashi-ku, Tokyo, Japan). These measurements included total body muscle and fat mass (in kilograms), body fat percentage, and the quantities of fat and muscle in all extremities and the trunk. All measurements were taken in the morning after the patients had fasted and emptied their bladders. The BIA (Bioelectrical Impedance Analysis) component of the measurements took approximately 30 seconds for each participant. The BIA monitor used in this study provided separate measurements for FM (Fat Mass), FFM (Fat-Free Mass), and estimated SMM (Skeletal Muscle Mass) for both limbs and the trunk. Therefore, the sum of SMM in the four limbs (appendicular skeletal muscle mass, SMMa) was calculated.

Additionally, grip strengths for both the right and left hands were measured using the Camry EH101 hand dynamometer (Camry Corporation, Mongkong KLN, Hong Kong, China). After zeroing the dynamometer needle, the participant was asked to squeeze the device without it touching their body, and this process was repeated three times. The average values of the readings on the dial were recorded in kilograms (kg). The maximum grip strength of both hands was measured using a digital CAMRY (Camry Corporation, Mongkong KLN, Hong Kong, China) electronic hand dynamometer with a range of 1-90 kg. During the measurement process, the child holding the dynamometer was instructed to keep their arm at a right angle, place their elbow next to their body, and grip the dynamometer. The handle of the dynamometer was adjusted accordingly. The child was instructed to hold and grip the dynamometer with all four fingers on the handle and the thumb on the side, with the fingers wrapped around the handle. When ready, they were asked to squeeze the dynamometer with maximum isometric effort, and this grip was maintained for approximately 10 seconds. This procedure was repeated three times for both the right and left hands, resulting in three separate measurements for each hand. The averages of these values were calculated and recorded as the final measurement on the form. The highest value obtained in this process was used for calculations. During these measurements, no other body movements were allowed, and the individual was encouraged to exert maximum effort. The maximum hand grip strength was divided by BMI to calculate the grip strength to BMI ratio.

Sarcopenic Obesity Evaluation Methods

McCarty and Kim's studies (13,14) were used as references to define sarcopenia. In this method, BMI z-scores were divided into five intervals for boys and girls aged 6-8 and 9-10 separately. MFR was calculated by dividing appendicular skeletal muscle mass (SMM) by total body fat mass (BFM). The mean and standard deviation of the obtained

MFR were calculated for each fifth interval of the BMI z-score. An MFR equal to -2 standard deviations was found for the middle fifth interval of the BMI z-score. Sarcopenic obesity (SO) was defined as cases where the MFR value fell below the highest fifth percentile of the BMI z-score.

In McCarthy et al.'s study (13), they determined the muscle-to-fat ratio (MFR) by dividing the appendicular skeletal muscle mass (SMMa) by the fat mass (FM). They categorized the children into fifths of BMI z-scores within specific age ranges, separately for boys and girls. The mean and standard deviation (SD) of MFR were calculated for each fifth. For the first time, they established an MFR cut-off corresponding to -2 SD for the middle fifth. Sarkopenic obesity (SO) was defined as cases falling below this cut-off among children in the highest fifth of BMI z-scores. For children at risk of developing SO, the methods proposed by Gontarev and colleagues (17) were employed. In this method, the value obtained by dividing the measured maximum hand grip strength by the calculated BMI was calculated. BMI was determined as body weight divided by height squared (kg/m 2).

Ethical Aspects of the Study

Ethical approval for this study was obtained from the Gülhane Education and Research Hospital, Scientific Research Ethics Committee (Approval No: 2021-350).

Data Analysis

The distribution of all data was assessed using the Kolmogorov-Smirnov test. For normally distributed data, mean ± standard deviation was reported, while for non-normally distributed data, median and interquartile range (IQR) were used. These calculations were performed separately for both genders and the two age groups defined (6-8 years as Group 1 and 9-10 years as Group 2). Initially, descriptive statistics were conducted. Subsequently, Spearman correlation analysis was performed to compare MFR and grip-to-BMI between girls and boys within each age group, with p-values <0.05 considered statistically significant.

Thirdly, ROC curves were used to determine the ability of the grip-to-BMI ratio to predict the risk of sarcopenic obesity in children. In ROC curves, the Area Under the Curve (AUC) was calculated and interpreted as follows: 0.9-1.0 excellent; 0.8-0.9 good; 0.7-0.8 fair; 0.6-0.7 poor; and 0.5-0.6 fail (p <0.05) (18). Fourthly, ROC analysis cut-off points for the grip-to-BMI ratio to define sarcopenic obesity were calculated separately for each gender and age category. The best cut-off point, balancing sensitivity and specificity, was defined as the cut-off point that yielded the smallest value for the equation = $(1\text{-sensitivity})^2 + (1\text{-specificity})^2$ (18). An age-adjusted binary logistic regression model was used to predict the likelihood of developing sarcopenic obesity based on the cut-off values in Grip-to-BMI. Effect sizes were reported as odds ratios (ORs), which are exponentials of the estimates. All analyses were conducted using the Statistical Package for the Social Sciences software (SPSS, v. 22.0; SPSS Inc., Chicago, IL, USA), and p < 0.05 values were considered statistically significant.

RESULTS

Among a total of 431 children, 230 (53%) were female, and 201 (47%) were male, with a median age of 8 (ranging from 6 to 10). In the 6-8 age group, there were 122 (53%) girls and 110 (47%) boys. Notably, the distribution of heights between both genders in this age range did not yield significant differences (p=0.587). However, within the 9-10 age group, a significant difference in height was observed between boys and girls (p=0.009).

Regarding weight, no significant differences were detected between both genders in the 6-8 age range (p=0.531). Conversely, in the 9-10 age group, there was a significant disparity in weight (p=0.010) (see Table 1 for descriptive statistics of children categorized by age group and gender).

Regarding the Body Mass Index (BMI), there were no significant differences between girls and boys in the 6-8 age group (p=0.645). However, in the 9-10 age group, a notable difference was observed (p=0.028) (see Table 1).

Tablo 1. Descriptive statistics of boys and girls

	6-8 Years			9-10 Years		
	Boys	**Girls**	**p value**	**Boys**	**Girls**	**p value**
N (%)	110(47)	122(53)		91(47)	108(53)	
Height (cm)	125,63±6,75	124,97±7,26	0,587*	137,96±7,24	135,29±6,83	**0,009***
Height sds	0.47±1.17	0.58±2.1	0.730	0.47±1.12	0.06±0.97	**0.016**
Weight (kg)	25,95(18,50-54,00)	25,85 (15,30-53,40)	0,531**	34,60 (20,90-68,30)	32,15 (20,60-63,00)	**0,010****
Weight sds	0.77±1.37	0.59±1.66	0.358	0.90±1.49	0.38±1.39	**0.013**
BMI (kg/m^2)	16,25(12,80-30,10)	16,75 (11,10-27,80)	0,645**	18,80 (12,80-32,50)	17,30 (13,50-31,20)	**0,028****
BMI sds	0.46 ±1.45	0.30±1.55	0.715	0.78±1.49	0.41±1.34	**0.054**
BFM (kg)	5,10 (2,70-22,10)	6,05 (2,30-19,30)	0,226**	8,50 (2,80-29,90)	7,30 (3,60-29,80)	0,518**
SMM (kg)	7,35 (4,10-14,80)	7,10 (3,40-11,50)	0,801**	10,80 (5,30-19,70)	9,35 (4,50-16,30)	**<0,001****
MFR (kg/kg)	1,31±0,36	1,19±0,31	**0,026***	1,31 (0,51-2,62)	1,18(0,49-2,11)	0,203**
Handgrip (kg)	11,25 (5,50-19,50)	10,20 (4,20-20,40)	**0,022****	15,70 (10,10-27,90)	13,75 (6,10-32,00)	**<0,001****
Grip-to-BMI (kg/kg/m^2)	0,64 (0,24-1,01)	0,61 (0,33-1,13)	**0,029****	0,77 (0,33-1,35)	0,72 (0,39-2,12)	0,088**
Sarkopenic obesity by MFR n(%)	17 (15.5)	9 (7.4)	0,051***	4 (4,4)	11(10.2)	0,123***

BMI: body mass index; BFM: body fat mass; SMM: skeletal muscle mass; MFR: muscle fat ratio. *:independent samples t-test; ** Mann-Whitney U test; ***Pearson chi-square test

In terms of Body Fat Mass (BFM) and Skeletal Muscle Mass (SMM), no significant differences were found in the 6-8 age group for both girls and boys (p=0.226, p=0.801). Conversely, in the 9-10 age group, while there was no significant difference in BFM (p=0.518), there was a significant disparity in SMM (p=0.001).

Muscle-to-Fat Ratio (MFR) showed a difference in both girls and boys in the 6-8 age group (p=0.026). However, this difference was not significant among children aged 9-10 (p=0.203).

In terms of handgrip strength, there was a statistically significant difference between boys and girls in both age groups (6-8 years: p=0.022, 9-10 years: p<0.001).

Lastly, the Grip-to-BMI ratio showed a significant difference in both boys and girls in the 6-8 and 9-10 age groups (p=0.029, p=0.088). The prevalence of sarcopenic obesity in girls was found to be 8.7%, while in boys, it was 10.4% (Table 1).

The relationship between Grip-to-BMI and MFR was low in girls and boys aged 6-8 years (r=0.363, r=0.458, p<0.001), while it was high among boys and girls aged 9-10 years (boys: r=0.628, p<0.001; girls: r=0.612, p<0.001) (Table 2).

Table 2. Spearman correlation between MFR and grip-to-BMI

	6-8 Years		9-10 Years	
	Boys	**Girls**	**Boys**	**Girls**
	MFR		**MFR**	
Grip-to-BMI	0,363*	0,458*	0,628*	0,612*

*: Correlation is significant at the level of p<0,001 (2-tailed)

In the study, cut-off values for MFR in the 3rd quintile using BMI were found to be ≤0.81 for 6–8-year-old girls, ≤0.78 for 9–10-year-old girls, ≤0.96 for 6–8-year-old boys, and ≤0.61 for 9–10-year-old boys. The Area Under the Curve (AUC) was 0.664 for 6–8-year-old boys, 0.702 for girls in the same age group, 0.957 for 9–10-year-old boys, and 0.820 for girls in the same age group, indicating the accuracy of the test in identifying children at risk of developing sarcopenic obesity. The cut-off points for Grip-to-BMI ratio were estimated as 0.564 for 6–8-year-old girls, 0.654 for boys in the same age group, 0.672 for 9–10-year-old girls, and 0.633 for boys in the same age group. The Grip-to-BMI cut-off points were found to be sensitive for both genders and age groups (Table 3).

Table 3. Evaluation of hand grip strength/BMI ratios in ROC analysis by age and gender

	AUC (95% CI)	p Value	Cut-off point	Sensitivity (%)	Specificity (%)	Equation
Boys (6-8 years)	0,664 (0,537-0,790)*	0,033	0,654	82,4	50,0	0,286
Girls (6-8 years)	0,702 (0,543-0,862)*	0,044	0,564	77,8	64,6	0,174
Boys (9-10 years)	0,957 (0,885-1,000)*	0,002	0,633	100,0	83,9	0,026
Girls (9-10 years)	0,820 (0,732-0,908)*	0,001	0,672	90,9	71,1	0,091

AUC: Area under the curve; 95%CI:95% confidence interval; Equation: (1-Sensitivity)2+(1-Specificity)2

For males, OR (95% CI): 11,705 (3.318-41,290), p < 0.001

For females , OR (95% CI) :11,833 (3,352 -41,757) p< 0,001

In the age-adjusted binary regression model, the odds ratio (OR) was 11,833 (95% CI: 3,353-41,757) with p< 0.001 for girls and 11,705 (95% CI: 3,318-41,290) with p<0.001 for boys. This demonstrates the relationship between the Grip-to-BMI ratio and the risk of developing sarcopenic obesity.

DISCUSSION

This study presents significant findings regarding the impact of the COVID-19 pandemic on child health. The research involved 431 Turkish children aged 6-10 years, utilizing bioelectrical impedance analysis (BIA) to estimate body fat percentage and skeletal muscle mass. Notably, the study highlighted the grip-BMI ratio as an effective tool for identifying risk of sarcopenic obesity in children. By applying BIA to estimate body composition indicators amongst a sample of young participants, the study provides valuable insights. It suggests the grip-BMI ratio warrants consideration as a screening metric to identify at-risk pediatric demographics.

