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INSTRUCTIONS FOR AUTHORS

AIM AND SCOPE

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

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

Pediatric Practice and Research Journal operates a blind review process. Contributions deemed suitable are then typically sent to a minimum of two independent expert reviewers in the field of study to assess the scientific quality of the paper.

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

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

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

Language of the Journal

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

Authorship Criteria

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

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

Ethical Responsibility

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

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

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

The articles submitted to the Pediatric Practice and Research Journal will be deemed to have been conducted in accordance with the Helsinki Declaration of Principles, and have received ethical and legal permissions and will not be held responsible.

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

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

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

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

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

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

Policy of Screening for Plagiarism

The manuscripts are scanned by the Journal using the iThenticate program for determination of plagiarism and non-ethical situations. Pediatric Practice and Research Journal will immediately reject manuscripts leading to plagiarism.

TYPES OF MANUSCRIPT

Manuscripts should be submitted online via www.pprjournal.com

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

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

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

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

PREPARATION OF MANUSCRIPTS

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

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

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

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

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

Title

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

Abstract

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

Keywords

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

Text

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

References

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

References should be listed in the following form:

Journal article

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

Supplement

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

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Online article not yet published in an issue

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

Book

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

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

Chapter in a book

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

Journal article on the Internet

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

Website

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

An organization as an author

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

Acknowledgements

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

Tables

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

Figures

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

Figure Legends

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

Measurements and Abbreviations

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

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

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

Editorial Correspondence

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YAZARLARA BİLGİ

AMAÇ ve KAPSAM

Pediatric Practice and Research Dergisi, dört ayda bir yayımlanır ve üç sayı ile bir cilt tamamlanır. Dergi; pediatri ile ilgili tüm nitelikli klinik ve deneysel araştırmaları, olgu sunumlarını ve editöre mektupları yayımlar.

Pediatric Practice and Research Dergisi, bilimsel yayınlara açık erişim sağlar. Dergi basımından hemen sonra, makalelerin tam metinlerine ücretsiz ulaşılabilir.

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

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

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

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

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

Derginin Yazı Dili

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

Yazarlık Kriterleri

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

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

Etik Sorumluluk

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

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

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

Pediatric Practice and Research Dergisi'ne gönderilen makalelerdeki çalışmaların Helsinki İlkeler Deklarasyonu'na uygun olarak yapıldığı, kurumsal etik ve yasal izinlerin alındığı varsayılacak ve bu konuda sorumluluk kabul edilmeyecektir.

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

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

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

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

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Makale yazarlar tarafından akademik intihal önleme programından geçirilmelidir.

Makalenin etik kurallara uygunluğu yazarların sorumluluğundadır.

İntihal Taraması Politikası

Makaleler, intihal ve etik olmayan durumların belirlenmesi için iThenticate programı kullanılarak Journal tarafından taranır. Pediatric Practice and Research Dergisi intihallere yol açan makaleleri derhal reddedecektir.

YAZI TÜRLERİ

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

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

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

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

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

MAKALENİN HAZIRLANMASI

Dergide yayınlanması istenilen yazı için aşağıdaki kurallara uyulmalıdır.

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

Yazının Başlığı

Kısa, kolay anlaşılır ve yazının içeriğini tanımlar özellikte olmalıdır.

Özetler

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

Anahtar Sözcükler

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

Metin

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

Kaynaklar

Pediatric Practice and Research Dergisi, Türkçe kaynaklardan yararlanmaya özel önem verdiğini belirtir ve yazarların bu konuda duyarlı olmasını bekler.

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

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

Dergilerdeki yazılar

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

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Ek sayı (Supplement)
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Henüz yayınlanmamış online makale
Butterly SJ, Pillans P, Horn B, Miles R, Sturtevant J. Off-label use of rituximab in a tertiary Queensland hospital. Intern Med J doi: 10.1111/j.1445-5994.2009.01988.x

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

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

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

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

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

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

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

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

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

İlaçların yazımında jenerik isimleri kullanılmalıdır.

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REVIEW

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Efficacy of Minimally Invasive Crystallized Phenol Application in the Treatment of Pilonidal Sinus in Children

Çocuklarda Pilonidal Sinüs Tedavisinde Minimal İnvaziv Kristalize Fenol Uygulamasının Etkinliği

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ABSTRACT

Aims: Pilonidal sinus treatment involves surgical excision or flap reconstruction; however, the disease has a high recurrence risk. We determined the outcomes of a modified local application of crystallized phenol.

Material and Method: In the outpatient clinic, the pilonidal sinus orifices were connected by an incision under local anesthesia. The hair in the sinus was removed. Then, crystallized phenol was applied. The incision was not sutured. Daily dressings and baths were recommended.

Results: Crystallized phenol was applied to 50 patients with pilonidal sinus disease (median age=15 years). During the follow-up, no bleeding or pain was reported. Recurrence was not found in the follow-ups (one year to three years).

Conclusions: Surgery has disadvantages such as long-term hospitalization, recurrence risk, and high cost. Crystallized phenol does not have any of the aforementioned disadvantages. The modified method, in which we incised and applied crystallized phenol to all sinus tracts, might have also reduced the recurrence.

Keywords: Pilonidal sinus disease, crystallized phenol, pilonidal sinus recurrence, surgery

ÖZ

Amaç: Pilonidal sinüs tedavisi, cerrahi eksizyon veya flep rekonstrüksiyonunu içerir; ancak hastalığın tekrarlama riski oldukça yüksektir. Çocuklarda kristalize fenolün modifiye edilmiş lokal uygulamasının sonuçlarını sunmayı hedefledik.

Gereç ve Yöntem: Poliklinik şartlarında pilonidal sinüs ağızları lokal anestezi yapıldıktan sonra bir insizyonla birleştirildi. Sinüsteki kıllar temizlendi. Daha sonra kristalize fenol uygulandı. Sinüs ağızlarına yaptığımız insizyon sütüre edilmedi. Günlük pansuman ve banyo önerildi.

Bulgular: Pilonidal sinüs hastalığı olan 50 çocuk hastaya (medyan yaş=15 yıl) kristalize fenol uygulandı. Takiplerinde kanama ve ağrı şikayeti olmadı. Takiplerde nüks saptanmadı (1-3 yıl)

Sonuç: Cerrahinin uzun süreli hastanede kalış süresi, nüks riski ve yüksek maliyet gibi dezavantajları vardır. Kristalize fenol yukarıda belirtilen dezavantajların hiçbirine sahip değildir. Değiştirdiğimiz yöntem, tüm sinüs yollarına kesilip kristalize fenol uygulanması olup nüksü de azaltmış olabilir.

Anahtar Kelimeler: Pilonidal sinüs hastalığı, kristalize fenol, pilonidal sinüs nüksü, cerrahi

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INTRODUCTION

Pilonidal sinus disease (PSD) is a debilitating infectious and inflammatory condition. In PSD, a hair-containing sinus or abscess occurs in the sacrococcygeal region. Although the etiology is unknown, the cleft creates a suction that draws hair into the midline pits when a patient sits down (1,2).

The incidence of PSD was 26 out of 100,000 (3). In recent years, the incidence (56/100.000) and regional difference have increased (4,5). The information on the frequency of PSD occurrence in children is unclear. However, the frequency of admission of children with PSD, especially adolescents, to outpatient clinics has increased.

Ingrown hair in the pilonidal sinus might become infected and present acutely as an abscess in the sacrococcygeal region. After resolving an acute episode, recurrence is common. Several procedures have been proposed to treat chronic PSD. Complex and/or recurrent sinus tracts may require extensive resection and closure with Z-plasty, advancement, or rotational flaps (1).

The recurrence rate of PSD is high even after different surgical interventions (6). Therefore, better treatment methods are under investigation, and phenol application is one of them (7-10). Grabowski et al. (2) studied non-surgical interventions for treating PSD. The complications associated with the application of phenol were the least, and recurrence was lower after administering this treatment than after implementing other approaches. Further studies need to compare the percentage and type of phenol applied and the feasibility of the pediatric population. (2).

Crystalized phenol (CP) (also known as carbolic acid) is an effective sclerotic agent for treating PSD. It also has antiseptic characteristics and anesthetic properties and can be administered to conscious patients. It can be found in crystallized and liquid forms. The CP has some advantages, such as being easy to apply and safer because it does not flow in liquid form. CP becomes liquid at body temperature. It also irritates the internal PSD cavity, produces granulation tissue, or inflammation, then heals by fibrosis and closes the cavity (9).

In recent years, there have been successful publications on the application of CP in children with PSD. In our study, we aimed to present our experience and results about the modified CP application, which we think will reduce recurrences.

MATERIAL AND METHOD

This study was carried out at the University of Health Sciences, Bursa Faculty of Medicine, Bursa City Hospital. Following the approval of the ethics committee (no. 2021–11/7), patients with PSD who applied to our clinic between January 2020 and January 2022 were retrospectively analyzed. Patients diagnosed with pilonidal sinus who applied to the outpatient clinic were included in the study. However, patients with abscess formation at that time were not included in the study. They were included in the study after the abscess was drained and the inflammation subsided. Patients who previously underwent surgery, such as flap reconstruction and primary excision for PSD, were excluded from the study. Fifty patients (19 girls, 31 boys) were included in the study.

The procedure was performed under local anesthesia in outpatient clinics. Sinus orifices were observed (**Figure 1a**). The sinus orifices were connected using a surgical instrument with an incision (**Figure 1b**). If there was only one sinus orifice, the sinus cavity was opened with an incision (**Figure 1c**). The hair in the sinus was removed after performing the incision (**Figure 1d**). An antibiotic ointment was applied to the skin to prevent skin irritation due to phenol. Then, CP (**Figure 1e**) was applied to all pilonidal tracts (**Figure 1f**). The incisions were not sutured. The patients were educated about performing daily dressings and taking baths regularly and discharged. They were suggested to visit the clinic for regular check-ups. No recurrence was detected in 1-3 years of follow-up.

Figure 1. Modified crystallized phenol method

a: Pilonidal sinus with four sinus orifices in the sacrococcygeal region in a boy with a previous history of discharge and, drained abscess. b: Control of the sinus orifices with a surgical instrument in another patient, c: Incision of the orifices of pilonidal sinus, d: Hair removed from the sinus pilonidalis, e: Crystallized phenol, f: Application of crystallized phenol after incision in a patient. The surrounding tissue has protected with an antibiotic ointment.

Statistical Analysis

The conformity of we determined whether the continuous variables followed the normal distribution by performing the Shapiro-Wilk test. Continuous variables were expressed as the mean ±standard deviation or the median (minimum: maximum); categorical variables were expressed as n (%). Based on the normality test results, the Mann-Whitney U test was used for comparisons between groups. Categorical variables were analyzed

by the Chi-squared test, Fisher's exact test, and Fisher-Freeman-Halton tests. A logistic regression analysis was performed to determine the risk factors affecting the duration of wound closure. All statistical analyses were performed using the SPSS (IBM Corp. Released 2015; IBM SPSS Statistics for Windows, Version 25.0; Armonk, NY: IBM Corp.) program. The type I error level was accepted as α=0.05 in the statistical analysis.

RESULTS

CP was administered to 50 patients with PSD (19 females and 31 males; median age=15.5 years). These patients were admitted to our clinic for the first time. However, they had previously received medical and drainage treatments for discharge, swelling, and abscesses in other centers. No patient had undergone surgery (such as primary excision with primary suture, primary healing after excision, or flap reconstruction). Most patients had at least three sinus orifices. After applying CP, there was no bleeding or pain in the follow-up, but wound infection developed in two patients. These two patients, who did not perform their dressings regularly, recovered without problems after regular dressing. No recurrence was observed in the follow-up (one year to three years).

The duration of the patient's complaint affected the time of wound closure, as shown in **Table 1**. In our study, wound healing time was observed in 16 patients in less than 2 weeks. Wound healing time was observed in 34 patients after more than 14 days. (14 days-42 days). The number of sinuses, family history, and incision length also affected the duration of wound closure. Since the incision is made along the tract, the length of the incision also shows the length of the tract. Therefore, tract length affects wound healing.

We performed a logistic regression analysis to determine the risk factors affecting the duration of wound closure for 14 days or more in the patients. We first examined the patient's age, gender, weight, complaint, duration of complaint, treatments received, number of sinuses, additional disease, income status, family history, and incision length by performing a univariate logistic regression analysis. The information on the gender, weight, duration of complaint, number of sinuses, family history, and incision length were included in the multivariate logistic regression analysis. In the multivariate logistic regression analysis, the forward elimination method was used for selecting the variable. In the final step, gender, incision length, and family history were found to be the significant variables. The steps of the analysis are presented in **Table 2**.

Table 2: Risk factors that affect the duration of wound closure.

Step-1	Wald	p-value	OR	95% (CI)	
				Min	Max
Incision length (cm)	7.34	0.007	8.35	1.80	38.79
Model $\chi2=0.358$; $p < 0.001$					
Hosmer-Lemeshow Test: p=0.949					
Step-2	**Wald**	**p-value**	**OR**	**95% (CI)**	
				Min	**Max**
Family history (Present)	3.82	0.050	0.19	0.04	1.00
Incision length (cm)	7.19	0.007	9.44	1.83	48.76
Model $\chi2=1.044$; $p < 0.001$					
Hosmer-Lemeshow Test: p=0.959					
Step-3	**Wald**	**p-value**	**OR**	**95% (CI)**	
				Min	**Max**
Gender (Female)	4.17	0.041	12.48	1.10	140.67
Incision length (cm)	6.08	0.014	17.79	1.80	175.08
Family history (No)	5.28	0.022	18.00	1.53	211.68
Model $\chi2=3.141$; $p < 0.001$					
Hosmer-Lemeshow Test: p=0.872					

OR: Odds ratio, CI: Confidence interval.
The "male" category for the gender variable and the "present" category for the family history were accepted as the reference category.

Table 1: Comparisons of patient groups regarding the duration of wound closure, less than 14 days and 14 days or more.

	Duration of wound closure				p-value
	n	< 14 days	n	≥ 14 days	
Patient complaint					
Abscess	16	5 (31.30%)	34	5 (14.70%)	0.581[c]
Pain		3 (18.80%)		10 (29.40%)	
Discharge		6 (37.50%)		13 (38.20%)	
Swelling		2 (12.50%)		6 (17.60%)	
Duration of complaint (Months)	16	3 (1:12)	34	6 (1:12)	0.008[a]
Received treatment					
Drainage	13	3 (23.10%)	30	9 (30%)	0.727[d]
No treatment		10 (76.90%)		21 (70%)	
Number of sinuses	16	3 (3:4)	34	4 (3:10)	0.011[a]
Additional disease	16	0	34	2 (5.90%)	>0.999[d]
Income level					
Low	16	4 (25%)	34	9 (26.50%)	>0.999[d]
Medium		12 (75%)		25 (73.50%)	
Family history	16	9 (56.20%)	34	9 (26.50%)	0.041[a]
Length of incision (cm)	16	4 (3:4) 3.56 ±0.51	34	4 (3:8) 5.03 ±1.42	<0.001[a]

The data were expressed as median (minimum: maximum) and n (%).a: Mann-Whitney U Test, b: Chi-square Test, c: Fisher-Freeman-Halton Test, d: Fisher's Exact Chi-square Test.

The multivariate logistic regression analysis ended in three steps, as shown in **Table 2**. The logistic regression model obtained in the final step was significant ($p < 0.001$), and the dataset was compatible with this model ($p=0.872$). The analysis results indicated that the risk of prolonging the duration of wound closure in female patients was 12.48 times higher than that in male patients. An increase in the incision length by 1 unit increased the risk of prolonging the duration of wound closure by 17.79 times. The risk of wound closure lasting 14 days or more was 18 times higher in the group without a family history of the disease compared to the group with a family history of the disease

The ROC analysis was performed to determine the cut-off point for incision length according to the duration of wound closure. When the incision length was > 4 cm, the area under the ROC curve was calculated as 0.82 (sensitivity=47.06%, specificity=100%; $p < 0.001$), and the incision length > 4cm was significantly associated with a risk of wound closure time of 14 days or more.

DISCUSSION

Many treatment alternatives have been developed for PSD because of its high recurrence rates (22.8%) (11). Phenol application is one of them. Many treatment methods are applied in the treatment of PS, from primary excision to flap techniques. however, due to the high recurrence rates, ideal treatment method researches are being tried. In recent years, successful results have been published with CP application as a minimally invasive method in children and adults with PSD (2,7-10). In our study, CP application was made by incising the sinus orifices. We aimed to share the results of our modified CP application.

Kayaalp et al. (9) in review study, reported that although the recovery time varies, it occurs within three weeks in most cases. In our study, we determined that the incision length (tract length), female gender and absence of family history caused delayed wound healing. We found that the incision length was 4 cm or more in children with wound healing time over 14 days. Although it depends on the distance between the sinuses, we tried to keep the incision length to a minimum without extending the incision. After this experience, we planned to keep the tract incision below 4 cm in patients with a tract length of 4 cm and above and to perform CP in a few sessions. Delayed wound healing in girls may be caused by structural gender differences such as high percentage of fat in tissues. The positive effect on wound healing in children with a family history of PSD was evaluated as the fact that children with PS both applied to the hospital earlier and paid more attention to wound care and cleaning due to their families' experience. During the wound healing process, the activities and daily lives of our patients are not restricted. They continued their routine activities with daily bathing and dressings. It is recommended not to do heavy exercise and sports only in this process. Our patients performed their daily activities the day after the procedure. During follow-ups, they reported that they spent their days comfortably and did not feel the need to use analgesics.

Different recurrence rates have been reported following the application of phenol (9–15.7%) (12,13). While evaluating recurrence in PSD, the follow-up period can be very long. Buenova et al. (6) showed an overall recurrence rate of 16.1% at 24 months, 21.4% at 60 months, and 47.4% at 303 months; 24 months after the operation, the recurrence rate ranged from 10.5% for excision with primary midline closure to 30.0% for the Bascom I procedure. Recurrence after excision with primary midline closure was 71.8% at 268 months postoperatively. Dogru et al.(13) found the recurrence rate below 18 years to be 32.9%, higher than the recurrence rate for adults. In a study of Madenci and Uysal (14) on children, they found postoperative recurrence developed in 14 patients (16.3%). In our study, no recurrence was observed, which was probably because the connection of the sinus orifices and the hair in the cavity was cleaned, and phenol was applied thoroughly in the cavity. However, although the small number of our patients and the short follow-up period limit us to provide data on clear recurrence, it is hopeful that there is no recurrence in our early-term results. Therefore, long-term follow-up of our patients will show the actual recurrence rate.

When we compared our study with the reported phenol applications in the literature, the number of pilonidal sinus orifices reported for phenol applications in other studies were either unspecified (7,15) or less than 3 (10). The number of pilonidal sinus orifices influences recurrence. The success rate was better in the cases with 1–3 sinus orifices and comparable to surgical methods' success rate. No recurrence was observed in our study. In this respect, the effect of the number of sinuses on recurrence was not evaluated. However in our study, the number of orifices was found to be effective on the wound healing time, but in further evaluation, it was seen that the length of the sinus tract affected more than the number of sinuses.

Phenol provides treatment with its sclerosing effect by destroying epithelium and debris in the PS tract. In the German National Guideline on the management of pilonidal disease: update 2020, phenol is not allowed to be used by German health authorities due to its possible side effects (16). In the study, "Despite favorable results in recent studies, the human use of phenol has been banned by German health authorities due to its toxicity" was added as the last sentence (16). Garabowski et al. In their review study by evaluating 97 articles in the literature on the treatment of pilonidal disease, they commented that phenol is an

effective method in the management of pilonidal disease with low recurrence and complication rates, with level 2-4 evidence, grade B recommendation. This valuable study suggests further research on the consequences of its use in children (2). Following this article, Yüksel (17) stated in his letter to the editor that it should not be used in children yet, citing Germany as an example. Otherwise, the feasibility of phenol application has been shown in the literature in other studies, including application in the children group, and no severe side effects have been encountered were reported (7,15,18-20).

In a study conducted by Arslan et al. (12), the mean number of CP application sessions was 2.2 in the simple group and 4.2 in the complicated group. Although no recurrence was reported in the phenol group in a study by Kurt, 37 patients were administered phenol once, six patients were administered phenol twice, and two patients were administered phenol thrice (21). Dogru et al. reported that the mean number of phenol applications was 2.1. Similar to our findings, they found that the number of sinus orifices, the number of phenol application sessions, the duration of the disease before treatment, and positive family history affected recurrence (13). We applied phenol once after removing hair and following the incision to connect the sinus orifices. In other studies, the cases in which phenol was administered more than once were not evaluated as recurrence. The requirement for re-application of phenol was probably reduced in our study since an incision was made. We had two questions regarding the cases that were not considered recurrences when phenol was applied more than once. How should recurrence be defined in phenol application? What should be the standards in phenol application?

CP, which is a minimally invasive method, is easy to apply and easy to learn. Its other advantages are that it can be applied on an outpatient basis, without the need for an operating table, in outpatient settings (2,22). Therefore, Yuksel explained the crystallized phenol technique in detail to encourage dermatologists to treat PSD in the outpatient clinic (22). Also, CP application eliminates the cost of hospitalization and possible complications of surgery and anesthesia (23).

The limitation of our study was the need for a longer follow-up period and a larger number of patients. However, it is promising that there is no recurrence in the follow-up period with the number of patients available as a preliminary study.

CONCLUSIONS

In our study, CP was evaluated as a minimally invasive, easy to apply, no recurrence, cost effective method in children with PSD. The modified CP method in which we incised the sinus tracts might have also contributed to a reduction in recurrence.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of University of Health Sciences, Bursa Faculty of Medicine, Bursa City Hospital Ethics Committee (no. 2021–11/7)

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

Referee Evaluation Process: Externally peer-reviewed.

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

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

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

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Bibliometric Analysis of Articles on Pediatric Caudal Anesthesia

Pediatrik Kaudal Anestezi ile İlgili Makalelerin Bibliyometrik Analizi

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ABSTRACT

Aim: Bibliometric analysis studies are studies that examine the literature on a subject numerically and holistically, and have recently attracted a lot of attention in the field of medicine. The number of articles about pediatric caudal anesthesia has increased gradually over the past few decades. However, there is no bibliometric analysis study on pediatric caudal anesthesia in the literature. This study aimed to present a bibliometric analysis of articles published in the Web of Science (WoS) Core database related to pediatric caudal anesthesia.

Material and Method: We used the search engine of WoS and included all types of contributions (original articles, reviews, letters, etc.) in the bibliometric analysis. The keywords used to access articles are "pediatric, caudal, anesthesia, analgesia, and block" words. For the analyses, VOSViewer 1.6.13. version was used.

Results: The most cited publications on pediatric caudal anesthesia were in the following journals: Pediatric Anesthesia (84 articles, 1892 citations), Anesthesia and Analgesia (26 articles, 884 citations) and Anesthesiology (7 articles, 537 citations). The countries that publish and receive the most citations about pediatric caudal anesthesia starting from the highest are the USA, France, Sweden, Turkey, Canada.

Conclusion: The following parameters were the foci of a thorough analysis of articles on pediatric caudal anesthesia: publication date, number of citations, journal name, theme, and country. It is noteworthy that pediatric caudal anesthesia currently plays a crucial role in pediatric anesthesia research. However, there is still a need for new studies from different countries on different cases in the literature on pediatric caudal anesthesia.

Keywords: Analgesia, Anesthesia Caudal, Bibliometrics, Pediatrics

ÖZ

Amaç: Bibliyometrik analiz çalışmaları, bir konu hakkındaki literatürü sayısal ve bütünsel olarak inceleyen ve son zamanlarda tıp alanında oldukça ilgi gören çalışmalardır. Pediatrik kaudal anestezi ile ilgili makalelerin sayısı son birkaç dekatta kademeli olarak artmıştır. Ancak literatürde pediatrik kaudal anestezi ile ilgili bibliyometrik analiz çalışması bulunmamaktadır. Bu çalışmada pediatrik kaudal anestezi ile ilgili olarak Web of Science (WoS) Core veritabanında yayınlanan makalelerin bibliyometrik analizinin sunulması amaçlanmıştır.

Gereç ve Yöntem: WoS arama motorunu kullandık ve her türlü katkıyı (orijinal makaleler, incelemeler, mektuplar vb.) bibliyometrik analize dahil ettik. Makalelere ulaşmak için kullanılan anahtar kelimeler "pediatrik, kaudal, anestezi, analjezi ve blok" kelimeleridir. Analizler için VOSViewer 1.6.13. versiyonu kullanıldı.

Bulgular: Pediatrik kaudal anestezi ile ilgili en çok atıf yapılan yayınlar Pediatric Anesthesia (84 makale, 1892 atıf), Anesthesia and Analgesia (26 makale, 884 atıf) ve Anesthesiology (7 makale, 537 atıf) dergilerinde yer aldı. Pediatrik kaudal anestezi ile ilgili yayın yapan ve sırasıyla en çok atıf alan ülkeler ABD, Fransa, İsveç, Türkiye, Kanada'dır.

Sonuç: Pediatrik kaudal anestezi hakkındaki makalelerin kapsamlı analizinde "yayın tarihi, alıntı sayısı, dergi adı, konu ve ülke" gibi parametrelere odaklanılmıştır. Pediatrik kaudal anestezinin şu anda pediatrik anestezi araştırmalarında çok önemli bir rol oynaması dikkat çekicidir. Bununla birlikte, literatürde pediatrik kaudal anestezi konusunda farklı ülkelerden farklı vakalar üzerinde yeni çalışmalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: Analjezi, Anestezi Kaudal, Bibliyometrik, Pediatri

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INTRODUCTION

Caudal anesthesia is one of the most used regional blocks, especially in pediatric anesthesia. In most surgical procedures of the lower abdomen and lower extremities, caudal anesthesia is widespread in intraoperative and postoperative analgesia (1). The following reasons highlight caudal anesthesia as a preferable method: it is safe to use, easy to apply and can be used for many surgical procedures (2). The frequency of use of caudal block by pediatric anesthesiologists is very high in the United States, with 61% of the central blocks applied in pediatric patients in France and 49.5% of the central blocks applied in Italy (3). In addition to surgical anesthesia, pediatric caudal anesthesia can treat acute and chronic pain (caudal analgesia) (4). Pediatric caudal analgesia is effective in postoperative analgesia after intraumbilical, lower abdominal, and lower extremity operations under general anesthesia (5). At the same time, there are a very high number of publications on caudal anesthesia in many different journals in the literature. One of the most critical indicators showing the contribution of these publications in the field is the number of citations of the publication. The number of citations is beneficial to make inferences about the impact of the research on a subject, i.e., its contribution to the literature (6). Moreover, the number of citations is critical for many institutions and organizations (for example, the Council of Higher Education, and universities). They use it in determining the metrics of the journals in the literature and evaluating the individual performance of the authors of the articles and in procedures such as recruitment, rewarding, and extending the term of office (7). The number of citations of publications is necessary to calculate the H index, the journal impact factor (IF), the eigenfactor score, and the SCImago journal rank, which are among the crucial indicators related to the journals in the literature (8). At the same time, knowing the most cited articles in a particular research field is necessary to determine the most active journals, authors, countries, institutions, and expertise; the scope of the research field in question (9). Therefore, bibliometric research has been carried out intensively by researchers in recent years. There are bibliometric analysis studies on some methods, some types of diseases, and medical education in medicine (10-17). In the field of anesthesia, in bibliometric analysis studies, it was observed that subjects such as studies in the field of anesthesia, anesthesia applications in different age groups, and regional anesthesia were discussed in bibliometric analysis studies (18-21). There was no study involving bibliometric analysis of studies on pediatric caudal anesthesia. Therefore, this study aimed to conduct a bibliometric analysis in this field.