The Grip-to-BMI ratio demonstrated its efficacy in identifying SO risk, with impressive Area Under the Curve (AUC) values. Among 6-8-year-olds, AUC values were 0.702 for girls and 0.664 for boys. For 9-10-year-olds, these values rose to 0.820 for girls and an impressive 0.957 for boys. The research determined optimal cutoff points for the Grip-to-BMI ratio for 6-8-year-old boys and girls, offering sensitivity rates of 82.4 % and 77.8 %, and specificity rates of 50% and 64.6%, respectively. In the 9-10 age group, sensitivity rates were exceptionally high at 100% for boys and 90.9% for girls, with corresponding specificity rates of 83.9% and 71.1%. Importantly, this study sheds light on the pandemic's effects on child health. It contributes to a better understanding of how the COVID-19 pandemic, with its disruptions

to daily routines, such as reduced physical activity and altered dietary habits, may have contributed to the emergence of SO in children.

The COVID-19 pandemic significantly impacted the children's daily routines and resulted in important alterations to body composition. Research has shown that the pandemic's impact, characterized by reduced physical activity, increased stress, and altered dietary habits, may lead to increased fat accumulation in children. One study analyzed the implications of the COVID-19 pandemic on variations in body composition, revealing differences in body mass index (BMI), body fat proportion (%fat), and BMI z-scores (19). In addition, Azoulay et al. observed an improvement in the muscle-fat ratio among participants of low and normal weight but found the ratio remained relatively stable in overweight/obese individuals (20). Specifically, the research undertaken by Azoulay and associates examined alterations in body composition ratios across weight groupings of pediatric members during the pandemic. They found lean and healthy weight children exhibited enhanced muscle-fat percentages compared to pre-pandemic levels. However, overweight and obese youth did not exhibit considerable fluctuation in their muscle-fat percentages. Fäldt et al. noted a rise in BMI, particularly in lower socioeconomic status regions, among 3-4-year-old children in Sweden during the pandemic period. Bergmann et al. stated that parents of overweight children perceived increases in body weight and declines in physical activity levels throughout the phase of social segregation. In summary, studies have indicated that the COVID-19 pandemic has led to adverse changes in body composition in children, marked by an increase in body fat and BMI (20-22).

Another study carried out in the Czech Republic revealed that the existing obesity and overweight issues in boys aged 9-11 were exacerbated by the restrictions related to COVID-19 (23). In a study conducted in Turkey, the frequency of overweight and obesity in Isparta province during the COVID-19 pandemic was determined to be 26.5%. This research also recognized a rise in BMI among 9-10-year-old boys and girls. Both within Turkey and worldwide, elements such as limitations on school attendance and the transition to online learning, suspension of sports, and a shift to a more sedentary way of life, combined with increased snacking throughout the day because of lockdown restrictions, could have contributed to this emerging trend. By identifying distinct patterns in body composition responses within various pediatric weight categories, the results offer valuable insights into how the lifestyle adjustments required during the pandemic had varying effects on individuals, depending on their initial levels of adiposity. The findings indicate that leaner children demonstrated advantages in terms of preserving relative skeletal muscle mass, while excess weight may have hindered similar adaptations in overweight or obese youth. In general, this research provides valuable insights into the diverse effects of societal lockdowns and

changes in activity levels on the body composition of pediatric individuals.

While sarcopenia is commonly associated with age-related muscle decline, recent research suggests that pediatric populations may also be susceptible to sarcopenia as a result of obesity and sedentary lifestyles. The term "sarcopenia," derived from the Greek words "sarx" for flesh and "penia" for loss, was first coined by Rosenberg in 1989 to describe the reduction of muscle mass in the elderly population (24). Additionally, "Sarcopenic Obesity (SO)" is defined as a condition characterized by decreased muscle mass along with excessive fat accumulation (25). Sarcopenic Obesity (SO) has been studied primarily in the elderly population. However, research has demonstrated its potential development in children. SO is linked to insulin resistance and metabolic disorders among children (26-27). This condition results from the release of certain hormones and chemicals in the abdominal cavity, including adipokines. These substances play a pivotal role in inducing inflammation, subsequently causing insulin resistance and distinct metabolic effects in individuals with Sarcopenic Obesity (SO) (6). Furthermore, myosteatosis and mitochondrial dysfunction have been identified as underlying factors contributing to muscle weakness and fatigue in individuals with SO (28).

Various methods have been employed in studies to diagnose Sarcopenic Obesity (SO). Gontaraev (17) and Steffi (31) utilized a combination of Bioelectrical Impedance Analysis (BIA) and dynamometry, whereas Gatjens (30), McCarthy (13), and Stefanaki (29) exclusively relied on BIA. In our research, we employed both BIA and hand dynamometry for diagnosis. Furthermore, there are discrepancies among the samples used in these studies. Gontarev utilized a healthy group aged 6-10 years, Steffi examined a healthy adolescent population aged 4-14 years, Gatjens and McCarthy investigated healthy adolescents aged 5-18 years, and Stefanaki et al. exclusively included overweight children in their study. This study exclusively included completely healthy children aged 6-10 years. The most notable aspect of this study is that it was conducted exclusively during the period of the COVID-19 pandemic, and the study sample included only healthy, prepubertal children. Hence, the differences in the prevalence of sarcopenic obesity (SO) between studies may be related to these different factors.

In studies assessing body composition using the Bioelectrical Impedance Analysis (BIA) method with the MFR - 2 SD, the prevalence of Sarcopenic Obesity (SO) has been found to be 7.2%, 8.31%, and 9.2% among boys aged 5-10 years and 5.66%, 5.9%, and 9.3% among girls aged 5-10 years.

In this study, using the method of McCarthy and colleagues, the prevalence of Sarcopenic Obesity (SO) was found to be 15.5% among boys aged 6-8 years, 7.4 % among girls in the same age group, 4.4% among boys aged 9-10 years, and 10.2% among girls in the same age group. The decline in physical activity and the rise in food consumption observed during the COVID-19

pandemic appear to play pivotal roles in the reduction of muscle mass and the augmentation of body fat mass, subsequently impacting the development of SO.

The BIA technique, which was also employed in this study, was initially described in the 1960s and became widely recognized in the 1980s. Over the years, various other methods have been used for the diagnosis of Sarcopenic Obesity (SO), considering both cost-effectiveness and ease of use. In this regard, Cruz-Jentoft et al. (12) recommended the use of handgrip strength for the diagnosis of sarcopenia. Utilizing handgrip strength in children to determine the risk of Sarcopenic Obesity (SO) may offer a beneficial and practical approach for field studies, considering the use of specialized equipment and expensive procedures. As body fat percentage increases alongside obesity and MFR decreases, muscle strength likely diminishes.

Relative muscle strength assessment may provide a practical alternative to bioelectrical impedance analysis (BIA) for identifying pediatric patients vulnerable to SO. Sarcopenia has historically referred to age-related muscle depletion in older adults. However, recent evidence indicates that physical inactivity during childhood can also induce sarcopenia. Measurement of muscle strength could help detect declining muscle mass and function in sedentary youth at risk of concurrent adiposity. Early identification of SO predisposition through readily available strength tests may enable timely lifestyle interventions to mitigate future health complications. More research is still needed to validate relative strength as a screening tool for childhood SO compared to modalities such as BIA (14). Notably, Gontarev et al. conducted a study involving 4021 children in Macedonia and determined Grip-to-BMI ratios within the range of 0.826 to 0.859 for boys (95% CI) and 0.752 to 0.789 for girls. In a separate study by Steffi and colleagues, which included 730 children in the Czech Republic, Grip-to-BMI ratios were found to be 0.791 for girls aged 4-9, 0.789 for girls aged 10-14, 0.719 for boys in the 4-9 age group, and 0.896 for boys aged 10-14 (31). In contrast, our study exclusively enrolled 431 participants during the COVID-19 lockdown period, setting it apart from previous research. During this unique timeframe, we observed Grip-to-BMI ratios of 0,664 (95%CI 0,537-0,790) for boys and 0,702 (95%CI 0,543-0,862) for girls aged 6-8 and 0,957 (95% CI 0,885-1,000)for boys and 0,820 (95%CI 0,732-0,908) for girls aged 9-10. It is plausible that the variations in Grip-to-BMI ratios observed in our study result from significant lifestyle changes amid the COVID-19 pandemic. These lifestyle modifications are consistent with recognized factors that have a negative effect on muscle strength and contribute to increased adiposity over a period of time. This correlation is likely responsible for the differences observed in Grip-to-BMI ratios between our study and previous research conducted prior to the pandemic.

The main finding of our study aligns with our hypothesis, indicating that the grip-to-BMI ratio effectively distinguishes children at risk of sarcopenic obesity from those who are

not. This suggests that the grip-to-BMI ratio could serve as a valuable screening method applicable in field settings.

While the underlying causes of sarcopenia differ between children and the elderly, insufficient physical activity and poor nutrition emerge as significant risk factors for pediatric sarcopenia. Previous research has linked low activity levels, particularly on weekends, to unfavourable body composition in children aged 6-8. The COVID-19 pandemic likely heightened the risk of sarcopenia in children due to decreased physical activity during remote schooling and increased sedentary behaviour (32-33). These environmental conditions, coupled with disrupted nutrition, created a conducive setting for the development of sarcopenic obesity.

The grip-to-BMI ratio offers a practical diagnostic approach by identifying at-risk children through a simple measurement, normalized by BMI. This method is advantageous, considering potential barriers to healthcare access during crisis periods. While not conclusive, the grip-to-BMI ratio provides a cost-effective and efficient initial screening tool to identify children requiring further medical evaluation, nutritional guidance, or exercise therapy to address emerging sarcopenia and prevent future health complications. Therefore, the grip-to-BMI ratio exhibits promise as a suitable field-based metric deserving application in various pediatric populations.

The research sheds light on the effects of the COVID-19 pandemic on child wellness. It demonstrates how disruptions to daily routines introduced by the pandemic, particularly decreased physical activity and altered dietary habits, may have contributed to the development of sarcopenic obesity. Specifically, reduced opportunities for exercise due to lockdowns and school closures, coupled with potential changes in nutrition during this period, could have negatively impacted body composition in children.

By applying BIA to estimate body composition indicators amongst a sample of young participants, the study provides valuable insights. It suggests the grip-BMI ratio warrants consideration as a screening metric to identify at-risk pediatric demographics. Overall, the findings enhance understanding of the pandemic's potential downstream health consequences and inform efforts to address related public health challenges going forward.

LIMITATIONS

One limitation of the study is that it only included participants from a single region in Turkey, which may restrict the generalizability of the findings. The findings of this study may not accurately represent the prevalence of sarcopenic obesity among 6-10-year-old Turkish children in other regions of the country. To enhance the generalizability of the results, future research should involve larger sample sizes and include participants from diverse geographical locations within Turkey. This would provide a more comprehensive understanding of the prevalence and characteristics of sarcopenic

obesity in this specific age group across the country.

CONCLUSION

The study findings suggest that the grip-to-body mass index (BMI) ratio could be a valuable tool for early diagnosing and managing sarcopenic obesity risk. Furthermore, they indicate that the alterations resulting from the COVID-19 pandemic in children may adversely affect the development of sarcopenic obesity. However, the acquired data will contribute to comprehending and monitoring the pandemic's effects on children's health. The utilization of the grip-to-BMI ratio as a straightforward method for early identification and management of children susceptible to sarcopenic obesity is recommended. Nevertheless, long-term investigations in this domain are imperative.

Source(s) of financial support: None.

Conflicts of interest: The authors have no conflicts of interest to declare.

Ethical statement: This article was produced from the thesis titled "The relationship between physical activity and sarcopenic obesity in children aged 6-10 during the COVID-19 pandemic", which was conducted with the approval of the Scientific Research Ethics Committee of Gulhane Education and Research Hospital (approval number=2021-350).