MATERIAL AND METHOD

Study Design

In this study, the document analysis method, one of the qualitative research methods, was used. This study had a bibliometric analysis approach to determine the trends in pediatric caudal anesthesia and analgesia in the field of anesthesia in medical science worldwide. Bibliometric analysis studies are crucial in reviewing the research and findings on a specific subject by combining them (22). Bibliometric analyses provide an opportunity to analyze the trends of the studies in the literature related to the determined subject, the scientific dimension, impact, growth rate, etc., of researchers, publications, and journals and to consider their intellectual status in the research field (23). With bibliometric analysis studies, it is possible to examine the literature numerically and holistically (24, 25). According to Hosseini et al., bibliometric analysis has the following steps: data collection, bibliometric data processing, analysis-visualization, and transfer of findings (26). This bibliometric analysis had the same steps.

Data collection

The bibliometric analysis scanned the WoS database (Web of Science Core Collection database maintained by Clarivate Analytics. Access date: 18.9.2022). WoS (the standard and most used tool for generating citation data) was used for research assessment purposes. Various terms related to pediatric caudal anesthesia were entered into the search box. Then, the root of each keyword was entered one by one in the "Title" field. Specifically, "pediatric" and "caudal" words were written in the search box with an "AND" between them, indicating the presence of both words together. Furthermore, anesthesia, analgesia, and block words were added with "or" next to these two words. The wildcard "*" was used to obtain more comprehensive results in each search and to obtain plural or different word attractions of the root keyword. Additionally, different words expressing the same concepts were used when necessary to make a more comprehensive search. Different spellings of words (pediatric-paediatric, anesthesia-anaesthesia, etc.) were also used in searches. To reach articles containing pediatric caudal anesthesia, pediatric caudal block, and pediatric caudal analgesia simultaneously, "or " linker was used between anesthesia, analgesia, and block words. As a result of this search, 346 articles were reached. A filter for languages (English) was used, all types of articles were considered, and the topics were selected from various sources.

Data analysis

As a result of the keyword searches made in the WoS system, the steps described in **Figure 1** were applied to access the bibliometric data as a text document. Each of the obtained text documents contains the author,

title, source, summary, citation information, and all other information (journal publication information) related to the article (Web of Science Core Collection Help, 2019).

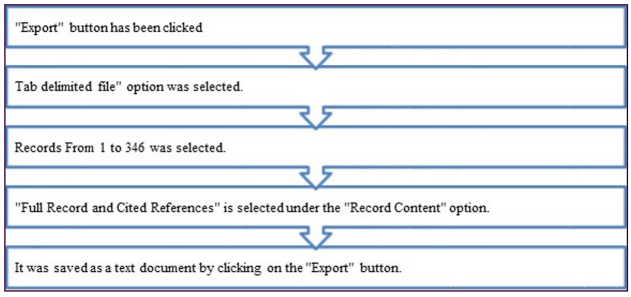

Figure 1. The process to retrieve WoS bibliometric data

The number of articles and the total number of citations according to the years obtained from the WoS core database. Then, they were fed into the Excel program. The graphics were created with Excel. The "Citeration Report" link on the "Results" page was clicked to get the number of articles and citations by year, and the screenshot of the "Times Cited and Publications Over Time" chart on the "Citation Report" page was taken separately as Publication and Citation. Then, text documents containing keywords were visualized by VOS viewer 1.6.13. During this visualization;

- Distribution of articles published in terms of keywords by year
- Number of citations of articles published in terms of keywords by year
- Most used concepts in terms of keyword
- Citation analysis in the context of the journal through the keyword
- Citation analysis in the context of the country through the keyword.

In addition, the citation per publications (CPP) score of the countries with the highest number of publications and citations was calculated as follows:

CPP=Total citations from WoS (TC)/Number of Articles (27).

RESULTS

In the findings section, the results of the analysis of the keywords "pediatric" and "caudal" and "analgesia" or "anesthesia" or "block" and 346 articles in the WoS database by year, the number of citations, the most used concepts in these publications, the citation analysis of key concepts in the context of the journal and the citation analysis in the context of the country are presented as graphs and concept maps.

Findings related to the number of publications

The numerical distribution of the publications on pediatric caudal anesthesia in WoS from 1991 to the present day is seen (**Figure 2**). According to the graph, while the number of publications scanned in WoS related to Pediatric Caudal was 3 in 1991, this number increased 6.66 times in 2021 and reached 20 publications per year. Still more, the least published years related to pediatric caudal anesthesia were 1992 and 1994 (two publications), while the most published year was 2020 (25 publications).

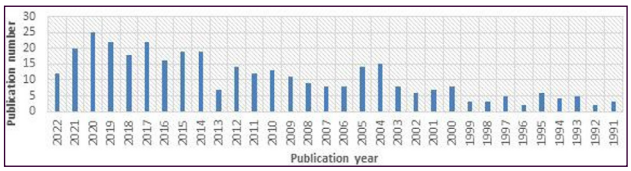

Figure 2. Article distribution graph by year

Findings related to the number of citations

Figure 3 shows a graph of the number of citations received by the publications published on pediatric caudal anesthesia in WoS.

Publications on pediatric caudal anesthesia started to be cited in WoS in 1992. In the last decade, the annual citation average on the subject has been above 200 and reached 400 figures since 2020 (**Figure 3**).

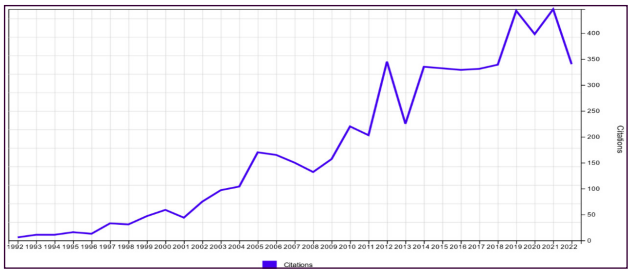

Figure 3. Graph of the citation distribution of publications by year

Most Used Concepts

With the help of text-based data obtained from the WoS system, VOSviewer's co-occurrence analysis generated a map of the most used concepts together with keywords. During this analysis, "Author Keywords" was selected. The minimum number of occurrences of a keyword was set to 10. The number of keywords to be selected is given as 24 by the program. The concept number value included in the articles published with keywords was 24 (**Figure 4**). These concepts formed three separate clusters, and each cluster is in different colors. The 1st cluster consists of 11 concepts, the 2nd cluster 8 concepts, and the last cluster 5 concepts. Considering the leading concepts of each cluster, the most mentioned concept of the first cluster was "caudal" (f=49), the most common concept in the second cluster was "caudal block" (f=52), and in the last cluster was "analgesia" (f=32). Interestingly, the emerging concepts were also among the keywords of the research. The drugs in the concept map are as follows: tramadol, dexmedetomidine, bupivacaine, levobupivacaine, clonidine, ketamine, fentanyl, and ropivacaine.

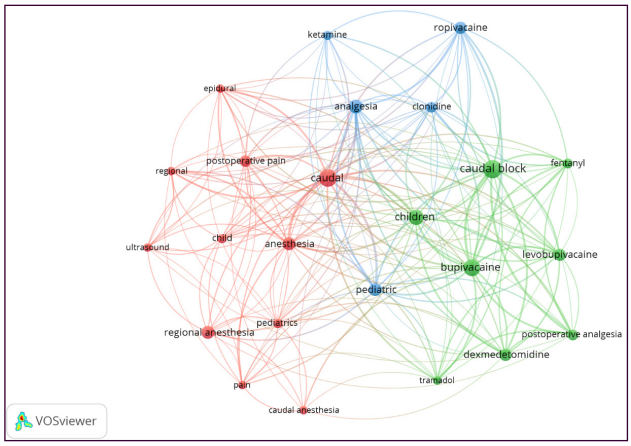

Figure 4. Map of the most used concepts

Citation Map in the Context of the Journal

VOSviewer Citation analysis produced the citation map in the context of the journal with the help of text-based data obtained from the WoS system. "Sources" was selected during this analysis. The minimum number of documents of a source was set to 5. The minimum number of citations of a source was set to 0. Set values filtered a total of 16 journals. The journal-citation map created by the VOSviewer program is in **Figure 5**. There is an intense connection between the published journals (**Figure 5**). The ranking of the top 5 journals according to the number of citations among 16 journals is as follows: Pediatric Anesthesia (76 articles, 1575 citations), Anesthesia and Analgesia (26 articles, 884 citations), Anesthesiology (7 articles, 537 citations), British Journal of Anesthesia (7 articles, 366 citations), and Paediatric Anesthesia (8 articles, 317 citations). According to our web browsing results, Pediatric Anesthesia, which ranks first on the list, and Paediatric Anesthesia, which ranks fifth, are actually the same journals. The journal was under the name Paediatric Anesthesia until March 2004, after which it continued under the name Pediatric Anesthesia. The actual single journal had 84 articles on pediatric caudal anesthesia with 1892 citations. In other words, approximately a quarter (24.3%) of the 346 articles reviewed in WoS on pediatric caudal anesthesia were published in this journal.

Citation Map in the Country Context

VOSviewer Citation analysis generated the citation map in the context of the country with the help of text-based data obtained from the WoS system. "Countries" was selected during this analysis. The minimum number of documents in a country is was 5, while the minimum number of citations in a country was 0. As a result of the set values, a total of 19 citing countries were reached. The country-citation map created by the VOSviewer program is given in **Figure 6**. A citation network was formed between 19 countries, as seen in **Figure 6**, in publications on pediatric caudal anesthesia. The ranking of the top 5 countries according to the number of citations is as follows: USA (71 articles, 1395 citations), France (16 articles, 698 citations), Sweden (20 articles, 684 citations), Turkey (38 articles, 468 citations), and Canada (21 articles, 432 citations). According to the CPP score calculated to reveal the publication productivity of the countries in the top five on pediatric caudal anesthesia according to the number of citations, the previous ranking was reordered with France (43.62) as the first, followed by Sweden (34.2), Canada (20.57), the USA (19.64), and Turkey (12.31).

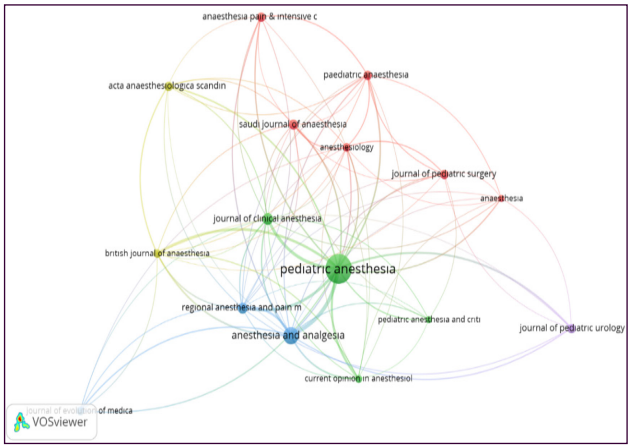

Figure 5. Citation map according to the journal where the publication is made

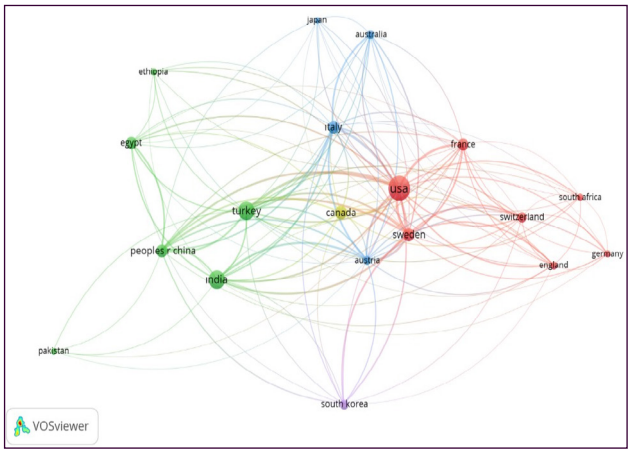

Figure 6. Map of citations in the context of the country

DISCUSSION

In recent years, anesthesiologists have frequently preferred pediatric caudal anesthesia in pediatric surgeries and pediatric caudal analgesia in postoperative analgesia (28). Therefore, it is one of the hot topics that attract attention. Within the scope of this research, the bibliometric examination of the publications scanned in WoS related to pediatric caudal anesthesia was made, and the number of publications by year, the number of citations by year, the countries with the highest number of publications, the countries received the highest citations, the journals that published the most and received the most citations, and the concepts in the publications related to the subject were determined.