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MEDICAL RESEARCH REPORTS

Med Res Rep 2024;7(1):34-40
https://doi.org/10.55517/mrr.1325671

REVIEW

Şiddetli Erken Çocukluk Çağı Çürüğü ve Demir Eksikliği Anemisi İlişkisi

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ÖZET

Erken çocukluk çağı çürüklerinin agresif formunda özellikle düşük sosyoekonomik duruma bağlı olarak ağrı, enfeksiyon, çiğnemede zorluk sonucu beslenme yetersizliği görülmektedir. Beslenme yetersizliğine bağlı olarak demir eksikliği anemisi gelişmekte ve çocuğun yaşam kalitesini önemli ölçüde etkilenmektedir. Diş hekimleri özellikle küçük çocuklarda diş çürüğü gelişimini önlemek için koruyucu uygulamalara önem vermelidir. Bu çalışmanın amacı şiddetli erken çocukluk çağı çürükleri ile demir eksikliği anemisi arasındaki ilişkiyi güncel literatüre dayanarak ortaya koymaktır. Erken çocukluk çağı çürükleri ile demir eksikliği anemisi arasındaki ilişkiyi değerlendirmek için literatür taraması yapılmıştır. Bu amaçla PubMed, Google Scholar, SpingerLink, Web of Science, Elsevier ScienceDirect, Scopus elektronik veri tabanlarında indekslenen makalelere "early childhood caries" ve "iron deficiency anemia" anahtar kelimeleri kullanılarak erişim sağlanmış ve değerlendirme yapılmıştır. Literatürdeki çalışmalarda özellikle şiddetli erken çocukluk çağı çürükleri olan çocukların çürüksüz kontrol grubuna göre düşük ferritin ve hemoglobin düzeyleri sonucu demir eksikliği anemisine daha yatkın olduğu bildirilmektedir. Buna dayanarak şiddetli erken çocukluk çağı çürüklerinin çocuklarda malnütrisyon ve demir eksikliğine bağlı anemi için risk faktörü oluşturduğu sonucuna ulaşılmıştır. Diş hekimleri ve pediatristler demir içeren gıdaların tüketimi konusunda ebeveynlere önerilerde bulunmalıdır. Ayrıca demir eksikliği anemisi riskini azaltmak için erken çocukluk çağı çürüklerini önlemeye yönelik stratejiler geliştirilmelidir. Bu konu ile ilgili yetersiz beslenme durumu, yaşam tarzı ve sosyoekonomik risk faktörlerini incelemek için daha fazla çalışmaya ihtiyaç vardır.

Anahtar Kelimeler: Demir eksikliği anemisi, Erken çocukluk çağı çürüğü, Malnütrisyon

ABSTRACT

In the aggressive form of early childhood caries, especially due to low socioeconomic status, are observed nutritional deficiencies as a result of pain, infection, difficulty in chewing. Iron deficiency anemia develops due to nutritional deficiency and affects the quality of life of the child significantly. Dentists should attach importance to preventive practices to avoid the development of dental caries, especially in young children. The aim of this study is to reveal the relationship between severe early childhood caries and iron deficiency anemia based on the current literature. A literature review was conducted to evaluate the relationship between early childhood caries and iron deficiency anemia. For this purpose, the articles indexed in PubMed, Google Scholar, SpingerLink, Web of Science, Elsevier ScienceDirect, Scopus electronic databases were accessed and evaluated using the keywords "early childhood caries" and "iron deficiency anemia". In studies in the literature, it has been reported that children with especially severe early childhood caries are more prone to iron deficiency anemia as a result of low ferritin and hemoglobin levels compared to the control group without caries. Based on this, it was concluded that severe early childhood caries constitutes a risk factor for malnutrition and iron deficiency anemia in children. Dentists and pediatricians should advise parents on the consumption of foods containing iron. In addition, strategies to prevent early childhood caries should be developed to reduce the risk of iron deficiency anemia. More studies are needed to examine the malnutrition status, lifestyle and socioeconomic risk factors related to this issue.

Keywords: Iron deficiency anemia, Early childhood caries, Malnutrition

Cite this article as: Bektaş Ö. Şiddetli Erken Çocukluk Çağı Çürüğü ve Demir Eksikliği Anemisi İlişkisi. Medical Research Reports 2024; 7(1):34-40

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Received: 11.07.2023; Accepted: 26.11.2023

GİRİŞ

Diş çürüğü; diş yüzeyine yapışan Streptococcus mutans gibi karyojenik mikroorganizmaların fermente olabilen karbonhidratları metabolize ederek oluşturduğu asitlerin, demineralizasyon sonucu zamanla diş dokusunda yıkıma, çiğneme fonksiyonunun kaybına ve etkilenmiş dişlerin estetik olmayan görünümüne neden olduğu enfeksiyöz bir hastalıktır (1). Yaygın ve agresif diş çürüklerinin bir formu olan erken çocukluk çağı çürüğü ise genel sağlık durumunu ve yaşam kalitesini etkileyen önlem alınmadığında hızlı ilerleyen bir kronik çocukluk çağı hastalığı olup 71 aya kadar olan çocuklarda çürük, çürük nedeniyle kayıp diş veya dolgulu diş varlığı olarak tanımlanır. Şiddetli erken çocukluk çağı çürüğü 3 yaşın altında 4'ten fazla, 4 yaşında 5'ten fazla ve 5 yaşında 6'dan fazla çürük, kayıp veya dolgulu diş yüzey sayısı olma durumudur (2).

İlk olarak 1952 yılında Beltrami adlı araştırmacı küçük çocuklarda erken dönemde görülen diş çürüklerini "melanodontie infantil" olarak adlandırmıştır. Daha sonra 1962 yılında Elias Fass bu durumu tanımlamak için "nursing bottle mouth" terimini kullanmıştır, ancak uzun süreli biberon kullanımının erken çocukluk çağı çürüğünün oluşumunda tek neden olmadığı ve bu klinik durumun multifaktöriyel enfeksiyöz bir hastalık olduğu anlaşılmıştır (3).

Erken çocukluk çağı çürüğü, yaşamın ilk yıllarında en sık görülen ciddi bir halk sağlığı sorunu olarak kabul edilmektedir (4). Diş çürüğü önlenebilir bir hastalık olmasına rağmen, dünya genelinde 530 milyondan fazla çocuğun süt dişlerinde çürük bulunmaktadır (5).

Bu çalışma; mevcut literatür incelemesi sonucu şiddetli erken çocukluk çağı çürüğü ile demir eksikliği anemisi arasındaki ilişkiyi güncel kaynaklara dayanarak ortaya koymayı amaçlamaktadır.

1. 1. Erken çocukluk çağı çürüklerinin etiyolojisi

Erken çocukluk çağı çürüğü, çeşitli bireysel ve sosyal risk faktörlerine bağlı olarak gelişen karmaşık, multifaktöriyel bir hastalıktır. Çocuğun genetik yapısı, diş morfolojisi ve mine hipoplazisi erken çocukluk çağı çürüğünün gelişimini ve ilerlemesini etkileyebilir (6,7). Bununla birlikte karyojenik mikroorganizmalar, dental plak ve substrat ana etiyolojik faktörlerdir. Erken çocukluk çağı çürüğünün genellikle uygun olmayan beslenme ve ağız hijyen alışkanlıkları ile ilgili olduğu bilinmektedir (8). Düşük sosyoekonomik durum, ebeveynlerin eğitim durumu, sık ara öğün tüketimi, annenin sigara kullanımı, annenin tükürüğündeki Streptococcus mutans seviyesi ve diş kaybı, florür kullanımı erken çocukluk çağı çürüğü ile ilişkili olan faktörler arasında sayılmaktadır (8,9,10).

Özellikle bebeklerdeki gece beslenmesi ağız sağlığını olumsuz etkilemektedir (11). Diğer kronik hastalıklara benzer şekilde, diş çürükleri tedavi hizmetinden yoksun gelişmemiş ülkelerde ve

düşük gelirli ailelerin çocuklarında sıklıkla görülmektedir (12). Şiddetli erken çocukluk çağı çürüğüne yatkınlık, özellikle düşük sosyoekonomik statüdeki çocuklarda sıklıkla diyet yetersizliklerinden kaynaklanmaktadır (13).

Erken çocukluk çağı çürüğü, ağız ve diş sağlığı dışında sonuçları bakımından genel sağlık durumunu etkilemektedir. Çocuklarda fokal enfeksiyona neden olabilen yaygın çürükler sonucu ağrı, beslenme yetersizliğine bağlı olarak gelişim geriliği, uyku bozukluğu, huzursuzluk gibi sorunlara neden olmaktadır (14,15,16).

1. 2. Demir eksikliği anemisi

Dünya Sağlık Örgütü (DSÖ) 60 aylıktan küçük çocuklarda anemiyi hemoglobinin 110 g/L'den az olması olarak tanımlamaktadır (17). Demir eksikliği anemisinde ortalama korpüsküler hacim (MCV) 80 f L'den azdır (18). DSÖ'nün 2001 yılındaki verilerine göre gelişmekte olan ülkelerdeki 0-4 yaş arası çocukların %30, 5-14 yaş arası çocukların %48'inde demir eksikliği anemisi görülmektedir. Ülkemizde ise çeşitli araştırmalarda çocuklarda görülen demir eksikliği anemisi sıklığının % 15,2 ile % 62,5 arasında olduğu bildirilmiştir (19).

Demir eksikliği anemisi 2016 çalışmasına göre, 1,24 milyardan fazla kişiyi etkileyen önemli bir sağlık sorunudur4. Özellikle yoksulluk, malnütrisyona bağlı yetersiz demir alımı nedeniyle bebekler ve okul öncesi çocuklar arasında görülmektedir (20). Demir eksikliği anemisi genelde asemptomatik olmasına rağmen; çocuklarda psikomotor, davranışsal, bilişsel ve zihinsel gelişimi etkilediği bilinmektedir (21,22). Ayrıca, demir eksikliğine bağlı olarak lökosit ve lenfositlerdeki fonksiyonel bozukluk, IL-2 VE IL-6 gibi interlökinlerin üretimindeki sorun bağışıklık sistemini etkileyerek enfeksiyona duyarlılığı artırır (22,23).

Demir eksikliği durumunda, demir depo proteini olan serum ferritin seviyeleri tanı ve tedavide kritik rol oynamaktadır (24). Ayrıca serum ferritini bir akut faz proteinidir ve enfektif, inflamatuar veya malign hastalıklarda yükselebilir (25).

1. 3. Demir eksikliği anemisi ve erken çocukluk çağı çürüğü

Beslenme eksikliği, yetersiz demir alımı ve küçük çocukların genel sağlık durumuna etkileri ile anemiye neden olmaktadır. Anemi dünya çapında bir sağlık sorunudur ve yaygınlığı gelişmekte olan ülkelerde gelişmiş ülkelere göre daha yüksektir (26).

Düşük sosyo-ekonomik duruma bağlı olarak çocuklarda hem demir düzeyleri hem de ağız sağlığı durumu, beslenme ve diyet kalitesinden büyük ölçüde etkilendiği için demir eksikliği anemisi ile erken çocukluk çağı çürüğü arasında ilişki olduğu düşünülmektedir (27,28). Erken çocukluk çağı çürüğü tanısı konan çocuklarda süt dişi pulpasındaki enflamasyon ağrıya neden olur ve rahatsızlık sonucu çiğneme alışkanlıklarındaki değişiklikler beslenme yetersizliğine bağlı demir alımını etkileyebilir (13,29). Diş

çürüklerinin tedavisinin demir takviyesi olmaksızın demir eksikliği anemisini ortadan kaldıracağı öne sürülmüştür (30). Bu, demir eksikliği anemisi ile erken çocukluk çağı çürüğü arasındaki ilişkinin beslenme durumu ile ilişkili olduğu düşüncesini güçlendirmektedir. Çocukluk çağındaki kronik yetersiz beslenme, daimi dişlerin sürmesini de geciktirerek çürük riskini artırmaktadır (31). Bununla birlikte, vücuttaki demir durumunu etkileyen faktörlerin erken çocukluk çağı çürüğü oluşumuna etkisini tam olarak belirlenememiştir.

İn vivo çalışmalarda demir takviyeleri verilen farelerin daha düşük çürük oranlarına sahip olduğu gösterilmiştir (32,33).

Demirin Streptococcus mutans'ın karyojenik potansiyeli üzerindeki olumsuz etkileri:

- asidik ortamlarda mine demineralizasyonunu baskılaması (34);
- diş plağı asiditesini azaltması (35);
- Streptococcus mutans üzerine bakteriyostatik etkisi (36) ;
- glikosiltransferaz aktivitesini inhibe etmesi (37) ile açıklanmaktadır.

Demir iyonları; mine yüzeyinde aside dayanıklı bir yapı oluşturarak çökelir, tükürükteki kalsiyum ve fosfat iyonlarını absorbe ederek apatit oluşumunu başlatır ve çürük sürecinin asit fazlarında minerallerin değişimini gerçekleştirir (38). Demir eksikliği anemisinde tükürük bezi fonksiyonları bozularak tükürük salgısı ve tamponlama kapasitesi azalır, bu da diş plağının ve gıda artıklarının yeterince uzaklaştırılamaması sonucunda diş çürüklerine neden olur (39). Buna ek olarak, tükürük ve kandaki demirin ferrik formundaki azalma Streptococcus mutans'ın virülans faktörlerinin inhibe edilememesine neden olarak çürüğe yatkın bir ortam oluşturur (40).