This bibliometric analysis reached 346 publications in the WoS database between 1991 and 2022 were reached. These publications were in 16 different journals from 19 countries. According to the results, research on pediatric caudal anesthesia started to attract attention in the 1990s, and interest in the subject increased gradually. While the number of publications scanned in WoS related to pediatric caudal anesthesia was 3 in 1991, this number increased 6.66 times in 2021 and reached 20 publications annually. However, as we mentioned in the introduction section, caudal anesthesia has a significant percentage (50-60% ratio) among the anesthesia applications used in pediatric patients (3), so more publications are necessary on the subject. The first citation on the subject in the WoS is in 1992, and these citations increased considerably in the last decade (annual number of citations between 200-400). This increase indicates an increasing interest in the subject.

The most published and cited journals on pediatric caudal anesthesia were Pediatric Anesthesia, Anesthesia and Analgesia, Anesthesiology, and the British Journal of Anesthesia. Pediatric Anesthesia magazine published 12 issues a year in England. The journal has been publishing since 1991, and the impact factor (IF) is 2.129 for 2021 (IF2021). Anesthesia and Analgesia is a journal that publishes 12 issues a year in the USA. The journal is the publishing body of the International Society for Anesthesia Research. The IF2021 of the journal is 6.627. Anesthesiology magazine, which ranks third on the list, is a magazine that publishes four issues a year. The journal is being prepared for publication by the American Society of Anesthesiologists (ASA). The IF2021 value of the journal is 8.139. British Journal of Education is a journal with a very high impact factor (11.719 for 2021), which publishes four issues a year from the UK. In our study, the journals that we have determined to have the most cited publications on pediatric caudal anesthesia are the journals that have been included in the list of the most cited journals in similar bibliometric analysis studies conducted on different subjects in the field of anesthesia (18, 20, 29, 30). They are among the most productive journals in this research field for the following reasons: their impact factors, their publication history spanning many years, and their inclusion in this and similar bibliometric analysis studies. Moreover, the journals included in the list can be suggested as a source by scientists who review or want to publish the results of research on pediatric caudal anesthesia.

The ranking of the top 5 countries according to the number of citations received by the publications on pediatric caudal anesthesia is as follows: USA, France, Sweden, Turkey, and Canada. According to the CPP score, the countries with the most citations are France, Sweden, Canada, the USA, and Turkey. Four of the countries included in the list are countries with high-income levels according to World Bank data, while only Turkey is in the category of developing countries. In previous studies, countries with high-income levels publish more scientific studies on anesthesiology (18). In our study, the fact that the four countries included in the list (USA, France, Sweden, and Canada) are among the countries with high-income levels coincides with this finding. According to the data of the World Bank, Turkey (https://data.worldbank.org/country) is a developing country and a country in the upper-middle income category. The fact that it is among the five most cited countries in this field is a good sign of improvement, and other developing countries also need publications on the subject.

Study Limitations

This study, which presents the bibliometric results of studies screened in WoS on pediatric caudal anesthesia, also has some limitations. First, the results of this study are limited to the studies conducted in the field of pediatric caudal anesthesia in the WoS core database, whose article publication language is English and which were reached in the analyses conducted by the VOSwiever program. Researchers who will conduct similar research in this study can also review other databases, such as PubMed, Scopus, and Google Scholar, and make international comparisons. The scope of the studies can be expanded by including the studies conducted in different languages. Additionally, the authors recommend that researchers who will study the field of anesthesia conduct bibliometric analysis studies on different keywords.

CONCLUSION

It is noteworthy that pediatric caudal anesthesia currently plays a crucial role in pediatric anesthesia research. However, there is still a need for new studies from different countries on different cases in the literature on pediatric caudal anesthesia. Undeveloped and developing countries should be encouraged to conduct research in the field of pediatric caudal anesthesia.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethics committee approval is not required for this study.

Referee Evaluation Process: Externally peer-reviewed.

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

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

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

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DOI: 10.21765/pprjournal.1244508

ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

The Effect of Eating Behaviors and Sleeping Habits of Children Aged 6-12 on Obesity

6-12 Yaş Çocukların Yeme Davranışları ve Uyku Alışkanlıklarının Obesite Üzerindeki Etkisi

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ABSTRACT

Aim: The aim of this study was to determine the effects of eating behaviors and sleeping habits of children aged 6-12 years on obesity.

Material and Metod: The data required for the research were collected online between 21 May 2022 and 15 July 2022. The study group of the research consisted of children aged 6-12 years. In data collection, online survey method, socio-demographic data collection form, three-factor eating scale, child sleep habits questionnaire (CHA) were used from 220 children aged 6-12 years who had parental consent, participated voluntarily, and were selected by convenience sampling method, one of the improbable sampling methods. SPSS 26.0 data analysis program was used in the statistical analysis of the data obtained in the study, and t-test and one-way Anova test and regression were used to examine the effects of children's eating behaviors and sleeping habits on obesity.

Result: In the study, it was revealed that children's sleep habits and uncontrolled eating, cognitive restriction, emotional eating behaviors were similar to each other according to age groups, gender, education level, night sleep interval, total sleeping time. It has been stated that children are at risk of obesity depending on the degree of eating behavior and sleeping habits of children.

Conclusion: It is recommended to conduct studies on the effects of eating behaviors and sleeping habits of children aged 6-12 on obesity.

Keywords: Child, eating habits, sleeping habits, obesity

ÖZ

Amaç: Bu çalışmanın amacı, 6-12 yaş arası çocukların yeme davranışları ve uyku alışkanlıklarının obezite üzerindeki etkilerini belirlemektir.

Gereç ve Yöntem: Araştırma için gerekli olan veriler 21 Mayıs 2022 – 15 Temmuz 2022 tarihleri arasında çevrimiçi olarak toplanmıştır. Araştırmanın çalışma grubunu 6-12 yaş arası çocuklar oluşturmaktadır. Veri toplamada, ebeveynleri tarafından gönüllü olarak katılan ve aileleri tarafından seçilen 6-12 yaş arası 220 çocuktan çevrimiçi anket yöntemi, sosyo-demografik veri toplama formu, üç faktörlü yeme ölçeği, çocuk uyku alışkanlıkları anketi (ÇHA) kullanılmıştır. Olasılıksız örnekleme yöntemlerinden biri olan kolayda örnekleme yöntemi. Araştırmada elde edilen verilerin istatistiksel analizinde SPSS 26.0 veri analiz programı kullanılmış olup, çocukların yeme davranışları ve uyku alışkanlıklarının obezite üzerine etkisini incelemek için t-testi ve one-way Anova testi ve regresyon kullanılmıştır.

Bulgular: Araştırmada yaş grupları, cinsiyet, eğitim düzeyi, gece uyku aralığı, toplam uyku süresine göre çocukların uyku alışkanlıkları ile kontrolsüz yeme, bilişsel kısıtlama, duygusal yeme davranışlarının birbirine benzer olduğu saptanmıştır. Çocukların yeme davranışı ve uyku alışkanlıklarının derecesine bağlı olarak çocukların obezite riski altında olduğu belirtilmiştir.

Sonuç: 6-12 yaş arası çocukların yeme davranışları ve uyku alışkanlıklarının obezite üzerine etkilerinin araştırıldığı çalışmaların yapılması önerilmektedir.

Anahtar Kelimeler: Çocuk, yeme alışkanlıkları, uyku alışkanlıkları, obezite

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INTRODUCTION

Obesity and overweight are defined by the World Health Organization (WHO) as excessive fat accumulation in the body at a level that may impair health (1). Obesity is an important public health problem and is increasing day by day in developed and developing countries (2). It has been reported that more than 340 million children and adolescents aged 5-19 years in the world were overweight or obese in 2016 (3). In our country, the prevalence of obesity has increased day by day, while the prevalence of obesity for 15 years and older was 19.6% in 2016, it increased to 21.1% in 2019. It was determined that 24.8% of women were obese, 30.4% were overweight, 17.3% of men were obese, and 39.7% were overweight (4). According to the results of the Turkey Nutrition and Health Survey (2017) (5), 18.6% of women in the 15-18 age group are overweight and 6.6% are obese, 15.7% of men are overweight and 8.4% are obese. In the Turkish Dietary Guidelines (2015) (6), it is recommended that due to the increase in obesity, attention should be paid to the consumption of total and saturated fat, cholesterol, salt and sugar in the diet. The American Heart Association recommends increasing the consumption of fresh vegetables and fruits in children over the age of 2, consuming unsaturated fats such as olive oil in the diet, consuming whole grain bread and cereals, reducing the consumption of sugary foods and beverages, and consuming non-fat dairy products (7), It has been observed that 10.8% of children in Turkey do not have the habit of having breakfast, and 9.1% skip lunch (8).

Along with genetic factors, some environmental factors and habits play a role in the etiology of obesity. Especially, poor quality of eating behaviors and sleeping habits can cause sleepiness and hormonal changes during the day, and it has been determined that it has an effect on obesity in children by negatively affecting body metabolism (9-10). Since childhood is the period in which habits are acquired, more studies on this issue and mechanisms should be reviewed. It is necessary to emphasize the importance of sleep in childhood by indirectly affecting behaviors such as nutrition and physical activity, and to prevent mistakes made (11).

Sleep, a healthy and balanced diet, and eating habits are a crucial factor in efforts to improve health in school-age children, as a fundamental component of physical growth and academic performance (12). It is reported in the literature that sleep problems in childhood are 25-30% (13). In a study, it was reported that sleep problems negatively affect the endocrine system functions and cause changes in the levels of appetite stimulating hormone ghrelin and anorexogenic hormone leptin (14). In a study, it is reported that school-age children need 8.5-10 hours of sleep. It is emphasized that insufficient sleep can lead to poor academic performance by causing irritability and lack of attention in children (15) For this reason, sleep deprivation directly affects weight gain, unbalanced and inadequate nutrition, eating habits, and can significantly increase the risk of overweight and obesity, especially in children between the ages of 6-12. The aim of this study was to determine the effects of eating behaviors and sleeping habits of children aged 6-12 years on obesity.

MATERIAL AND METOD

The study was carried out with the permission of Hakkari University Scientific Research and Publication Ethics Committee (decision no: IRB:2022/54-1) for the research. All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. Within the scope of the research, ethical unification was approved with the consent formula for children aged 6-12 and the informed consent formula from the family.

The research population consisted of children between the ages of 6-12. The sample, on the other hand, was selected by convenience sampling method, one of the non-probability sampling methods, between the ages of 6-12, with parental consent, participating voluntarily, and having no obstacle to answering the questions. The study was carried out with 220 children who met the conditions of participation.

Research data were collected with the following data collection forms:

Socio-demographic data collection form: This form; It consists of a total of 3 questions about the age, gender and educational status of the children.

Three-factor eating scale: A three-factor eating questionnaire was developed by Bryant et al. (16) to measure the eating habits of children with three factors. The three-factor eating scale, which was validated and reliable in Turkish by Demir et al. (17) consists of seventeen items, including the behaviors of primary and secondary school students. It is a Likert type and the answers are as follows: 1 = definitely wrong, 2 = mostly wrong, 3 = mostly right 4 = definitely right. It is a four-point Likert type scale form containing 17th item in the questionnaire. At meal times', 'sometimes between meals', 'often between meals' and 'almost always'. Construct validity was evaluated using the exploratory, varimax rotation of the scale. The scale UE shows a three-factor structure referring to EE, with a 0•85 Cronbach α coefficient obtained as a result of the scale's internal consistency analysis. The Cronbach α values of the sub-dimensions are 0•85 (UE), 0•83 (EE) and 0•67 (CR).

Children's Sleep Habits Questionnaire (CSHQ): The Children's Sleep Habits Questionnaire (CSHQ) - Abbreviated Form, developed by Owens et al. (18) to investigate children's sleep habits and sleep-related problems, consists of a total of 33 items. Turkish validity

and reliability study was conducted by Perdahlı Fiş et al. (19); ; In the scale, bedtime resistance (1,3,4,5,6,8 items), delay in falling asleep (2nd item), sleep duration (9,10,11 items), sleep anxiety (5,7,8, 21st items), night awakenings (items 16,24,25), para-somnias (12,13,14,15,17,22,23), impaired breathing during sleep (items 18,19,20) Eight subscales were defined, which can be listed as waking up during the day in the morning/Daytime Sleepiness (items 26,27,28,29,30,31,32,33). The scale is filled in retrospectively by the parents. Parents are asked to evaluate the child's sleep habits over the previous week. Items in the scale are usually coded as (if the specified behavior occurs 5-7 times a week): 3 points, sometimes (if it occurs 2-4 times a week): 2 points, and rarely (if it occurs 0-1 times a week): 1 point; Items 1,2,3,10,11 and 26 are reverse coded (usually: 1 point, sometimes: 2 points, and rarely: 3 points). Items thirty-second and 33 are coded as not sleepy: 0 points, too sleepy: 1 point, falls asleep: 2 points. Children with a total score of 42 and above from the questionnaire are considered to have clinically significant sleep problems. The Cronbach's alpha coefficient was found to be 0.78. The correlation coefficient between test-retest was found to be 0.81.

Statistical Analysis

SPSS (Statistical Package for Social Sciences) 26.0 package program was used in the analysis of the data. Percentage distribution, mean and total scores were used for descriptive statistics in the study. T-test and one-way Anova test and regression were used to analyze the effects of children's socio-demographic characteristics, eating behaviors and sleeping habits on obesity.

RESULTS

Of the children aged 6-12 years, 65.9% of the participants in the study were boys and 34.1% were girls. When analyzed according to age groups, 24.1% are 12 years old, 25.9% are 10-11 years old, 26.4% are 8-9 years old and 23.6% are 6-7 years old. 20.9% of the children study in kindergarten, 51.4% in primary school and 27.7% in secondary school (**Table 1**).

Table 1. Socio-demographic Findings

		n	%
Gender	Male	145	65.9
	Female	75	34.1
Age group	12 age	53	24.1
	10-11 age	57	25.9
	8-9 age	58	26.4
	6-7 age	52	23.6
Educational status	Kindergarten	46	20.9
	Primary education	113	51.4
	Secondary education	61	27.7
	Total	220	100.0

It is seen that the F value obtained as a result of the multiple regression analysis is significant (F (3, 2016)= 8.043; p<0.05). This result shows that the regression model of the relationship between children's sleep habits variable and uncontrolled eating, cognitive restriction and emotional eating behaviors is statistically significant. There is a significant relationship between children's sleep habits and cognitive restriction and emotional eating behaviors (p<0.05) (**Table 2**).

Table 2. Eating Behaviors and Sleep Habits Results

	B	Standard deviation	β	t	p	R2
Still	91.921	3.078		29.865	.000	0.10
Uncontrolled eating	-.173	.124	-.091	-1.390	.166	
Cognitive restriction	-.542	.210	-.168	-2.585	.010	
Emotional eating	-.399	.121	-.217	-3.306	.001	
F (3. 216)= 8.043 p=0.000						
Dependent variable: Children's sleeping habits						

As a result of the analysis, it was determined that the eating behavior averages according to age groups were similar to each other and there was no difference between the averages (p>0.05). As the age level increased, it was revealed that there was no difference between the average sleep habits of the children according to the age groups in which the sleep habits of the children were impaired (p>0.05) (**Table 3**).

As a result of the research, it was determined that girls' "uncontrolled and emotional eating" behaviors were higher than boys. On the other hand, it was determined that the "cognitive restriction" behaviors of girls, one of their eating behaviors, were higher than that of boys. It was determined that there was no difference between the mean eating behaviors of the children according to their gender (p>0.05) (**Tablo 4**).

As a result of the analysis, it is seen that the uncontrolled and emotional eating behaviors of primary and secondary school students are higher than kindergarten students. It was determined that there was no difference between the averages of uncontrolled and emotional eating behaviors according to the level of education (F=1.514; p>0.05: F=.631; p>0.05). It is seen that the cognitive restriction behavior of children studying in kindergarten is higher than that of primary and secondary school students. It was determined that there was no difference between the averages of cognitive restraint behavior according to the level of education (F=1.462; p>0.05) (**Tablo 5**).

Table 3. Results on eating behaviors and sleeping habits by age groups

Age groups	n	Average	Standard deviation	Total point	F	p
Uncontrolled Eating					1.108	.347
12 age	53	2.40	0.62	19.17		
10-11 age	57	2.58	0.56	20.63		
8-9 age	58	2.51	0.69	20.09		
6-7 age	52	2.41	0.58	19.25		
Total	220	2.48	0.62	19.81		
Cognitive restriction					.978	.404
12 age	53	2.16	0.91	6.49		
10-11 age	57	2.38	0.97	7.14		
8-9 age	58	2.33	0.96	6.98		
6-7 age	52	2.48	1.05	7.44		
Total	220	2.34	0.97	7.01		
Emotional eating					.097	.961
12 age	53	2.36	0.73	14.17		
10-11 age	57	2.41	0.81	14.44		
8-9 age	58	2.41	0.97	14.43		
6-7 age	52	2.45	0.88	14.71		
Total	220	2.41	0.85	14.44		
Total eating behaviors					.760	.518
12 age	53	2.34	0.42	39.83		
10-11 age	57	2.48	0.47	42.21		
8-9 age	58	2.44	0.58	41.50		
6-7 age	52	2.44	0.50	41.40		
Total	220	2.43	0.50	41.26		
Total sleep habit					.996	.396
12 age	53	2.44	0.26	80.53		
10-11age	57	2.41	0.27	79.42		
8-9 age	58	2.36	0.33	77.79		
6-7 age	52	2.37	0.27	78.06		
Total	220	2.39	0.28	78.94		

Table 4. Eating Behaviors and Sleeping Habits by Gender

Gender	n	Average	Standard deviation	Total point	t	p
Uncontrolled eating					-1.570	.118
Male	145	2.43	0.61	19.43		
Female	75	2.57	0.62	20.53		
Cognitive restriction					.585	.559
Male	145	2.37	0.96	7.10		
Female	75	2.28	1.00	6.85		
İmpressive eating					-1.801	.073
Male	145	2.33	0.79	13.99		
Female	75	2.55	0.95	15.29		
Total cost of eating					-1.797	.074
Male	145	2.38	0.45	40.52		
Female	75	2.51	0.57	42.68		
Total sleep habit					2.786	.006
Male	145	2.43	0.24	80.19		
Female	75	2.32	0.34	76.52		

Table 5. Results on Eating Behaviors and Sleeping Habits by Education Level

Educational status	n	Average	Standard deviation	Total point	F	p
Uncontrolled eating					1.514	.222
Kindergarten	46	2.36	0.58	18.89		
Primary education	113	2.54	0.63	20.33		
Secondary education	61	2.44	0.62	19.54		
Total	220	2.48	0.62	19.81		
Cognitive restriction					.241	.786
Kindergarten	46	2.39	0.99	7.17		
Primary education	113	2.35	1.01	7.06		
Secondary education	61	2.27	0.90	6.80		
Total	220	2.34	0.97	7.01		
Emotional eating					.631	.533
Kindergarten	46	2.31	0.81	13.87		
Primary education	113	2.47	0.93	14.80		
Secondary education	61	2.37	0.73	14.20		
Total	220	2.41	0.85	14.44		
Total eating behaviors					1.462	.234
Kindergarten	46	2.35	0.44	39.93		
Primary education	113	2.48	0.54	42.19		
Secondary education	61	2.38	0.46	40.54		
Total	220	2.43	0.50	41.26		
Total sleep habit					1.013	.365
Kindergarten	46	2.42	0.22	79.98		
Primary education	113	2.37	0.31	78.06		
Secondary education	61	2.42	0.28	79.77		
Total	220	2.39	0.28	78.94		

As a result of the analysis, it was revealed that the children with low uncontrolled eating behavior had high sleep habits, but there was no difference between their averages (t=1,276; p>0.05). It was determined that children with low cognitive restriction behavior had high sleep habits and those with high cognitive restriction eating behavior had low sleep habits, and there was a difference between the averages (t=5.219; p<0.05). It is seen that the rate of children (n=55) who deliberately restrict their food intake (cognitive restriction) in order to keep their body weight constant, to prevent weight gain or to lose weight (n=55) is low (25%). Based on this finding, the low level of conscious restriction indicates that it may be an important factor that increases the risk of obesity (**Tablo 6**).

Table 6. Results on the Effects of Eating Behaviors and Sleep Habits on Obesity

	n	Average	Standard deviation	Total point	t	p
Sleep habits						
Uncontrolled Eating					1.276	0.203
Low	180	2.40	0.26	79.32		
High	40	2.34	0.38	77.23		
Cognitive Restriction					5.219	0.000
Low	165	2.45	0.24	80.7394		
High	55	2.23	0.34	73.5273		
Emotional Eating					3.798	0.000
Low	158	2.44	0.24	80.40		
High	62	2.28	0.35	75.21		
Total eating behaviors					6.257	0.000
Low	191	2.44	0.24	80.36		
High	29	2.11	0.39	69.55		

DISCUSSION

According to the results of the National Nutrition and Health Survey in the United States (NHANES 2011-2012), there is no difference between the children in the 8-12 age group according to their age groups, and Aksoy et al. (20), the approach of parents with obese children to obesity and their children is consistent with our findings. Bozkurt et al. (21) in his study named the relationship between the nutritional status of school-age children and some biochemical parameters. According to TOÇBİ (22) research report; It has been determined that 14.3% of the children aged 6-10 years in Turkey are overweight and 6.5% are obese. In the Turkey Nutrition and Health Survey (TBSA) conducted by the Ministry of Health in 2010, it was determined that 14.3% of 2248 children aged 6-18 were overweight and 8.2% were obese. In a study conducted with 5026 children and adolescents in Isparta, 11.6% were found to be obese and 12.2% to be overweight (23). In the study conducted by Savaşhan et al. in 71 primary schools in 2015, the prevalence of obesity was 7.5% and the rate of overweight was 11.1% in 3963 children aged 6-11 years. İt was concluded that the longer the total sleep habits and the higher the age, the more positive the eating behaviors of the children. According to the results of this research; It was concluded that as total sleep habits increase and age increases, children's eating behaviors are more positive. It shows parallelism with our research findings.

In studies in which anthropometric measurements of children aged 3-6 years were made, it was stated that uncontrolled and eating behaviors were frequently observed in males (24-25). Remmers et al. (26) results of his study and Carnell and Wardle (27) based on obesity in children, and Weber et al.(28). According to the results of the United States National Health Screening, the prevalence of obesity in boys and girls in the 6-11 age group was 10.8% and 10.7%, respectively (Styne 2001). In a study conducted in Muğla, it was shown that 7.6% of female students and 9.1% of male students out of a total of 4260 (2040 female, 2220 male) children aged 6-15 were overweight or obese (30). The results of this study support the effect of nutrition and sleep habits on obesity in men.

Önal and Adal (31) In his study on childhood obesity, it was found that as the education level of children increases, their eating habits become irregular, while in the study of Den Wittenboer (12) the sleep habits of children are similar. A large-scale study of 2,241 Estonian and Swedish children found no link between sleep duration and eating behaviors and sleep habits (32) Our study supports these results. It was determined that as the level of education increased, there were irregularities in nutrition and sleep levels and the frequency of obesity (33%) was higher in adolescents who evaluated their school success as poor or moderate. Although not statistically significant in the study of Hermassi et al., (33), it was found in a study conducted with primary school children that normal-weight children had a higher risk of obesity as their education level in all academic fields increased Moon (34).

Kutluk et al. (35) in his study titled "An important nutritional problem in infants and children: anorexia; irregular eating habits increase the risk of obesity; concluded. In the study of Camcı (36) to determine the validity and reliability of the Child Feeding Questionnaire (CFQ) and to apply to Turkish parents, it was determined that children's eating habits affect the risk of obesity. Ek et al. (37) and our research findings are similar to the findings of his study. In studies conducted in China, Iran, and the Netherlands, A relationship was found between sleep duration and childhood obesity (38-39-40). This result is in parallel with our study. In the National Health and Nutrition Examination Survey, children who reported short (5-6 hours) and long (> 9 hours) sleep in the compared groups had greater food variety and lower energy intake in the group reporting 7 to 8 hours of sleep, not being able to eat healthy but to ready-made foods. It has been concluded that because they tend towards obesity, it affects the risk of obesity (41). In the study of Crispim et al.,(15) with 52 participants, it was revealed that consuming a high-calorie and carbohydrate-rich meal 30-60 minutes before bedtime causes late sleep. In addition to the amount of carbohydrates, it is argued that the glycemic index may also have a significant effect on sleep patterns and may be an obesity risk. As a result, the effects of the eating behaviors and sleep habits of children aged 6-12 years on obesity are in parallel with the studies and our research findings.

Study Limitations

Children between the ages of 6 and 12 were included in the study. Research results can only be generalized to the sample group in the study.

CONCLUSION

When the results of the research were evaluated in general, it was revealed that the relative importance of children's sleep habits was in the form of emotional eating and cognitive restriction. Sociodemographic, eating and sleeping habits variables were found to be significant predictors of obesity. Depending on the degree of eating behavior, it has been determined that children with a strong desire for food consumption without considering the consequences and losing control as a result of losing control have a high tendency to overeat and children who tend to eat are at risk of obesity.

In line with the results; the right steps should be taken and the right goals should be planned. Especially in children between the ages of 6-12, proper nutrition and sleep

habits should be gained. Proper nutrition and eating habits should not be given, and sleep training should be emphasized in the fight against obesity in children. It is recommended to carry out researches in order to prevent the risks and understand the importance of the mentioned areas in this field.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Hakkari University Scientific Research and Publication Ethics Committee (decision no: IRB:2022/54-1).

Informed Consent: Within the scope of the research, ethical unification was approved with the consent formula for children aged 6-12 and the informed consent formula from the family.

Referee Evaluation Process: Externally peer-reviewed.

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

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ORIGINAL ARTICLE
ORİJİNAL ARAŞTIRMA

Distribution of Agents and Evaluation of Antibiotic Sensitivity and Resistance in Urinary System Infections in Children: A Single Centre Experience

Çocuklarda Üriner Sistem Enfeksiyonlarında Etkenlerin Dağılımı ve Antibiyotik Duyarlılığı ve Dirençlerinin Değerlendirilmesi: Tek Merkez Deneyimi

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ABSTRACT

Aim: Urinary tract infections (UTIs) are one of the most common bacterial infections and potentially serious bacterial infection in childhood. We aimed to determine the common agents and antibiotic sensitivity and resistance status according to the results of urine culture in children diagnosed with UTI.