Şiddetli erken çocukluk çağı çürüğü olan çocuklarda yetersiz beslenme sonucu, anemi ve gelişim geriliği gözlenmektedir (41). Tang ve arkadaşları çocuklardaki çürük durumu ile anemi arasındaki ilişkiyi araştırmış ve şiddetli erken çocukluk çağı çürüğünün anemi ile ilişkili olduğunu bildirmişlerdir (42). Buna bağlı olarak şiddetli erken çocukluk çağı çürüğünün demir eksikliği anemisi için bir risk faktörü olduğu düşünülmektedir (43).

Clarke ve arkadaşları tarafından yapılan bir çalışmada, şiddetli erken çocukluk çağı çürüğü olan çocuklarda yüksek anemi prevalansı olduğu bildirilmiştir (44). Shaoul ve arkadaşları demir takviyesi olmadan sadece diş çürüklerinin tedavisi ile demir eksikliği anemisinin düzeldiğini bildirmişlerdir (30). Schroth ve arkadaşları şiddetli erken çocukluk çağı çürüğü olan çocukların ferritin ve hemoglobin seviyelerinin çürüğü olmayan çocuklara göre daha düşük olduğunu bildirmişlerdir. Aynı zamanda demir eksikliği ve demir eksikliğine bağlı anemi, şiddetli erken çocukluk çağı çürüğü olan çocuklarda çürüğü olmayan çocuklara kıyasla daha sık görülmüştür (13).

Literatürdeki çalışmalara dayanarak şiddetli erken çocukluk çağı çürüğü olan çocuklarda demir eksikliğine bağlı aneminin sık görüldüğü söylenebilir. Bu durum ile ilgili çeşitli teoriler bulunmaktadır:

Vücudun inflamatuar yanıtı: Erken çocukluk çağı çürüğü olan çocuklarda görülen inflamasyon; eritropoezi engelleyebilen sitokinlerin üretimine, kandaki hemoglobin ve demir seviyesinin düşmesine neden olabilir (45). Özellikle pulpitis ve kronik diş apsesi sitokinlerin eritropoezde önemli olan metabolik yolları etkileyen kronik inflamasyonu indükleyerek büyümeyi etkiler. Bu sitokinlerden interlökin-1 (IL-1), inflamasyonda eritropoezin inhibisyonunu indükleyerek kemik iliğinde azalmış eritrosit üretimi sonucunda anemiye neden olmaktadır (46,47). Bununla birlikte demir eksikliği olan çocuklarda tükürük bezi fonksiyonunun bozulması, tamponlama kapasitesinin azalmasına ve diş çürüklerine yol açmaktadır (45,48).

Erken çocukluk çağı çürüğüne bağlı çiğneme güçlüğü ve yetersiz beslenme: Erken çocukluk çağı çürüğü, çocuklarda ağrıya veya rahatsızlığa neden olduğu için çocuklar demir açısından zengin yiyecekleri çiğnemekte sorun yaşarlar. Bu da beslenme eksikliklerine ve kandaki demir seviyesinin düşmesine yol açarak demir eksikliğine anemisine neden olur (44).

Yemek alışkanlıkları veya diyet faktörleri: Yüksek karbonhidrat ve düşük et tüketimi kandaki demir seviyesini düşürmektedir. Araştırmalarda şiddetli çocukluk çağı çürüğü olan çocuklarda demir eksikliği anemisinin yüksek prevalansa sahip olduğunu gösterilmiştir. Beslenme alışkanlıklarının değişmesi ve diş çürüğü tedavisi sonrası demir eksikliği anemisinin azalabileceği düşünülmektedir (43,44).

Kronik enfeksiyonlar: Kronik enfeksiyonların, hemoglobin düzeylerini düşürerek anemiye katkıda bulunabileceği bilinmektedir. Erken çocukluk çağı çürüğüne bağlı inflamatuar yanıt ve yetersiz beslenme, demir eksikliği ve buna bağlı aneminin iki ana nedenidir (49).

SONUÇ

Şiddetli erken çocukluk çağı çürükleri, okul öncesi çocukların süt dişlerinde yıkıma neden olan kronik multifaktöriyel bir hastalıktır. Bu derleme, şiddetli erken çocukluk çağı çürüklerinin çocuklarda malnütrisyon ve demir eksikliğine bağlı anemi için risk faktörü olduğunu ortaya koymaktadır. Şiddetli erken çocukluk çağı çürükleri olan çocuklar çürüksüz kontrol grubuyla karşılaştırıldığında, düşük ferritin ve hemoglobin düzeyleri sonucu demir eksikliği anemisine daha yatkındır. Diş hekimleri ve pediatristler bu oral-sistemik ilişkinin farkında olmalı; diyet çeşitliliği, özellikle kırmızı et, tavuk ve balık gibi doğal olarak demir içeren gıdaların tüketimi konusunda ebeveynlere önerilerde bulunmalıdır. Yetersiz beslenme durumuyla ilişkili olabilecek yaşam tarzı ve

sosyoekonomik risk faktörlerini incelemek için daha fazla çalışmaya ihtiyaç vardır. Demir eksikliği ve buna bağlı anemi riskini azaltmak için erken çocukluk çağı çürüklerini önleyici stratejiler geliştirilmelidir.

Finansman ilinti beyanı: Yazarlar, bu makalenin araştırılması ve/veya yazarlığı için herhangi bir finansal destek almamıştır.

Çıkar Çatışması: Yazarlar arasında herhangi bir çıkar çatışmasının olmadığını bildirmektedir.

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MEDICAL RESEARCH REPORTS

REVIEW

Med Res Rep 2024;7(1):41-57
https://doi.org/10.55517/mrr.1277388

A Comprehensive Analysis of Covid-19 Research in Turkish Dentistry

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ÖZET

Pandemi başlangıcından 2021 yılı sonuna kadar 2 yıllık süreçte COVID-19 ile ilgili Türk diş hekimliği literatüründeki güncel verileri analiz etmek, sınıflandırmak ve özetlemektir. PubMed ve Google Akademik veri tabanlarında "koronavirüs", "diş hekimliği", "pandemic", "coronavirus", "dentistry", "pandemics", "SARS-Cov-2" terimleri ayrı ayrı ve kombinasyon halinde arandı. Türkçe ve/veya İngilizce olmasına bakılmaksızın Türk diş hekimlerine ait olan, girişimsel ve/veya gözlemsel olan ve pandemi başlangıcından 2021 yılı sonuna kadar yayımlanan ve diş hekimliğinde COVID-19 salgını hakkında bilgi içeren çalışmalar değerlendirildi. PubMed veri tabanında 46, Google Scholar'da 74 çalışma tespit edildi. Çalışmalar 8 ana başlık (bilgi düzeyi ve davranış değerlendirmesi, psikolojik etkiler, diş hekimliği bölümlerine özgü araştırmalar, uygulamalar, eğitim, pandeminin önemi, enfeksiyon kontrolü ve önlemler, sosyal medya ve sosyal ağların analizi) altında sınıflandırıldı. Analiz bulguları ile diş hekimliği alanında hizmet veren diş hekimleri ve sağlık meslek mensuplarının bilgi, tutum ve davranışlarının güncellenmesi, gelecekte yaşanabilecek olası pandemi durumlarına karşı hazırlıklı olmaları ve bulaşıcı hastalıklara bakış açılarını literatürün rehberliğinde şekillendirmeleri sağlanacaktır.

Anahtar kelimeler: COVID-19, Diş hekimliği, Pandemi, SARS-Cov-2

ABSTRACT

To analyze, classify and summarize current data in Turkish dentistry literature related to COVID-19 in 2-year duration from beginning of the pandemic to the end of 2021. The terms ''COVID-19", "koronavirüs", "diş hekimliği", "pandemic", "coronavirus", "dentistry", "pandemics", "SARS-Cov-2"'' were searched separately and in combinations in PubMed and Google Academic databases. Regardless of whether the studies were in Turkish and/or English, it was taken into account that they belong to Turkish dentists, interventional and/or observational, and have been published in the duration starts from the beginning of the pandemic to the end of 2021 and contain information on the COVID-19 pandemic in dentistry. 46 studies in PubMed database and 74 studies in Google Scholar were identified. Studies were classified under 8 main topics (knowledge level and behavioral assessment, psychological effects, research specific to dentistry departments, practices, education, importance of the pandemic, infection control and precautions, social media and social network analysis). Through the findings of the analysis, it will be ensured that dentists and healthcare professionals serving in the field of dentistry will be updated on their knowledge, attitudes and behaviors, be prepared for possible future pandemic situations and shape their perspectives on infectious diseases under the guidance of the literature.

Keywords: COVID-19, Dentistry, Pandemic, SARS-Cov-2

Cite this article as: Duran MH, Coşgun Baybars S, Gök, T. A Comprehensive Analysis of Covid-19 Research in Turkish Dentistry. Medical Research Reports 2024; 7(1):41-57

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INTRODUCTION

The COVID-19 pandemic appeared in China at the end of 2019 and affected society, suddenly came into our lives with social, political, economic, psychological effects and caused great changes. The unknown origin of emergence, failure to control virus and possible risk to all people regardless of geography have made the pandemic a global trauma (1). Risky environment and one-to-one contact with patients have caused healthcare professionals to be most affected community and have resulted in a great battle against COVID-19 at the beginning of 2020. The World Health Organization (WHO) and all countries have made changes in health policies and prepared guides to control pandemic and minimize its effects (2). Along with unexpected pandemic, scientific research has been performed in many areas affected by virus, such as identifying the virus, evaluating psychological effects, arranging treatment plans/practices and preventing disruption of education (3,4). The fact that dentistry is shown as the most susceptible profession to risk of coronavirus transmission has increased the value of studies in this branch. Route to be followed when a patient with suspected COVID-19 is encountered, SARS-CoV-2 transmission routes, infection control measures, patient evaluation, use of personal protective equipment and hand hygiene, considerations in dental procedures and disinfection of clinical areas are listed as infection control precautions to be taken in dentistry in the course of the pandemic and important for the dentists, dentistry students and auxiliary personnel who are in the high risk for infectious diseases to fulfill their duties in accordance with conditions during pandemic and normalization process and manage the process correctly (5).

The aim of this study is to analyze, classify and summarize current data in Turkish dentistry literature related to COVID-19 in the 2-year duration from beginning of the pandemic to the end of 2021. Through the findings of the analysis, it will be ensured that dentists and healthcare professionals serving in the field of dentistry will be updated on their knowledge, attitudes and behaviors, be prepared for possible future pandemic situations and shape their perspectives on infectious diseases under the guidance of the literature.

MATERIAL AND METHODS

The studies by Turkish dentists on the COVID-19 pandemic in the 2-year period from the time of the first COVID-19 case appeared in Turkiye until the end of 2021 were evaluated. The terms ‘‘COVID-19”, “koronavirüs”, “diş hekimliği”, “pandemic”, “coronavirus”, “dentistry”, “pandemics”, “SARS-Cov-2” were searched separately and in combinations in PubMed and Google Academic databases. Regardless of whether the studies were Turkish and/or English, it was taken into account that they belong to Turkish

dentists, interventional and/or observational, published in the duration starts from the beginning of the pandemic to the end of 2021 and contain information on COVID-19 pandemic in dentistry. Descriptive and content analysis were used in evaluation of the data.

RESULTS

A total of 120 research studies, 46 from the PubMed database and 74 from the Google Scholar database, were included in this study. The research studies are classified under 8 main headings according to the researchers specifically addressed topics (Figure1).