Material and Method: In this retrospective study, we evaluated causative agents and antimicrobial sensitive and resistance in positive urine isolates from the children admitted to our hospital's Pediatrics Clinic between January 2017 and August 2022.

Results: A total of 702 urine cultures were positive, of which 239 (34%) were boys and 463 (66%) were girls. The median age of the patients was 1.1 years (interquartile range, 5.4). The four most frequently detected microorganisms in urine cultures were *Escherichia coli* (52.3%), *Klebsiella pneumoniae* (16.1%), *Enterococcus faecalis* (7.8%) and *Proteus mirabilis* (6.4%), respectively. *Escherichia coli* (9.7% vs. 42.6%) and Klebsiella pneumoniae (8.3% vs. 7.8%) were the two most common uropathogens both in boys and girls. *Escherichia coli* and *Klebsiella pneumoniae* were highly resistant to ampicillin and 3rd generation cephalosporins, while highly sensitive to aminoglycosides, meropenem and imipenem.

Conclusion: In our study, in consistent with the literature, Escherichia coli was found to be the most common uropathogen in children with urinary tract infection. We suggest that when arranging the treatment of children with urinary tract infections in our region, antibiotic resistance should be considered.

Keywords: Antibiotic resistance, children, *Escherichia coli*, urine culture, urinary tract infection

ÖZ

Amaç: Üriner sistem enfeksiyonları, çocukluk çağında en sık görülen ve potansiyel olarak ciddi bakteriyel enfeksiyonlardan biridir. İdrar yolu enfeksiyonu tanısı alan çocuklarda idrar kültürü sonuçlarına göre sık görülen etkenleri ve antibiyotik duyarlılık ve direnç durumlarını belirlemeyi amaçladık.

Gereç ve Yöntem: Bu retrospektif çalışmada, Ocak 2017-Ağustos 2022 tarihleri arasında hastanemiz Çocuk Kliniği'ne başvuran çocuklardan alınan idrar izolatlarında etken maddeler ile antimikrobiyal duyarlılık ve direnç pozitifliği değerlendirildi.

Bulgular: Hastaların 239 (%34)'u erkek, 463 (%66)'ü kız olmak üzere toplam 702 idrar kültüründe pozitiflik saptandı. Hastaların ortanca yaşı 1,1 idi (çeyrekler arası aralık, 5,4). İdrar kültürlerinde en sık saptanan dört mikroorganizma sırasıyla *Escherichia coli* (%52,3), *Klebsiella pneumoniae* (%16,1), *Enterococcus faecalis* (%7,8) ve *Proteus mirabilis* (%6,4) idi. *Escherichia coli* (%9,7'ye karşı %42,6) ve *Klebsiella pneumoniae* (%8,3'e karşı %7,8) hem erkeklerde hem de kızlarda en yaygın iki üropatojendi. *Escherichia coli* ve *Klebsiella pneumoniae* ampisilin ve 3. kuşak sefalosporinlere karşı oldukça dirençli iken, aminoglikozidler, meropenem ve imipenem'e karşı oldukça duyarlı idi.

Sonuç: Çalışmamızda literatürle uyumlu olarak idrar yolu enfeksiyonu geçiren çocuklarda en sık üropatojenin Escherichia coli olarak saptandı. Bölgemizde idrar yolu enfeksiyonu olan çocukların tedavisi düzenlenirken antibiyotik direncinin göz önünde bulundurulmasını öneriyoruz.

Anahtar Kelimeler: Antibiyotik direnci, çocuklar, *Escherichia coli*, idrar kültürü, idrar yolu enfeksiyonu

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INTRODUCTION

Urinary tract infections (UTIs) are one of the most common bacterial infections and potentially serious bacterial infection in childhood, affecting around 1.7% of boys and 8.4% of girls before the age of 7 years. They account for 5% to 14% of pediatric emergency department visits (1-3). During the first year of life UTIs affect boys and girls equally, but after that age most cases occur in girls (4). As the microorganism enters the urinary system, some children excrete the bacteria in the urine without any symptoms, some have cystitis characterized by inflammation in the bladder mucosa, and very few children have a febrile UTI due to the systemic activation of the inflammatory process. *Escherichia coli* is the most common bacterium causing urinary infection and this bacteria was followed by *Klebsiella pneumoniae*, *Proteus mirabilis*, *Enterococcus faecalis*, and *Pseudomonas aeruginosa*. *Escherichia coli* have *P. fimbriae*, which facilitates the formation of infection and prevents its excretion with the urine. The laboratory evaluation for suspected UTI includes urine dipstick and microscopic analysis and urine culture. Non-adherent bacteria, on the other hand, can cause urinary infection in children with renal malformations such as abnormal urine flow and post-void residual urine (5).

UTIs are problematic to diagnose in young children. The most important difficulties are the absence of specific findings at this age, the inability to collect uncontaminated urine samples. However, since UTI is accompanied by specific symptoms after infancy, it is easily diagnosed and treated (5,6). The NICE guideline states that all infants and children with an unexplained fever of ≥38°C lasting more than 24 hours should be considered for a UTI, as well as non-specific findings such as fever, lethargy, irritability, malaise, vomiting, malnutrition, abdominal pain, jaundice and growth retardation, or especially in older children. Emphasizes the need for urinalysis in the presence of signs and symptoms suggestive of UTI such as pollakiuria, dysuria, haematuria, flank pain, drip and cloudy urination (7). On the other hand, the AAP guideline states that the clinician should consider a UTI in a febrile infant who does not have a source of infection and requires antibiotic treatment due to the patient's appearance (8). UTI is defined as upper and lower UTI according to the region of the urinary system; Upper UTI (pyelonephritis) is an infection of the kidneys, collecting system and ureters while lower UTI is an infection of the bladder and urethra (5).

Acute complications of UTI are like to those associated with any febrile illness in a young child. These include dehydration, electrolyte abnormalities, and febrile seizures. Renal complications of acute pyelonephritis are uncommon in otherwise healthy children but may include renal abscess or complete occlusion of a pre-existing, partial ureteropelvic junction obstruction. Acute kidney injury may occur because of dehydration or an administration of a nonsteroidal anti-inflammatory drug. Urosepsis also may occur, particularly with Gram-negative infections. The most consequential long-term complication of acute pyelonephritis is renal scarring (9). UTIs can lead to permanent renal injury. Recurrent UTIs lead to chronic kidney disease, hypertension, and ultimately end-stage renal disease (10). Renal insufficiency is a well-known complication, either from pyelonephritis per se, a pre-existing congenital renal anomaly which predisposes the child to UTI. Quantitative urine culture is the gold standard for the diagnosis of UTI (4). Today, prompt antibiotic therapy to prevent of acute complications as well as renal scarring is indicated for symptomatic UTI based on clinical findings and positive urinalysis while waiting for the culture results (9). The antibiotic may have to be adjusted based on the response to treatment and sensitivity testing of the isolated pathogen (4). The choice of antibiotics should take into consideration local data of antibiotic resistance patterns.

UTIs show etiological changes according to gender, age and region. Thus, regional studies of different time periods are increasingly important. Nowadays, the identification of etiological agents and the detection of antibiotic sensitivity and resistance are very critical in the selection of empirical antibiotics to be used in treatment. Therefore, in our study we aimed to determine the common agents and antibiotic sensitivity and resistance status according to the results of urine culture in children diagnosed with urinary tract infection.

MATERIAL AND METHOD

Data were obtained retrospectively in the hospital automation system, with a diagnosis of UTIs in children 0-18 years of age who were admitted to our hospital's Pediatrics Clinic between January 2017 and August 2022. UTI was defined with suggestive symptoms of UTI and results of urinalysis and urine culture. Automated urinalysis was done with flow cytometry. Results of urinalysis were recorded for nitrite positivity, leukocyte esterase positivity, and pyuria. Pyuria was defined as >10 leukocyte/mL. Urine culture with growth of a single organism was defined as UTI. Patients who were thought to be contaminated as a result of urine culture and had missing data were not included in the data analysis. The subjects' gender, ages, species that grew in urine culture, and antibiotic resistance/sensitivities were recorded. Midstream urine samples or clean urine samples collected in urine drainage bags for age were used for urine culture. Midstream or bladder-collected clear urine specimens seeded with 0.01ml capacity

sterile ring loop on 5% sheep blood agar (BD BBL™ Ready-to-Use Media and RTA) and eosin methylene blue medium (BD BBL™ Ready-to-Use Media and RTA), Plates with pure bacterial growth were incubated for at least 24 hours at 37° C temperature. More than 1000 colonies (cfu/mL) and single microorganism growth were accepted as positive culture in suprapubic aspiration and more than 100 000 colonies (cfu/mL) in other samples. UNMIC Combo panels and BD BACTEC FX 40 (FF1988 BD COMPANY USA) device were used for identification of overgrown bacteria and determination of antibiotic susceptibility. The European Committee on Antimicrobial Susceptibility Testing – EUCAST guidelines were used to evaluate the results. The patients were divided into two age groups: children less than 5 years of age and children 5 years of age and older. Ethics committee approval for our study was obtained from the ethics committee of Karatay University Medical Faculty Hospital (approval number 2023/007).

Statistical Analysis

Statistical analyzes in our study were performed using the Statistical Package for Social Sciences (SPSS) version 22 (IBM Corp. Armonk, NY, USA) program. Kolmogorov Smirnov and Shapiro Wilk tests were used to check whether the numerical measurements in the study group provided the assumption of normal distribution. In descriptive statistics, mean±standard deviation was used for parametric data if it fit the normal distribution, or median (interquartile range, (IQR)) if it did not fit the normal distribution, and frequency and percentage values were used for categorical data. Pearson chi-square test was used to compare categorical measures between groups. In the comparison of parametric measurements between the groups, the independent groups T test was used for the variables conforming to the normal distribution, and the Mann Whitney U test was used for the variables not conforming to the normal distribution of the groups. Significance level was accepted as $p<0.05$.

RESULTS

Demographic data of patients and percentage of microorganisms in urine culture

A total of 702 urine samples in which bacterial growth was detected were included in data analysis. The 239 (34%) patients were boy and 463 (66%) patients were girl. While the mean age of the patients was 3.20±3.80 years (median, 1.1 years, IQR 5.4), the mean age of the boys was 1.04±1.87 years (median, 0.4 years, IQR, 0.9) and the mean age of the girls was 4.31±4.05 years (median, 1.1 years, IQR, 6.8). When considering of gender, the mean age of girls was significantly higher than those of boys ($p<0.0001$). The distribution of microorganisms grew in urine culture was shown in **Table 1** and **Figure 1**.

Table 1: Distribution of microorganisms grew in urine culture in all patients

Microorganisms	n	%
Escherichia coli	367	52,3
Klebsiella pneumoniae	113	16,1
Klebsiella oxytoca	37	5,3
Proteus mirabilis	45	6,4
Enterococcus faecalis	55	7,8
Enterococcus faecium	17	2,4
Enterobacter cloacae	12	1,7
Pseudomonas aeruginosa	10	1,4
Staphylococcus epidermidis	23	3,3
Serratia liquefaciens	1	0,1
Serratia marcescens	2	0,3
Enterobacter aerogenes	8	1,1
Citrobacter youngae	2	0,3
Citrobacter freundii	3	0,4
Citrobacter koseri	4	0,6
Citrobacter amalonaticus	1	0,1
Citrobacter braakii	1	0,1
Acinetobacter baumannii	1	0,1
Total	702	100,0

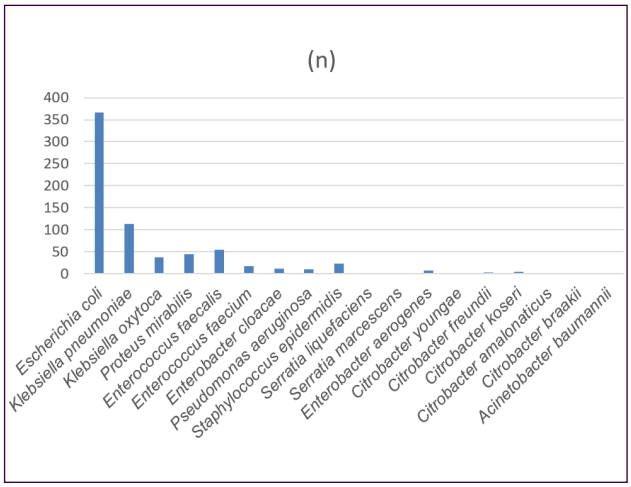

Figure 1. It shows distribution of microorganisms grew in urine culture

The four most frequently detected microorganisms in urine cultures were *Escherichia coli* (52.3%), *Klebsiella pneumoniae* (16.1%), *Enterococcus faecalis* (7.8%) and *Proteus mirabilis* (6.4%), respectively.

Percentage of microorganisms in urine culture distribution by gender

Escherichia coli (9.7% vs. 42.6%) and *Klebsiella pneumoniae* (8.3% vs. 7.8%) were the two most common uropathogens both in boys and girls. When considering of gender, *Escherichia coli* was found to be statistically significantly higher in girls than in boys ($p:<0.0001$). Distribution of microorganisms grew in urine culture by gender was shown in **Table 2** and **Figure 2**.