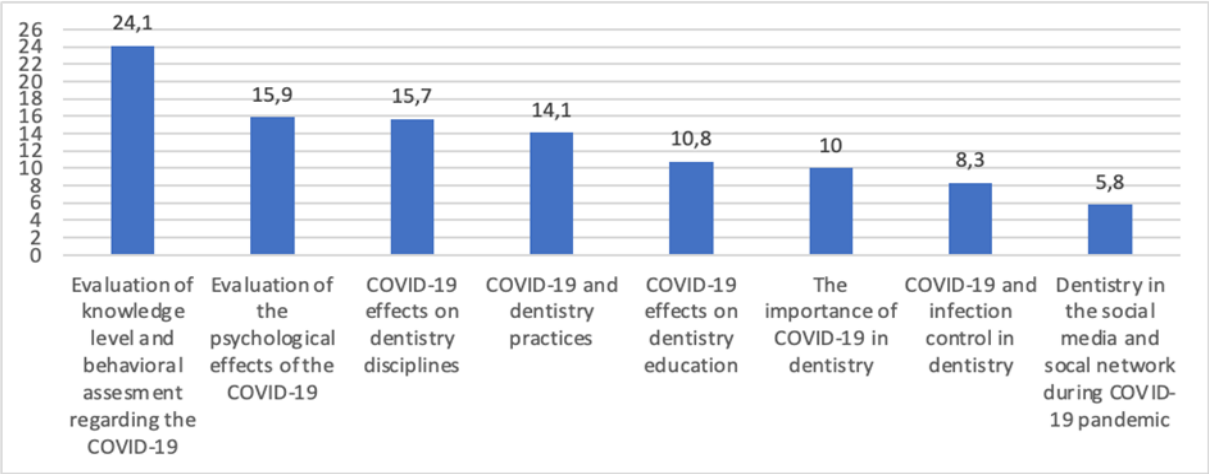

Figure 1. Percentage distribution of COVID-19 literature data in dentistry by main headings

1. Evaluation of knowledge level and behavioral assessment regarding the COVID-19: 29 studies

2. Evaluation of the psychological effects of the COVID-19: 19 studies

3. The effect of COVID-19 on dentistry disciplines:19 studies

4. COVID-19 and dentistry practices:17 studies

5. COVID-19 effects on dentistry education:13 studies

6. The importance of COVID-19 in dentistry:12 studies

7. COVID-19 and infection control in dentistry:10 studies

8. Dentistry in the social media and social network during COVID-19 pandemic:7 research

Turkish dentists have conducted 29 research studies under the heading of knowledge level and behavior assessment on the COVID-19 pandemic and the normalization process. 23 studies were conducted only on the level of knowledge, awareness and behavior assessment; 6 studies also include psychological effects like stress, anxiety and mood changes. Knowledge level and behavior assessment studies are analyzed under 4 main groups according to what they

are carried out. The groups were determined as dentistry undergraduate students, dentists continuing their postgraduate education, dentists serving in the public/private sectors and oral health workers and research on patients/society (Figure 2).

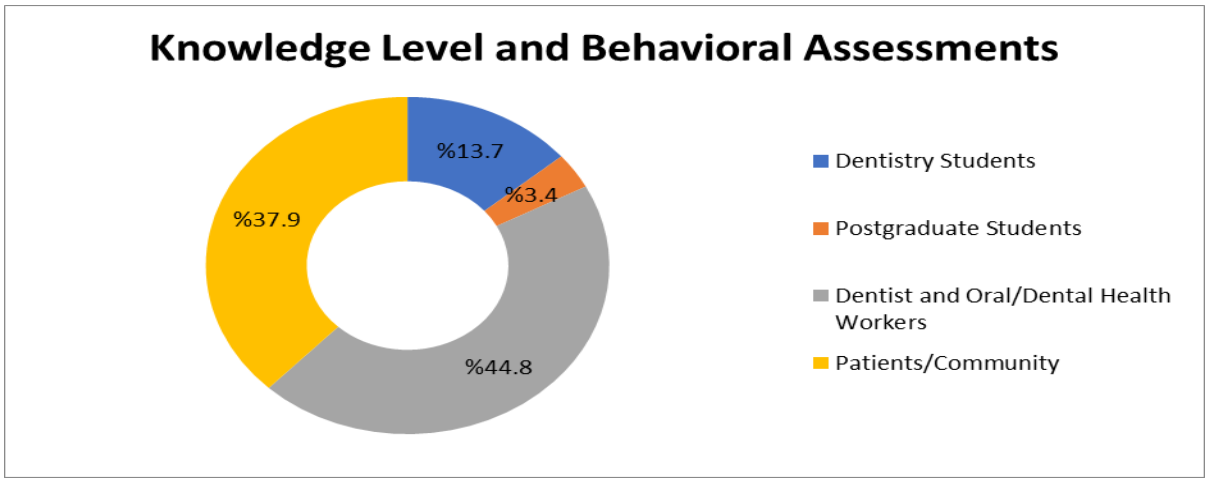

Figure 2. Distribution of knowledge level and behavioral assessment research on the COVID-19 pandemic by groups

13 research studies have been performed to assess the psychological consequences of the pandemic for dentistry workers. In addition, 6 studies include stress, anxiety and mood changes, as well as knowledge level and behavior assessment. Psychological studies were analyzed under 4 main groups according to they are carried out. The groups were determined as dentistry undergraduate students, dentists continuing their postgraduate education, dentists serving in the public/private sectors and oral health workers and research on patients/society (Figure 3).

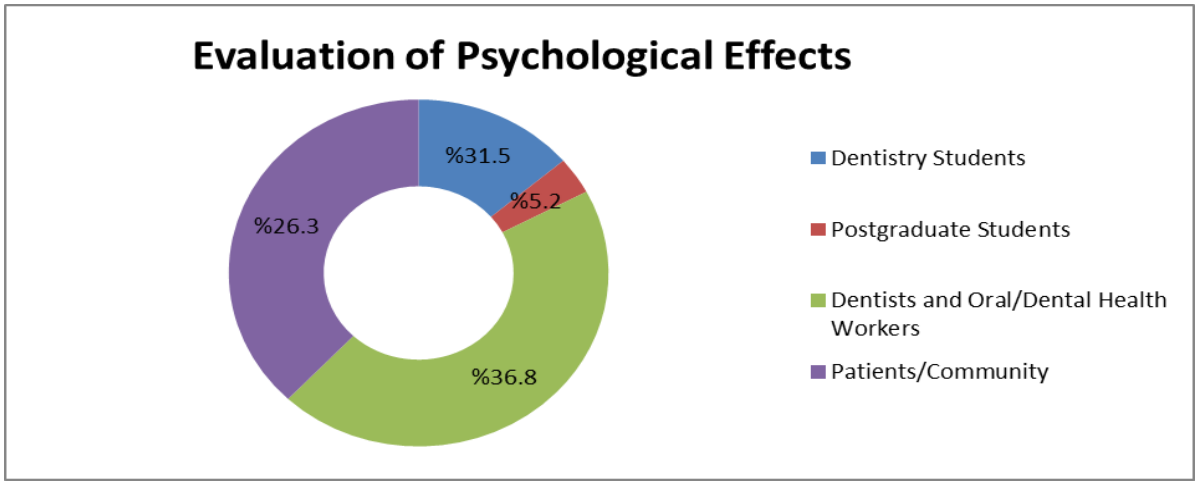

Figure 3. Distribution of research evaluating the psychological consequences of the COVID-19 pandemic by groups

19 research studies were conducted to analyze the effects of the COVID-19 pandemic specifically on eight dentistry disciplines (Figure 4).

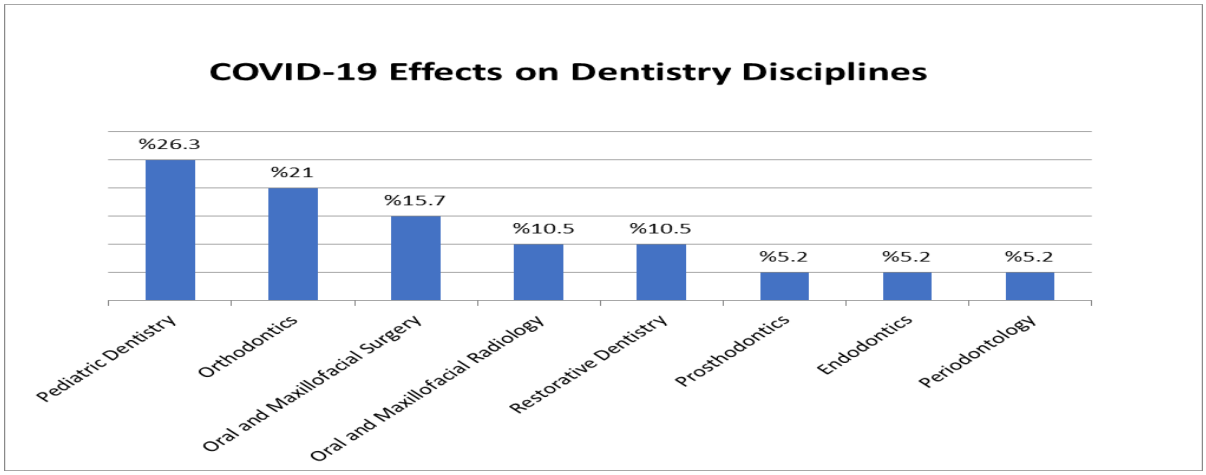

Figure 4. Percentage distribution of COVID-19 pandemic literature data by dentistry disciplines

17 research studies involving the COVID-19 pandemic effects on dentistry practice protocols, assessment of the ongoing situation and consideration of further measures to be taken in the coming period and their potential effects on the future of dentistry, environmental arrangements, patient appointment arrangements, chair side procedures and financial arrangements have been done. 13 studies fulfilled to assess the COVID-19 effects and the normalization process on dental education, the investigation of the ongoing situation, the new normal in education and suggestions for educators and students. Within the context of the influence of the COVID-19 pandemic in dentistry, 12 studies were conducted. In these studies which provide general information, the basic epidemiological features of SARS-Cov-2 virus, molecular immunopathogenesis, contagiousness and transmission routes, clinical characteristics and the significance of asymptomatic carriers, methods used in diagnosis, the importance of saliva and public oral and dental health while the pandemic were emphasized. During the time of the COVID-19 pandemic and normalization process, 10 studies were conducted on infection control and precautions. 8 studies included all the precautions to be taken comprehensively in the field of dentistry, 1 study included specific information for allied healthcare workers and 1 study for private clinics (Figure 5).

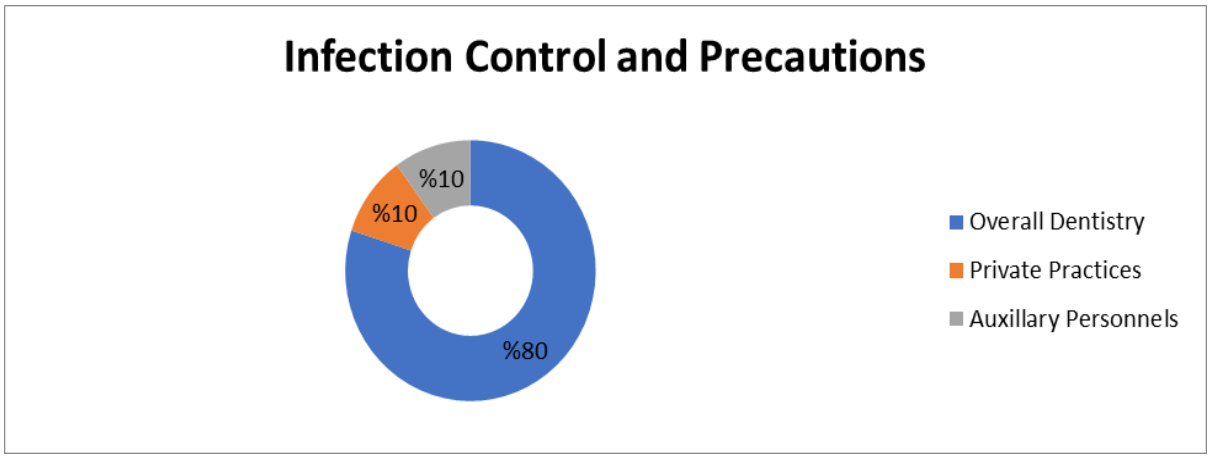

Figure 5. Percentage distribution of infection control research by groups in the COVID-19 pandemic

7 studies on the analysis of social media posts about the COVID-19 pandemic and dentistry were analyzed.

DISCUSSION

1. Knowledge Level and Behavioral Assessment Studies on the COVID-19 Pandemic Process in the Field of Dentistry in Türkiye

It is crucial to know the causative factor and all its possible effects in order to successfully manage the COVID-19 pandemic and a possible health crisis. Infection control and preventive measures may be ineffective if knowledge about the agent is not sufficient. This is a major disadvantage for dental professionals who take role in hindering the spread of pandemic. Therefore, a great number of studies have been conducted to establish the level of knowledge, attitudes and behaviors regarding COVID-19.

In the study of Tozar et al. (6) which evaluating the knowledge level of dental students about the COVID-19 pandemic, it was emphasized that the relationship of information sources about the COVID-19 pandemic with gender and class was independent from each other. As the transmission route of COVID-19 infection, a great difference was reported between female and male students only in the parental route in favor of females and no differences between genders were obtained in other transmission routes. Significant results were obtained in favor of women in the answers that the symptoms of COVID-19 infection may occur as shortness of breath, joint and muscle pain, or asymptomatic. In a study investigating the knowledge and protection levels of senior dentistry students about COVID-19, it was determined that senior students had a remarkable level of knowledge about COVID-19 but students who were continuing their clinical internship did not fully implement measures to protect against COVID-19 (7). In the study of Kara

and Ataş (8), which investigated pandemic effects on the protective behaviors of dental research assistants, it was found that dentistry research assistants who are in the high-risk group for COVID-19 transmission, did not fully practice their protective behaviors during and after the pandemic but the protection score increased with the pandemic; as the age increased it was observed that the protection score decreased after the pandemic. The post-pandemic protection score of those who did not have children was reported to be higher. In terms of other socio-demographic characteristics, it was observed that the prevention scores did not change during and after the pandemic and the pandemic changed the protective behaviors in dentistry practices, but it was not sufficient. In a study by Tunç and Toprak (9) which the sociodemographic data affecting the knowledge levels and attitudes of dentists about COVID-19 infection were evaluated, female physicians compared to males, physicians working in state hospitals compared to those working in private practices and those who stated that they were quite worried about the process were in comparison with those who did not were determined that they had a statistically quite higher level of knowledge than their counterparts. Also, it was reported that dentists should reshape their attitudes and perceptions with definite and contemporary information conducive to endure with the COVID-19 infection and transmission. Duruk et al. (10) in their survey study to analyze the clinical behaviors and attitudes of Turkish dentists towards the COVID-19 pandemic, determined that although they have increased their protective measures during the COVID-19 pandemic, they have not yet reached sufficient levels in terms of attitudes and behaviors. The authors also emphasized that the prevalence of Turkish dentists infected with COVID-19 is an issue that should definitely be investigated. The study involving also specialist dentists by Karayürek et al. (11) which investigated the awareness and knowledge of SARS-CoV-2 infection among dentists according to the Turkish dentistry guideline, demonstrated that Turkish dentists have satisfactory knowledge about the etiology of COVID-19, mode of transmission and pre-procedural warnings. It was reported that the participants recorded a good assessment of performing emergency dental treatment correspondingly to the guidelines prepared by the Turkish Dental Association (TDB) during the current COVID-19 pandemic. The authors specified that there is an immediate need to improve the knowledge of Turkish dentists on risk assessment through training programs, given the updates on coronavirus transmission and preventive strategies.

In a study, which included 765 patients and evaluated the patients' perspectives on dental treatments and institutional preferences during the COVID-19 normalization process in Turkiye, it was recorded that 69.30% of the candidates chose private practices for dental treatments, 18.80% preferred dentistry schools and 11.90% preferred oral and dental health centers. Also, a remarkable relationship was noticed between the patients' thinking that they

protect themselves adequately against the COVID-19 risk, the thought that COVID-19 is under control, the crowd-related anxiety in the reception room and institution preferences (12). In a study investigating the attitudes, behaviors and knowledge related to oral and dental health during COVID-19 times, it has been detected that there is a propensity towards food consumption that will positively affect oral and dental health according to the nutritional habits scoring. 20.2% of men and 11.4% of women smoked less during this period. 20.6% of the participants increased their frequency of brushing, 9.4% of them used floss, 28.7% of them used mouthwash. The frequency of use of brushing teeth by 7.8%, flossing by 7.1% and mouthwash by 7.5% of the participants decreased. 67.8% of the candidates agreed that oral and dental health is attributed to systemic health and 80.5% of them thought that the risk of COVID-19 transmission is possible in dental treatment. 21.7% of the participants had a problem with their dental and oral health in the COVID-19 times. While 25.6% of these individuals applied to the dentist because of the problem they experienced, 74.4% stated that they did not (13). According to a cross-sectional survey that evaluated parents' knowledge and habits respecting self-medication for their children's dental problems, most parents (70.2%) self-medicated for their children's dental problems during COVID-19. Self-medication with previously prescribed drugs was usually preferred (62.2%). Analgesics (98%) were the most frequently self-administered medication group for their children's dental problems. Conforming to the results, it was realized that the currency of self-medication by parents for dental problems of children was high in Turkiye during the pandemic (14). In a study evaluating the health-related quality of life and oral health habits of a group of children in the early times of the pandemic, it was noticed that the consumption of fast food, packaged foods and carbonated beverages decreased during the COVID-19 pandemic. Half of the parents reported that they were worried or afraid about their child going to the dentist during the pandemic and 64.2% of them reported that they missed their routine dental visits. Conforming to the results, the attitude of the general quality of life in a group of Turkish children was significantly affected by the COVID-19 pandemic (15).

2. Evaluation of the Psychological Effects of the COVID-19 Pandemic in the Field of Dentistry in Türkiye

The maintenance of psychological health and well-being have critical importance in the fight against the pandemic and post-pandemic period, especially for dentistry workers who are at high risk for infectious diseases. Infectious diseases are one of the causes that affect the physical health of individuals negatively, as well as their psychological health and well-being (1). To understand the psychological repercussions of the pandemic, emotions such as fear and anxiety compel to be pointed out and closely observed. Researchers assess the psychological outcomes of the pandemic on doctors, nurses, and caregivers and observed that fear, anxiety

and stress in healthcare workers increased during the pandemic (16).

In a study, investigating the anxiety levels of Turkish dentistry students during the pandemic, researchers reported that most of the students (81.1%) were concerned that the classes would be held in groups with the changeover to face-to-face education. This study showed that the thought of graduating late created fear in most of the participants (69.9%). Moreover, it was stated that relatively one-fourth of the students had the idea of changing professions due to the pandemic and the anxiety value of the group with the idea of changing professions was reported higher than the other group (17). In a study inspecting the relationship between depression, anxiety, sleep quality, stress levels and temporomandibular joint disorders in Turkish dentistry students, it was reported that sleep quality was impaired and higher depression, anxiety, stress levels, temporomandibular joint disorders have been shown among dental students in the COVID-19 pandemic times (18).

In a study evaluating the fear and anxiety levels of dentistry research assistants during the COVID-19 pandemic, it was stated that COVID-19 caused fear and anxiety and this process affected female assistants more than male ones. In this study, assistants in specialties where less aerosol procedures were performed stated that they experienced less anxiety and fear due to the coronavirus since the incidence of contamination was lower (19). Ovalıoğlu et al. (20) examined the patient's level of anxiety during the COVID-19 pandemic and observed that the pandemic had an impact on the patient's anxiety levels. Researchers found that patients who applied to the dentist in a non-emergency situation had lower anxiety levels, and women were found more concerned about the pandemic than men. In a study evaluating the perceptions and anxiety levels of patients with respect to dental treatment, it was stated that the patients' anxiety levels who applied to dental clinics for dental treatment during the pandemic period increased. Nevertheless, it was stated that the cautions taken in this process increased the confidence of the patients. This research affirmed that the patients were conscious of the instructions regarding COVID-19 and the significance of being vaccinated, it was concluded that being vaccinated reduced the anxiety level of people (21).

3.COVID-19 Pandemic Research Conducted Especially on Dentistry Disciplines in Türkiye

Şirin and Özçelik (22) investigated the correlation between COVID-19 and the stage of dental damage determined by radiological examination and included 137 patients (20-65 years old) based on examination reports and orthopantomographic images of 1516 COVID-19 patients diagnosed with real-time PCR tests. In this study, the stage of dental damage was established with respect to the apical periodontitis grading scale obtained from dental radiological images, the pathophysiological process of dental caries and radiological alveolar bone loss. The stage of dental damage was specified according to the

parameters of age, gender, number of dental caries, root canal treatment, dental fillings, tooth deficiency, dental implants, the severity of dental pathology and hospitalization due to COVID-19, presence of systemic chronic disease and symptoms associated with COVID-19 were used. Researchers accentuated that the correlation between the dental damage stage and the severity and prognosis of COVID-19 is remarkable. In the review about orthodontic practice during the COVID-19 pandemic, Töz et al. (23) made recommendations for at-home treatment of orthodontic emergencies in order to define new working conditions in orthodontic clinics and to provide treatments under appropriate conditions during the pandemic process. In patients with broken elastic chain, removing the elastic chain with sterile tweezers or cutting it with sterile scissors, placing a small piece of orthodontic relief wax rolled on it in the presence of brackets or lengthening wires that cause irritation on the lip and/or cheek and patients with critical appliances such as mini-screws, springs, forsus, etc., they should report problems in their appliances quickly and that they can use smartphones in such cases to take pictures of the problem and report the situation is among the current recommendations in this review. Topal (24) aimed to determine the number of brackets separated from the teeth and the oral hygiene status of 102 patients receiving active orthodontic treatment during the COVID-19 pandemic. It was established that the plaque index (PI) values of male patients were higher than females, and female patients broke more brackets than males. In the results, patients who continued active orthodontic treatment at the beginning of the pandemic were found insufficient to provide oral hygiene.

In a study which evaluated the impact of the COVID-19 pandemic on the transmission risk in prosthetic dental treatment clinical applications, the riskiest prosthetic applications in terms of SARS-CoV-2 transmission were determined as tooth preparation and denture adjustments. It has been determined that Turkish dentists show sufficient awareness of aerosol formation and risk during the COVID-19 pandemic process. Despite a positive attitude towards the use of protective equipment, it was stated that the current level of knowledge on surface types should be increased (25). According to a cross-sectional study investigating the need for emergency endodontic treatment along the COVID-19 process, it was recognized that as the number of COVID-19-positive cases across the country increased, the number of patients applying the faculty decreased. However, as the number of positive cases decreased, the number of patients applied and the need for urgent endodontic treatment increased. Furthermore, the number of patients compared to 2019 was declined (26). Bayraktar et al. (27) evaluated the effect of SARS CoV-2 effective mouthwash on the color change, translucency and average surface roughness of the nanofill resin composite and found that some mouthwashes affect the color change and translucency parameter of Filtek Ultimate nanofill resin composite, but not the surface

roughness. It was stated that surface roughness was not altered by any mouthwashes. Kara et al. (28) pointed out that there is a possible correlation between the severity of periodontal diseases and COVID-19 infections and this relationship may be caused by increased immune response mediated by Galectin-3 and increased viral binding. Researchers emphasized that it is crucial to take periodontal diseases under control and to provide meticulous oral hygiene during the COVID-19 pandemic period.

Şimşek and Yosun (29) reported that oral, dental and maxillofacial surgery is among the disciplines that should be pointed out because it includes emergency approaches and specific procedures that can not be deferred, even in the COVID-19 pandemic period. Performing the operations by an experienced team as much as possible, minimizing the formation of aerosols, avoiding the use of medical saws, ultrasonic devices and piezoelectric devices, especially during the pandemic period, avoiding the use of electrocautery devices, as self-threaded fixation screws can be a different option in the fracture treatment classified as emergency cases are among the current recommendations. Yüce et al. (30) conducted a retrospective study to investigate the experience of managing emergency patients in the oral, dental and maxillofacial surgery department during the prevention and control period of novel coronavirus pneumonia and they reported that non-operative tooth extraction as a radical treatment option with a lower aerosol generation rate and it has been most selected treatment option in patients who apply to the triage clinic and meet the definition of emergency during the pandemic period. In the review which focused on permanent dental treatments in pediatric dentistry during the pandemic period, Çakır (31) emphasized that trauma and pain caused by caries in permanent teeth are often at the forefront in pediatric dental clinics and mostly aerosol-producing dental procedures are required and stated that atraumatic restorative treatments are an effective option to reduce the spread of the virus in the solution of dental problems that are closely related to systemic health.

4. Dentistry Practices in the COVID-19 Pandemic and Normalization Process in Türkiye

Özdede et al. (32) investigated teledentistry and mentioned the application areas, advantages and disadvantages of teledentistry and suggestions for the development of teledentistry in this process. Also, it has been emphasized that teledentistry has high specificity and sensitivity in most previous studies and also research that evaluated the compatibility between the gold standard clinical examination and teledentistry have shown that there was moderate and strong agreement. Moreover, the positive predictive value and accuracy rate in teledentistry is quite high. Since unpredictable situations such as natural disasters or pandemics may always be encountered, researchers have suggested that integrating teledentistry and other telemedicine applications into the health system, not only in

local or global emergencies but also in other times, will contribute significantly to increasing the time, space, personnel needs and accessibility of health services. İlhan et al. (33) examined the application of telemedicine in existing oral health services and stated that telemedicine is a reliable and valid communication appliance between healthcare professionals and it can be preferred as "advanced triage" to handle medical/dental emergencies and to reduce contact between clinicians and patients during the coronavirus pandemic. Gürkan et al. (34) reviewed the importance of mouthwashes in post-coronavirus dental treatment applications and examined the general characteristics, types and usability of mouthwashes against COVID-19 in the manner of the literature. Authors have reported as the use of oral disinfectant mouthwashes has become widespread during the pandemic period. Although it is known that mouthwashes have antimicrobial effects principally but it is not clear yet how effective these products can be used against COVID-19. Akın et al. (3) investigating the presence of SARS-CoV-2 in aerosols associated with scaling and tooth preparation with ultrasonic instruments and COVID-19 contamination distance stated that aerosol-cannulated saliva ejectors are very important to minimize aerosol-mediated viral contamination. Also, a high-volume suction capacity (air volume) of 150 mm Hg or 325 L/min has been defined as sufficient to eliminate viral contamination and using high-volume aspiration has been suggested for dental treatment of COVID-19 patients.