Table 2: Distribution of microorganisms grew in urine culture by gender

Gender	Boy		Girl	
Microorganisms	**n**	**%**	**n**	**%**
Escherichia coli	68	9,7%	299	42,6%
Klebsiella pneumoniae	58	8,3%	55	7,8%
Klebsiella oxytoca	25	3,6%	12	1,7%
Proteus mirabilis	21	3,0%	24	3,4%
Enterococcus faecalis	30	4,3%	25	3,6%
Enterococcus faecium	4	,6%	13	1,9%
Enterobacter cloacae	7	1,0%	5	,7%
Pseudomonas aeruginosa	0	0,0%	10	1,4%
Staphylococcus epidermidis	14	2,0%	9	1,3%
Serratia liquefaciens	1	,1%	0	0,0%
Serratia marcescens	2	,3%	0	0,0%
Enterobacter aerogenes	4	,6%	4	,6%
Citrobacter youngae	1	,1%	1	,1%
Citrobacter freundii	0	0,0%	3	,4%
Citrobacter koseri	2	,3%	2	,3%
Citrobacter amalonaticus	1	,1%	0	0,0%
Citrobacter braakii	1	,1%	0	0,0%
Acinetobacter baumannii	0	0,0%	1	,1%
Total	239	34,0%	463	66,0%

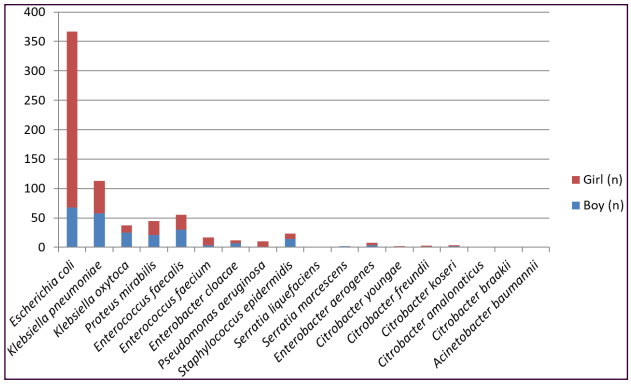

Figure 2. It shows distribution of microorganisms grown in urine culture by gender.

Distribution of microorganisms grown in urine culture by age

Escherichia coli and *Klebsiella pneumoniae* were the most common microorganisms in children less than 5 years of age. When considering of age groups, *Escherichia coli* and *Klebsiella pneumoniae* was found to be statistically significantly higher in children less than 5 years of age than in children older than 5 years (p:<0.0001 for both). Percentage of microorganisms grew in urine culture by age groups was presented in **Table 3** and **Figure 3**.

Antibiotic sensitivity and resistance rates of microorganisms

According to the antibiogram results for *Escherichia coli*, antibiotic resistance rates were approximately 65% to ampicillin, 45% to ceftazidime, 34% to cefixime, and 30% to ceftriaxone, respectively, whereas these rates were 12% to gentamicin, 1.1% to amikacin, 0.5% to meropenem and 0.3% to imipenem. *Klebsiella pneumoniae*'s antibiotic resistance rates were approximately 99% to ampicillin, 60% to ceftazidime, 48% to cefixime, and 41% to ceftriaxone, respectively, whereas these rates were 18% to gentamicin, 6% to amikacin, 3.6% to meropenem and 2.7% to imipenem. *Enterococcus faecalis*'s antibiotic resistance rates were 5% (3/55) to ampicillin and 16.7% (3/18) to ciprofloxacin, respectively.

Table 3: Distribution of microorganisms grew in urine culture by age groups

Gender	Children under 5 years of age		Children ≥5years of age	
Microorganisms	**n**	**%**	**n**	**%**
Escherichia coli	208	29,6%	159	22,6%
Klebsiella pneumoniae	105	15,0%	8	1,1%
Klebsiella oxytoca	36	5,1%	1	,1%
Proteus mirabilis	32	4,6%	13	1,9%
Enterococcus faecalis	44	6,3%	11	1,6%
Enterococcus faecium	12	1,7%	5	,7%
Enterobacter cloacae	12	1,7%	0	0,0%
Pseudomonas aeruginosa	10	1,4%	0	0,0%
Staphylococcus epidermidis	16	2,3%	7	1,0%
Serratia liquefaciens	1	,1%	0	0,0%
Serratia marcescens	2	,3%	0	0,0%
Enterobacter aerogenes	8	1,1%	0	0,0%
Citrobacter youngae	1	,1%	1	,1%
Citrobacter freundii	3	,4%	0	0,0%
Citrobacter koseri	3	,4%	1	,1%
Citrobacter amalonaticus	1	,1%	0	0,0%
Citrobacter braakii	1	,1%	0	0,0%
Acinetobacter baumannii	1	,1%	0	0,0%
Total	496	70,7%	206	29,3%

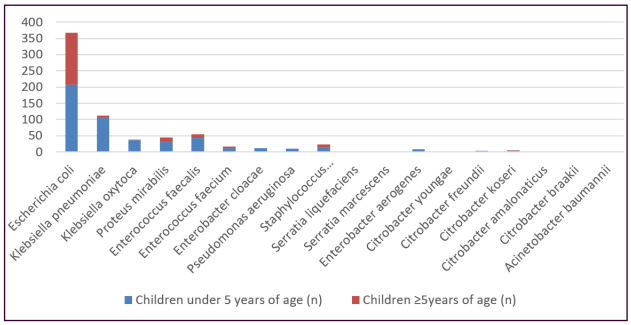

Figure 3. It shows distribution of microorganisms grew in urine culture by age groups.

Proteus mirabilis's antibiotic resistance rates were 56% (24/43) to ampicillin and 35.6% (16/45) to gentamicin, 15.4% (2/13) to imipenem, respectively whereas these rates were 0% (0/23) to ceftazidime, 0% (0/44) to meropenem 2.3% (1/43) to ceftriaxone 4.4% (2/45) to amikacin and 6.7% to cefixime (3/33). The sensitivity and resistance rates of *Escherichia coli* and *Klebsiella pneumoniae* obtained from urine cultures to various antibiotics was shown in **Table 4** and **Figure 4**.

Table 4: The sensitivity and resistance rates of *Escherichia coli* and *Klebsiella pneumoniae* obtained from urine cultures to various antibiotics

Antibiotics	*Escherichia coli*				*Klebsiella pneumoniae*			
	Sensitive (n)	Resistance (n)	Total (n)	Resistance rate (%)	Sensitive (n)	Resistance (n)	Total (n)	Resistance rate (%)
Ampicillin	129	236	365	64,7%	1	112	113	99,1%
Amikacin	361	4	365	1,1%	106	7	113	6,2%
Ceftazidime	126	101	227	44,5%	29	43	72	59,7%
Cefixime	215	110	325	33,8%	52	47	99	47,5%
Ciprofloxacin	325	42	367	11,4%	93	20	113	17,7%
Ceftriaxone	258	108	366	29,5%	66	46	112	41,1%
Fosfomycin	152	4	156	2,6%	59	3	62	4,8%
Nitrofurantoin	317	5	322	1,6%	25	4	29	13,8%
Gentamicin	322	45	367	12,3%	93	20	113	17,7%
Imipenem	365	1	366	0,3%	110	3	113	2,7%
Levofloxacin	157	23	180	12,8%	45	12	57	21,1%
Meropenem	362	2	364	0,5%	108	4	112	3,6%
Tobramycin	155	23	178	12,9%	44	11	55	20,0%

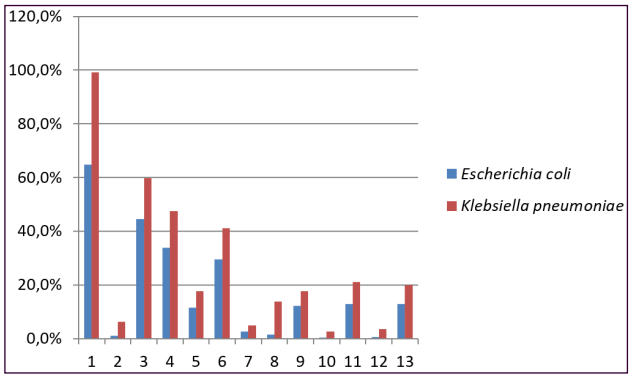

Figure 4: It shows antibiotic resistance rates of *Escherichia coli* and *Klebsiella pneumoniae*

1: Ampicillin, 2: Amikacin, 3: Ceftazidime, 4: Cefixime, 5: Ciprofloxacin, 6: Ceftriaxone, 7: Fosfomycin, 8: Nitrofurantoin, 9: Gentamicin, 10: Imipenem, 11: Levofloxacin, 12:Meropenem, 13:Tobramycin

DISCUSSION

It is known that *Escherichia coli* is the most common pathogen, responsible for approximately 80-90% of pediatric UTIs (2,3). *Klebsiella* (6%–7%), *Proteus* (5%–12%), *Enterococcus* (3%–9%), and *Pseudomonas* (2%–6%) are other common causative organisms in UTIs (1). Several studies have demonstrated that although *Escherichia coli* is the most frequent causative organism at all ages independent of patient demographic characteristics, it is more often found in females, while *K. pneumoniae* and *P. mirabilis* are more common in males (11). In our study, we showed that the most common uropathogen was *Escherichia coli* with a rate of 52%, consistent with the literature. The frequency of UTI was almost twice as common in girls as boys. The fact that the median age was higher in girls than in boys and when considering of gender, we found a statistically significant difference, it shows that UTI is more common at an earlier age in boys, as in the literature.

Antibiotic resistance for UTI-related bacterial pathogens continuously rises, making the definition of the best empiric antibiotic therapy is more difficult (11). Therefore, the choice of an antimicrobial for empirical therapy should be guided by the local, resistant patterns of pathogens (3,9). In recent years, the incidence of uropathogen resistance to commonly used antibiotics for paediatric UTI has increased worldwide. In a single paediatric institution from 2009 to 2014, Erol et al. showed that *Escherichia coli* resistance during the study period increased for ampicillin from 47.1% to 89%, for trimethoprim-sulphamethoxazole from 44.8% to 56% (12).

Several factors can explain the development of antibiotic resistance and its progressive increase, mainly the inappropriate use of these drugs. Antibiotics are among the drugs most commonly prescribed to children in hospital and community settings. Regarding UTIs, one of the most common causes of microbial selection and emergence of resistance is the administration of antibiotics for prophylaxis in children with recurrent UTI episodes, especially when a structural or functional abnormality of the urinary tract has been diagnosed. Usually, recent studies in children with UTI have shown that *Escherichia coli* was the pathogen with the highest incidence of antibiotic resistance and that the production of extended-spectrum beta-lactamases (ESBL) was the most common cause of this emerging phenomenon, although with differences among countries and within the same country (11). In our study, we showed that *Escherichia coli* and *Klebsiella pneumoniae* were highly sensitive both meropenem and imipenem.

The choice of antibiotics depends on resistance patterns in a given institution or region. Cephalosporins and amoxicillin–clavulanic acid are the oral antibiotics most often used. When intravenous treatment is required, no particular antibiotic has been shown to be superior; cephalosporins and aminoglycosides are frequently recommended for UTIs in children (13,14).

The reported rates of microorganisms involved in the ethology of urinary tract infection and the rates of antibiotic sensitivity and resistance vary according to international and national studies. A study by Guidoni et al. at Santa Casa University Hospital of São Paulo from August 1986 to December 1989 and August 2004 to December 2005 in which 257 children were included, *Escherichia coli* was detected at a rate of 77% and high resistance was observed with 55% to ampicillin, while low resistance was reported to 3rd generation cephalosporins with 5%, aminoglycosides 2% and ciprofloxacin 4% (15). However, in our study, we showed that *Escherichia coli* and *Klebsiella pneumoniae* were highly resistant to ampicillin and 3rd generation cephalosporins, while highly sensitive to aminoglycosides. This may be due to the increase in antibiotic resistance over the years.

In a recent study by Vazouras et al. in Greece from August 2010 to September 2015 involving 230 children, the most common microorganism detected in urine culture was *Escherichia coli* (79.2%), followed by *Klebsiella* spp. (7.2%), *Proteus* spp. (5.1%) and *Pseudomonas aeruginosa* (4.7%). In their studies, a high rate of resistance to ampicillin (42.0%) was reported for *Escherichia coli*, while a lower rate of resistance to third-generation cephalosporins (1.7%), nitrofurantoin (2.3%), ciprofloxacin (1.4%) and amikacin (0.9%) (16).

A comprehensive study by Edlin et al. in 2009, using data from 195 United States hospitals including 25,418 children showed that the most common agents detected in urine cultures were *Escherichia coli*, *Proteus mirabilis*, *Klebsiella*, Enterobacter, *Pseudomonas aeruginosa* and *Enterococcus*. In this study, *Escherichia coli* was found to be significantly higher in girls (83%) than in boys. Results of their study found that resistance in *Escherichia coli* was highest for ampicillin (45%) and trimethoprim-sulfamethoxazole (24%), while it was lower for gentamicin (4%), cefuroxime (2%) and ceftriaxone (less than 1%). For *Klebsiella*, resistance to ampicillin was high with 81%, while resistance to cefuroxime 7%, gentamicin 3% and imipenem less than 1% was reported (17).

In a recent study by Gunduz et al. from September 2014 to April 2016 in a single hospital in Ankara, in which 850 positive urine cultures were included, the most common microorganisms were *Escherichia coli* (64.2%), *Klebsiella pneumoniae* (14.9%), *Enterococcus* (5.4%), *Klebsiella oxytoca* and *Proteus mirabilis* (3.9%) and Enterobacter spp. (1.8%). In their study when for *Escherichia coli*, resistance to amikacin (0.2%) and ceftriaxone (2.7%) was quite low for *Klebsiella pneumoniae*, resistance to gentamicin (16.5%) and ceftriaxone (1.1%) (18).