5. Dentistry Education in the COVID-19 Pandemic and Normalization Process in Türkiye

Recen et al. (35) evaluated distance education in dentistry and pointed out the blended education, which means providing support from online platforms (lecture or lab videos, use of social media platforms, etc.), complementary and reinforcing face-to-face education which is traditionally and obligatory held in classrooms and laboratories and it has been described as a vital approach for education. In a study evaluating the perceptions of dentistry students to online education, it was found that they were mostly upset due to the discontinuity of conventional education and had to continue online, but in terms of continuing their education and preventing the suspension of education completely, they described this situation as an advantage (36). Demirel et al. (37) analyzed the effects of the pandemic on postgraduate education and reported that pandemic and filiation assignments adversely affected clinical training and the thesis process in particular. Moreover, it was reported that including interactive/visual elements in order to improve clinical education would be beneficial to re-organize the process which lost in the pandemic. In a study investigating the video course preferences of students, although there was no difference between the demonstration types in terms of the learning preferences of the students, the students mostly preferred the video demonstration method

where they met with the lecturers regularly (38).

6. Importance of the COVID-19 Pandemic in Dentistry in Türkiye

Duran (4) in his study investigating the importance of the COVID-19 pandemic in dentistry, mentioned the disadvantages of the Polymerase Chain Reaction (PCR) test, which is the current standard diagnostic method, such as the need for expensive facilities, well-trained personnel and often time requirements, recommended that dentists use alternative chair-side tests that use saliva as a sample and can be routinely applied before starting the emergency procedure. In the research, some methods studied in the literature such as LAMP tests (Loop-mediated isothermal amplification tests), antibody tests, and micro-fluid RT-PCR devices, which are being developed day by day and their sensitivity is increasing, are also mentioned. Torul and Omezli (39) reviewed 11 studies which investigated the effectiveness of saliva in the COVID-19 diagnosis in different patient groups and stated that saliva is a reliable and safe tool for the COVID-19 diagnosis. They also reported that saliva offers logistical and economic benefits as well as improved safety when compared to current methods used to diagnose COVID-19 but there is not enough information in the literature to make a clinically appropriate and definitive decision.

In a study evaluating xerostomia, taste and smell impairments after COVID-19, the most common finding in patients after treatment was reported as xerostomia, while taste and smell impairments were more common in women. It has been emphasized that dentists should be aware of these differences that can be observed in the oral cavity after COVID-19 during the diagnosis and treatment phase (40). Altıok et al. (41) specifically focused on the effect of polymorphic variants of host proteins that have been shown to be involved and/or affected in the pathogenesis of COVID-19, additionally what possible changes might be and how COVID-19 diagnosis and treatment procedures were affected by these variants have been investigated. Uzun et al. (42) evaluated the drug called Artesunate for the treatment of COVID-19 and stated that Artesunate is an effective treatment for COVID-19 due to its anti-inflammatory activity, chloroquine-like endocytosis inhibition mechanism and NF-κB (Nuclear Factor kappa B) coronavirus effect.

7. COVID-19 and Infection Control in the Field of Dentistry in Türkiye

In a study which the preventive measures against the coronavirus pandemic in dentistry were discussed, the route to be followed when a patient with suspected COVID-19 is encountered, the transmission routes of SARS-CoV-2, patient evaluation during the epidemic period, hand hygiene, use of personal protective equipment and disinfection of clinical areas are listed as points to be considered for infection control in dental procedures (5). Soysal et al. (43) evaluated the role of the assistant team in the dental health services in infection control during the

COVID-19 period and they stated that the entire dental health care team should provide infection control and drew attention to the responsibilities of the assistant team in infection control. In a study evaluating the precautions taken in private dental clinics during COVID-19 pandemic period in Turkiye, the most important difficulties faced by dentists working in private clinics during this period were expressed as the expense of the necessary protective equipment and the difficulty of equipment transportation (44).

8. The COVID-19 Pandemic and Dentistry on Social Media and Social Network

Along with the advancing technology and common use of the internet, digital platforms have become more powerful and important. Social media has been one of the ultimate advantages in informing patients, sharing experiences and reaching large communities during the pandemic process.

Özdede and Peker (45) analyzed the videos of dentistry and the new coronavirus on YouTube and determined that dental YouTube videos from official institutions have a higher information level and video quality, also they declared that it would be favorable for experts, universities and other institutions have upload scientific videos with sufficient duration, especially during the pandemic process. The researchers reported that the video contents were insufficient regarding dental emergencies and legal-financial issues during the pandemic, more videos were needed for these contents. Moreover, it was considered that the videos shared on the internet, especially about health, should be uploaded by subjected to an institutional approval and control system so it would be beneficial for YouTube to analyze and remove the low-quality videos containing unnecessary/false information and increase the relevance of useful videos when uploading. Conforming to a study of Google Trend Analysis, which aimed to present an analysis of internet data on dental treatments during the COVID-19 outbreak, no convincing correlation was noticed between total approved COVID-19 cases and Google Trends Values (GTV). Researchers stated that Google is one of the information sources of society in this process but after the end of the pandemic, new studies including more specific data are needed (46). Accordingly, a study presented an analysis of YouTube videos as an informational source for dentists in preventing the COVID-19 outbreak, the credibility of the videos was potentially significant, but shortcomings were found. Researchers noted that only 2 out of 55 videos are in good quality and that there is a huge demand to improve the quality and credibility of information to obtain better results during the pandemic (47). Altan and Coşgun (48) conducted a study to analyze the emotional responses of individuals experiencing toothache using the CrystalFeel algorithm for the first time. Researchers have emphasized that following the social media posts of individuals who experience toothache during the pandemic will help reduce feelings of fear and anger and draft public information messages properly for the demands of the target audience.

CONCLUSION

In the COVID-19 pandemic and future similar pandemics and social crisis, it will always be imperative to meet the community's immediate and elective dental and oral treatment needs. Dentists and healthcare professionals serving in dentistry should be update on their knowledge, attitudes and behaviors, prepare for possible future pandemic situations and shape their perspectives on infectious diseases under the guidance of the literatüre.

Source(s) of financial support: None.

Conflicts of interest: The authors have no conflicts of interest to declare.

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MEDICAL RESEARCH REPORTS

Med Res Rep 2024;7(1):58-62
https://doi.org/10.55517/mrr.1373202

CASE REPORT

A Rare Case of Acute Respiratory Distress Due to Hydrochloric Acid Inhalation

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ÖZET

Hidroklorik asit inhalasyonuna bağlı akciğer hasarı sık görülmesine rağmen görüntüleme bulguları iyi bilinmemektedir. Bu vakada hidroklorik asit inhalasyonu sonrası ARDS (Akut Solunum Sıkıntısı Sendromu) gelişen ve kliniği kötüleşen hastanın durumunu tartışmayı amaçladık. Astım nedeniyle takip edilen 37 yaşında kadın hasta, evde çamaşır suyu ile temizlik yaptıktan sonra ani nefes darlığı ve göğüs ağrısı şikayeti ile polikliniğimize başvurdu. Her iki akciğerde çevreye doğru progresif olarak ilerleyen yamalı camsı opasiteler ve konsolidasyonlar gözlendi. Hastaya klinik olarak akut solunum sıkıntısı sendromu tanısı konuldu. Hidroklorik asit etiyolojik ajan olarak saptandı. Hidroklorik asit, günlük kullanımda güçlü bir temizlik maddesi olarak kullanılan renksiz bir maddedir. Radyologlar, pulmoner intoksikasyonların radyografik bulgularından haberdar olmalıdır. Bunlardan bazıları hayatı tehdit edici olabilir ve acil teşhis gerektirebilir. Hastanın genel durumu kötü olduğunda ve klinisyenler tarafından anamnez alınamadığında radyolojik bulgular tanınabilir ve klinisyene yol gösterici ipuçları verilebilir. Bu sayede hastalarda zehirlenme sonucu gelişebilecek ARDS gibi ölümcül hastalıkları erken tanıyarak ve erken tedavi ile mortalite ve morbiditeyi azaltmayı hedeflemelidirler.

Anahtar kelimeler: HCI, Hidroklorik asit, İnhalasyon, İntoksikasyon, Respiratuar distres sendromu

ABSTRACT

Although lung injury due to inhalation of Hydrochloric acid (HCl) occurs frequently, imaging findings are not well known. In this case, we aimed to discuss the progression of the patient who developed ARDS (Acute Respiratory Distress Syndrome) after inhalation of hydrochloric acid and progressive during follow-up. A 37-year-old female patient who was followed for asthma was admitted to the outpatient clinic with complaints of sudden dyspnea and chest pain after cleaning with bleach at home. In both lungs, patchy glassy opacities and consolidations were observed, progressively progressing towards the periphery. The patient was clinically diagnosed as acute respiratory distress syndrome. Hydrochloric acid was detected as the etiological agent. Hydrochloric acid is a colorless, which is used as a powerful cleaning agent in everyday use. Radiologists should be aware of the radiographic findings of pulmonary intoxication. Some of these may be life-threatening and require urgent diagnosis. When the general condition of the patient is bad and the anamnesis cannot be obtained by clinicians, radiological findings can be recognized, and guidance tips can be given to the clinician. In this way, they should aim to reduce the mortality and morbidity by recognizing the fatal diseases such as ARDS which may develop in patients as a result of intoxication and with early treatment.

Keywords: HCI, Hydrochloric acid, Inhalation, Intoxication, Respiratory distress syndrome

Cite this article as: Türkoğlu S, Azarkan ND, Gündüz AM, Göya C, Gürbüz E. A Rare Case of Acute Respiratory Distress Due to Hydrochloric Acid Inhalation Medical Research Reports 2024; 7(1):58-62

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INTRODUCTION

Although lung injury due to inhalation of Hydrochloric acid (HCl) occurs frequently, imaging findings are not well known. ARDS (Acute Respiratory Distress Syndrome) is severe acute lung injury characterized by increased permeability of the alveolar and capillary barrier, edema with high protein content, hyaline membrane formation, and surfactant inactivation resulting from inadequate ventilation perfusion (1). In this case, we aimed to discuss the progression of the patient who developed ARDS after inhalation of HCl and progressive during follow-up.

CASE PRESENTATION

A 37-year-old female patient who was followed for asthma was admitted to the outpatient clinic with complaints of sudden dyspnea and chest pain after cleaning with bleach at home. The patient was examined by physical examination and auscultation and wheezing and rales were detected. In both lungs, patchy ground glass opacities were observed in perihilar areas. The patient was followed up in the clinic and his general condition deteriorated and his chest X-ray was taken on a daily basis. In both lungs, patchy glassy opacities and consolidations were observed, progressively progressing towards the periphery (Figure 1,2).

Figure 1. The patient was followed up his chest X-ray was taken on a daily basis. In both lungs, patchy glassy opacities and consolidations were observed, progressively progressing towards the periphery.

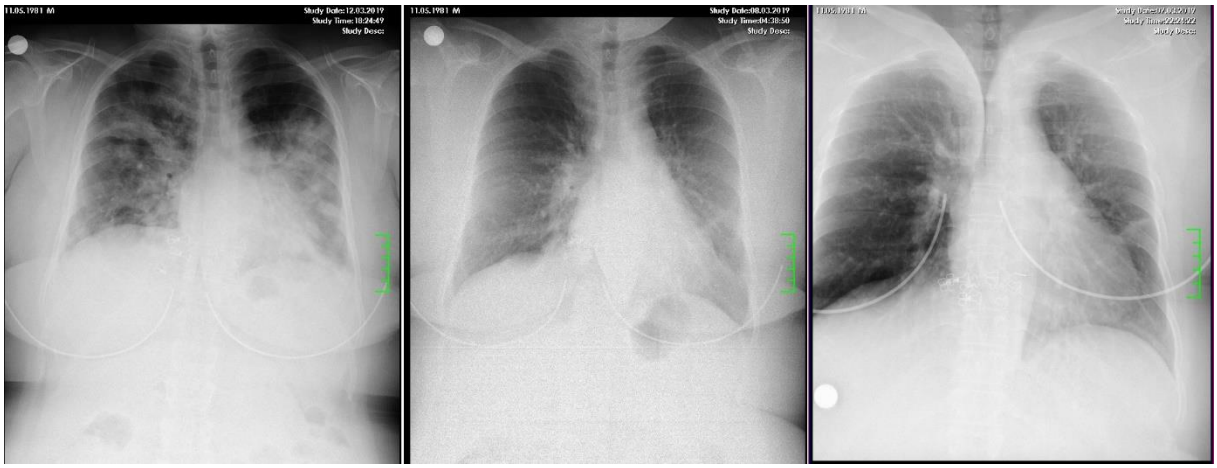

Figure 2. The patient was followed up his chest X-ray was taken on a daily basis. In both lungs, patchy glassy opacities and consolidations were observed, progressively progressing towards the periphery.

HCl The patient was clinically diagnosed as acute respiratory distress syndrome. HCl intoxication was detected as an etiological agent. Unfortunately, computed tomography could not be performed because the general condition of the patient was bad, and she could not leave the ventilator device. The patient later died due to ARDS.

DISCUSSION

HCI is a colorless, irritating and corrosive gas with a sharp odor. It is a highly soluble chemical in water that produces hydrochloric acid which decomposes completely into protons and chloride ions in water. It is used as a powerful cleaning agent in everyday use. It is also widely used in the industry and workers dealing with HCl are constantly at risk of inhalation. HCl is frequently preferred as a cleaning agent and in the industry. It can cause serious damage to the respiratory system due to improper use. Also, its use has increased significantly due to coronavirus anxiety recently. The exposure of the mucous membranes to high concentrations of HCl is so severe that the environment should be evacuated immediately after detecting the smell. Despite its general use, dosimetric human data for exposure to HCl is not sufficient and, after exposure to inhalation, imaging properties are not well defined. ARDS is a fatal disease characterized by acute lung injury and progressive dyspnea and hypoxemia. It is also caused by exposure to a number of toxic agents, including HCl. ARDS is a lung injury that develops acutely and progresses with severe hypoxemia due to exposure to various factors, including HCL. Inhalation of HCl may damage the alveolar-capillary membrane, impaired mammalian passages, and increase permeability, resulting in accumulation and activation of pulmonary edema and polymorphonuclear neutrophils in this area and induces release of various cytokines from neutrophils (2-3).

Despite the apparent and potent effects of HCl on the lungs, there are several relevant imaging studies that address most clinical symptoms, laboratory data, or treatment. As with methanol inhalation, HCl rarely causes clinical toxicity. Methanol inhalation, which has caused similar clinical outcome, has been reported in the literature before (4). Although the upper respiratory tract is most affected, the lower respiratory tract is also significantly affected. Despite the potent effects of HCl on the respiratory system, few imaging studies have addressed this issue. Rubin et al. In a study of tracheobronchial stenosis and asthma-CT findings after inhalation of acid without imaging in his acute phase, we found only one case report addressing lung injury due to inhalation of HCl in humans. Serious intensive care support and mechanical ventilation can significantly reduce mortality in patients who develop ARDS (5).

Clinically, HCl inhalation shows lung injury and progressive progression during the acute phase. In experimental animal models, HCl is an active agent (6) that causes direct effects associated with pulmonary edema and ARDS through a biphasic process, increased permeability during the first hour, followed by indirect effects associated with inflammatory responses. After exposure to acute HCl, pulmonary function tests typically show obstructive abnormalities and return to the baseline within 7-14 days (7,8). However, chronic inhalation of HCI gas or mist may cause a decrease in pulmonary function (9).

The first effect is an increase in the permeability of the respiratory mucosa, then an indirect effect related to inflammatory events occurs. If the lungs are exposed to Acute HCl, obstructive-type abnormalities are seen in pulmonary function tests. Respiratory system returns to normal within 7-14 days after exposure ends. The irritating effects of HCl must be removed from the source before serious damage can occur to exposed persons. HCl showed that there were serial changes in the lung following radiographic findings after inhalation of single gas and the severity of lung injury may be related to morphological images seen in the first imaging scan (10). mortality and morbidity by recognizing the fatal diseases such as ARDS which may develop in patients as a result of intoxication and with early treatment. The reason why Covid-19 was not considered in the differential diagnosis was that no cases were diagnosed yet in this period. It is important to consider other causes of ARDS and Covid-19 in the current differential diagnosis.

CONCLUSION

Radiologists should be aware of the radiographic findings of pulmonary intoxication, as they can be life-threatening and require urgent diagnosis. When the general condition of the patient is bad and the anamnesis cannot be obtained by clinicians, radiological findings can be recognized, and guidance tips can be given to the clinician. In this way, they should aim to reduce the

Source(s) of financial support: None.

Conflicts of interest: The authors have no conflicts of interest to declare.

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MEDICAL RESEARCH REPORTS

Med Res Rep 2024;7(1):63-67
https://doi.org/10.55517/mrr.1413512

Unraveling the Enigma: Omental Torsion in a Patient with Non-specific Abdominal Pain

CASE REPORT

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ÖZET

Omental torsiyon, akut karın ağrısının nadir bir nedenidir ve görülme oranı %0,37'den azdır. Spesifik olmayan semptomları nedeniyle sıklıkla akut apandisit gibi diğer akut karın ağrısı nedenleriyle karıştırılır. Bu olgu sunumunda acil servise karın ağrısı şikayeti ile başvuran ve peroperatif omental torsiyon tanısı konulan 26 yaşındaki erkek hastayı tartışacağız. Spesifik olmayan semptomları nedeniyle omentum torsiyonunun tanısı zordur. Akut ağrıda tanı konulamadığında tanısal laparoskopi geciktirilmemelidir. Omentum torsiyonu laparoskopik omentektomi ile kolaylıkla tedavi edilebilir.

Anahtar kelimeler: Akut batın, Karın ağrısı, Laparoskopik cerrahi, Omentum torsiyonu

ABSTRACT

Omental torsion is a rare cause of acute abdominal pain, with an incidence rate of less than 0.37%. Due to its non-specific symptoms, it is often confused with other causes of acute abdominal pain, such as acute appendicitis. In this case presentation, we will discuss a 26-year-old male patient who presented to the emergency department with complaints of abdominal pain and was diagnosed with perioperative omental torsion. The diagnosis of omental torsion is challenging due to its non-specific symptoms. When a diagnosis cannot be established in acute pain, diagnostic laparoscopy should not be delayed. Omental torsion can be easily treated with laparoscopic omentectomy.

Keywords: Acute abdomen, Abdominal pain, Laparoscopic surgery, Omentum torsion

Cite this article as: Teke E, Binici S. Unraveling the Enigma: Omental Torsion in a Patient with Non-specific Abdominal Pain. Medical Research Reports 2024; 7(1):63-67

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INTRODUCTION

Acute abdominal pain is one of the most common reasons for emergency department visits. The leading cause of acute abdominal pain necessitating surgery is acute appendicitis (1). Omental torsion, on the other hand, is a rare cause of acute abdominal pain, more frequently observed in males aged 30-50, with an incidence rate of less than 0.37%. The number of cases mentioned in the literature is fewer than 300 (2). The preoperative diagnostic rate in patients is below 5% (3).

Patients often present to the emergency department with non-specific symptoms such as localized abdominal pain in the right lower quadrant, nausea, vomiting, and loss of appetite. Elevated levels of leukocytes and C-reactive protein (CRP) can be observed in patients. Although imaging techniques can assist in diagnosis, their specificity is low (3).

In this case presentation, we describe a patient who presented with acute abdominal pain, and the definitive diagnosis of omental torsion was made intraoperatively.

CASE PRESENTATION

A 26-year-old male patient presented to the emergency department with a complaint of abdominal pain persisting for 48 hours. There was no nausea, vomiting or decrease in appetite in the patient's anamnesis. There was no previous surgery in the patient's history. Physical examination revealed tenderness in the right iliac fossa along with signs of peritoneal irritation. Laboratory results at the time of admission showed a hemoglobin level of 15.6 g/dL, a total leukocyte count of 13.56 x 103/µL, and a CRP level of 2.2 mg/dL. Abdominal ultrasound failed to detect the appendix. Therefore, the patient underwent intravenous contrast-enhanced abdominal computed tomography (CT). No pathology was identified in the appendix region on abdominal CT. However, dirty appearances in the mesenteric tissues in the right central abdomen and minimal free fluid in the pelvis were observed (Figure 1).

Figure 1. Image of omental torsion on abdominal computed tomography

Diagnostic laparoscopy was planned for the patient. During laparoscopic evaluation, distal free omental torsion was identified in the right upper quadrant. Despite detorsion of the omentum, the segment displaying necrotic appearance was resected (Figure 2).

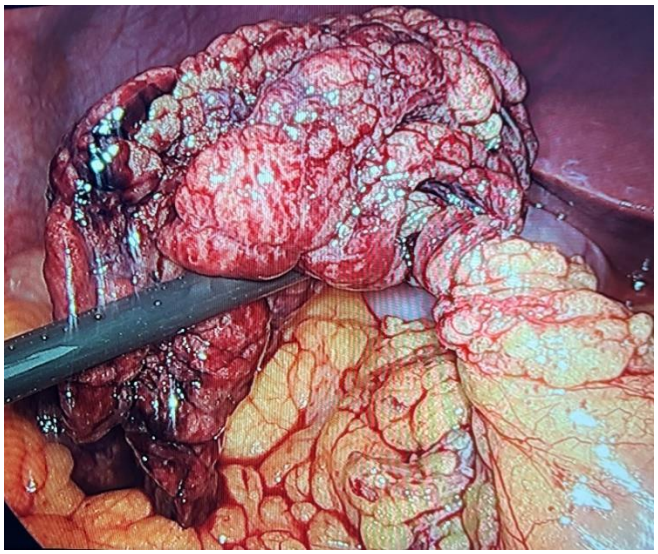

Figure 3. Laparoscopic view of omental torsion

The patient was discharged 24 hours after the surgery. No symptoms developed during the one-month follow-up.

DISCUSSION

Omental torsion can be classified as primary or secondary based on whether the distal end is free. In primary omental torsion, the distal end is free, while in secondary omental torsion, adhesions due to previous surgeries cause the distal end to be attached (3). Omental torsion, whether primary or secondary, can arise from various factors such as intra-abdominal tumors that increase intra-abdominal pressure, obesity, excessive physical exercise, and overeating (4). In our patient, no pathology causing an increase in intra-abdominal pressure was identified.

In omental torsion, intestinal blood supply is often not compromised, and bowel peristalsis remains unaffected. Therefore, most patients with omental torsion do not exhibit significant gastrointestinal symptoms (5). These patients typically present with constant, localized abdominal pain exacerbated by movement. High fever may be detected in cases where the blood supply to the omentum is severely compromised (5). As in our case, these non-specific symptoms can often lead to misdiagnosis, failure to diagnose, or diagnostic delays. Diagnosis can often be confused with acute appendicitis, acute cholecystitis, or epiploic appendicitis (3).

In addition to these non-specific symptoms, laboratory values are not specific to omental torsion. Preoperative CT scans are valuable in excluding other pathologies and partly demonstrating edema in the omental fatty tissue (6). Despite all these, laparoscopy is the definitive diagnostic method in cases where omental torsion is suspected (6).

The treatment approach in patients diagnosed with omental torsion is controversial. Although there are conservative treatment approaches due to the self-limiting nature of omental torsion, surgical resection is the primary treatment, especially in symptomatic patients (7,8). Delayed diagnosis or consideration of conservative treatment can mask the progression of the disease due to antibiotic and anti-inflammatory treatment. Therefore, it is crucial to avoid delays when the diagnosis is certain.

Laparoscopic surgical approach has many advantages over conservative treatment. The most important benefit is the confirmation of the diagnosis (6). Another benefit is the early removal of anti-inflammatory agents related to necrotic tissue. When omental torsion is rotated and blood supply is restored during laparoscopic surgery, omentum resection may not be performed if the omentum is not necrotic. Additionally, abdominal lavage is another advantage of the laparoscopic approach. Due to these and many other benefits, it is important not to delay the laparoscopic surgical approach.

CONCLUSION

The diagnosis of omental torsion is challenging due to its non-specific symptoms. When a diagnosis cannot be established in acute pain, diagnostic laparoscopy should not be delayed. Omental torsion can be easily treated with laparoscopic omentectomy.

Funding: This research was not funded.

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

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