A study of 158 children by Konca et al. at the Pediatric Polyclinics of Adiyaman University between August 2013 and August 2014 showed that *Escherichia coli* (60.1%) and *Klebsiella* spp.(16.5%) were the most common pathogens. In their study, *Escherichia coli* isolates were most susceptible to amikacin (100%), meropenem (100%), imipenem (97.9%), and gentamicin (95.8%). *Escherichia coli* isolates had the highest resistance rate to ampicillin/sulbactam (56.4%), and cefixime (36.8%), respectively. The *Klebsiella* isolates had a high sensitivity to imipenem (100%), amikacin (100%) and imipenem (100%). *Klebsiella* spp. had the highest resistance to ampicillin/sulbactam (78.3%), cefixime (53.8%), cefuroxime sodium (47.6%), and ceftriaxone (38.4%) (19). The reason why our study results differ from these results may be due to different geographical regions and different years.

In a study by Yilmaz et al., according to the results of 1373 urine cultures, growth was detected the most common uropathogens were *Escherichia coli* 940 (68.5%); *Proteus* spp, 183 (13.3%); *Enterococcus* spp, 65 (4.7%); *Klebsiella* 62 (4.5%) and *Pseudomonas aeruginosa* 21 (1.5%). In this study, the highest resistance rates of *Escherichia coli* and *Proteus* spp. were to trimethoprim-sulfamethoxazole (37% and 45%, respectively) and the highest resistance rate of *Klebsiella* spp. was to ampicillin-sulbactam (39%) followed by trimethoprim-sulfamethoxazole (38%) (20). Antibiotic resistance should be considered when starting antibiotic prophylaxis in recurrent UTIs.

The strength of our study was that it included a large number of children over a 5-year period. However, due to the retrospective nature of the study, we could not obtain precise information on the use of antibiotics and the clinical. Also, data on underlying diseases, whether it is recurrent or not, were not collected.

CONCLUSION

In our study, *Escherichia coli* was the most common uropathogen in children with UTIs. *Escherichia coli* was also found to be statistically significantly higher in girls than in boys. *Escherichia coli* and *Klebsiella pneumoniae* were the most common pathogens in children under 5 years of age. In our study, we showed that *Escherichia coli* and *Klebsiella pneumoniae* were highly resistant to ampicillin and 3rd generation cephalosporins, while highly sensitive to aminoglycosides, meropenem and imipenem. We believe that in the treatment of children who are thought to have UTI in our region, treatment should be arranged by taking these results into account.

ETHICAL DECLARATIONS

Ethics Committee Approval: Ethics committee approval for our study was obtained from the Ethics Committee of Karatay University Medical Faculty Hospital (approval number 2023/007).

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

Referee Evaluation Process: Externally peer-reviewed.

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

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REVIEW
DERLEME

Çocuklarda Q Ateşi Konulu Literatürün Derlemesi

Review of the Literature on Q Fever in Children

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Öz

Q ateşi *Coxiella burnetii* 'nin etkeni olduğu, ülkemizde uzun yıllardır bilinen, zaman zaman salgınlara yol açabilen zoonotik bir hastalıktır. Bu derleme çalışmasında Q ateşinin epidemiyolojisi, klinik belirtileri, semptomlarını, tanı ve tedavisini özetlemekte, ayrıca bu hastalığın çocuklardaki tutulumlarına yönelik literatürün gözden geçirilmesini hedeflemektedir. Dünya genelinde çocuk vaka bildirimleri ve seroprevelans çalışmaları özellikle son 20 yılda artmıştır. Ülkemizden ise çocuklara Q ateşini araştıran seroprevelans çalışmasına ulaşılamadı. Türkiye Q ateşinin görülebildiği ülkeler arasındandır. Ülkemiz çocuklarında (hasta grupları, risk grupları ve sağlam popülasyonda) Q ateşi seroprevelansını araştıran ve klinik çalışmalara ihtiyaç duyulmaktadır.

Anahtar Kelimeler: *Coxiella burnetii*, çocuk, çocuklar, pediyatrik, Q ateşi

ABSTRACT

Q fever is a zoonotic disease caused by *Coxiella burnetii*, which has been known for many years in our country and can cause epidemics from time to time. This review summarizes the epidemiology, clinical signs, symptoms, diagnosis and treatment of Q fever, and also aims to review the literature on the involvement of this disease in children. Child case reports and seroprevalence studies have increased worldwide, especially in the last 20 years. A seroprevalence study investigating Q fever in children from our country could not be reached. Türkiye is among the countries where Q fever can be seen. There is a need for clinical studies investigating the seroprevalence of Q fever in children (patient groups, risk groups and healthy populations) in our country.

Keywords: *Coxiella burnetii*, child, children, pediatric, Q fever

GİRİŞ

Q ateşi, *Coxiella burnetii* (*C. burnetii*)'nin etkeni olduğu, neredeyse dünya çapında bir dağılıma sahip olan bir zoonozdur (1,2). *C. burnetii*, Gram negatif bir bakteri olup, standart mikrobiyolojik kültürlerde üretilemez. Sadece asitleştirilmiş bir ortamda çoğalan, lizozom benzeri bir vakuol oluşturan, yüksek enfeksiyon kapasitesine sahip zorunlu hücre içi patojendir (3). Hastalığa yönelik farkındalık ve daha yeni tanı yöntemleri, erişkin ve çocuklarda çeşitli veya birden fazla semptomu olan olgularda tanı ve tespitin artmasına neden olmuştur (2). Bununla birlikte, yayınlanan literatürün çoğunluğu yetişkinlerin hastalığına odaklanmaktadır. Çocuklarda Q ateşi literatürde yetersiz bir şekilde sunulmuştur.

Bu derleme çalışmasında Q ateşinin epidemiyolojisi, klinik belirtileri, semptomlarını, tanı ve tedavisini özetlemekte, ayrıca bu hastalığın çocuklardaki tutulumlarına yönelik literatürün gözden geçirilmesini hedeflemektedir.

Epidemiyolojisi ve bulaş yolları

Hastalık ilk olarak 1937'de Avustralya'da tanımlanmıştır (4). Bu ilk tanımdan bu yana, bu patojen ve onunla ilişkili enfeksiyonlar hakkında bilgi önemli ölçüde artmıştır (1,4). Q ateşi dünya çapında bulunabilir, ancak bu hastalığın epidemiyolojik özellikleri, endemik veya hiperendemik olduğu durumlar ve büyük salgın salgınların mey-

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dana geldiği durumlar da dahil olmak üzere ele alınan coğrafi bölgeye göre değişir (4). Hastalığın farkındalığı ve daha yeni tanı yöntemleri, olağandışı belirtilerin tanınmasının artmasıyla sonuçlanmıştır (1). Çiftlik hayvanları, vahşi hayvanlar ve keneler başlıca rezervuarlardır (1-3). İnsanlara bulaşma, genellikle, enfeksiyon kaynağından uzağa rüzgarla taşınabilen kontamine aerosollerin solunması yoluyla olur (1,2). Çiftlik veya vahşi hayvanlarla yakın ilişkisi olan meslek grupları en fazla risk altındadır (1,4). Enfekte hayvanlardan elde edilen süt ürünlerinin tüketimi insanlarda gıda kaynaklı Q ateşine yol açabileceğini öne süren çalışmacılar da vardır (3). Enfekte bir kadının doğum çıktıları ile (kadın doğum uzmanında) teması takiben ve transplasental, kan ve cinsel yolla bulaşan insan vakaları bildirilmiştir (2).

Orta Doğu'daki savaşlar (5) ve tropik bölgelerdeki araştırmalar (6,7), Q ateşinin tropikal bölgelerde çok yaygın bir ateş nedeni olabileceğini göstermiştir. Son olarak, Hollanda'da çok büyük bir salgın olmuş ve bu salgın bu hastalığın önemli bir halk sağlığı sorunu haline gelebileceğini göstermiştir (8).

Ülkemizdeki Durum

Türkiye'de 1940-1950'li yıllardan itibaren Q ateşinin insanlarda ve hayvanlarda endemik olduğu bildirilmektedir (9-11). 2002 yılında yapılan bir çalışmada (12) bir Q ateşi salgınının meydana geldiği Samsun Tekkeköy'de (Türkiye'nin kuzeyi) seroprevalansı değerlendirilmiştir. Bu kesitsel çalışmada denekler rastgele orantılı örnekleme yöntemiyle seçilen, spesifik semptomlar olmadan sağlıklı olan 407 kişi değerlendirilmiş ve 33'ü (%8,1) geçmişte enfeksiyon kanıtı olarak tanımlandı ve 22'si (%5,4) Q ateşinin evrimsel formu (17 akut ve beş kronik form) olarak kabul edilmiştir. Seroprevalans, 30 yaş üstü kişilerde, avcılarda diğer kişilere göre anlamlı olarak daha yüksek (sırasıyla p=0.001, p=0.034 ve p=0.006) saptanmıştır. Sağlıklı denekler arasında ise %13,5 oranında seropozitiflik bulunmuştur. Bu çalışma Türkiye'nin kuzeyinde Q ateşinin yaygın olduğunu ve genellikle asemptomatik olduğunu doğrulamıştır (12). Karabay ve ark. (13) çalışmasında ise, Türkiye'nin Karadeniz bölgesinin batısında yer alan Bolu ilinin kırsal kesiminde yaşayan sağlıklı kişilerde *C. burnetii* seroprevalansı %20,8 olarak bulunmuştur. 2000–2001 yılları arasında Antalya, Diyarbakir ve Samsun illerinde sağlıklı kişiler arasında yapılan benzer bir çalışmada deneklerin %1,8'inde *C. burnetii* seropozitifliği saptanmıştır (14).

Ülkemizde sırasıyla 1948 ve 2002 yıllarında Orta Anadolu (Ozancık) ve Karadeniz bölgesinde olmak üzere iki salgın meydana gelmiştir (11,15,16). Ayrıca son yıllarda ülkemizden sporadik vakalar da bildirilmiştir (17-21).

Klinik Sendromlar

Hastalık, asemptomatik enfeksiyondan ölümcül hastalığa kadar uzanan geniş bir klinik belirti ve semptom yelpazesi ile ilişkilidir (2,3). Tipik olarak, iki klinik sunum vardır: hastaların %60-95'i kadarında saptanan akut hastalık (sıklıkla asemptomatik) ve hastaların %4-5'inde saptanan kalıcı fokal enfeksiyon (3). Q ateşi hem akut hem de kronik formda kendini gösterir. Akut enfeksiyonlar büyük ölçüde kendi kendini sınırlayan ateşli hastalıklardır, ancak belirli salgınlarda hastaneye yatış oranları %20'nin üzerinde olabilir (2). Q ateşinin sık klinik belirtileri arasında grip benzeri hastalık, pnömoni, hepatit ve endokardit bulunur (22).

Çeşitli çalışmalarda, *C. burnetii*'nin birincil enfeksiyonundan sonra, hastaların yaklaşık %60'ının asemptomatik olduğu ve geri kalanında ateş ve değişen derecelerde pnömoni veya hepatit görüldüğü bildirilmiştir (23,24). *C. burnetii* enfeksiyonunun klinik tutulumu, hem enfekte eden *C. burnetii* suşunun virülansına hem de enfekte hastadaki spesifik risk faktörlerine bağlıdır (4). Kalp kapak hastalığı, vasküler anevrizma/greftler ve maligniteler gibi risk faktörlerine sahip hastalarda kalıcı enfeksiyon riskine yol açar (25).

Hepatit ve pnömoni gibi akut Q ateşinin başlıca klinik belirtileri ülkeler arasında farklılık gösterir. Hepatit Fransa, Güney İspanya ve Tayvan'da pnömoniden daha sık görülmektedir (26,27). Heo ve ark. (28) çalışmasında hepatit, akut Q ateşinin en yaygın özelliği olmasına rağmen, bu hastalarda AST ve ALT konsantrasyonları sadece orta derecede yükselmiştir (üst normal limitlerden 2-3 kat daha yüksek). Ayrıca bu çalışmada, *C. burnetii* enfeksiyonunun bir otoimmün mekanizmayı indükleyip indüklemediği açık olmamakla birlikte, dolaşımdaki immün kompleksler, akut Q ateşinin patogenezinde veya şiddetinde anahtar rol oynayabilir ve enfektif endokarditte gözlendiği gibi ateşin uzamasına yol açabileceği savunulmuştur (28).

Teşhis

Teşhis esas olarak seroloji gibi dolaylı yöntemlerle veya mikrobiyolojik kültürler veya spesifik DNA'yı saptayan testler (PCR) gibi doğrudan yöntemlerle yapılır (3). İmmünofloresan, Q ateşinin teşhisi için referans yöntemdir. Serokonversiyon genellikle hastalığın başlangıcından iki hafta sonra ortaya çıkar; bu nedenle üç hafta arayla eşleştirilmiş serum örnekleri yararlıdır. Bununla birlikte, tek bir serumda faz II IgG titrelerinin 200 ve IgM titrelerinin 50'den yüksek olması akut Q ateşi tanısı koydurur. Kronik Q ateşi ise, faz I IgG titresinin 800'den yüksek olması ile teşhis edilir (4,29). Pnömonide *C. burnetii* ile *Legionella pneumophila* arasında, endokarditte ise *C. burnetii* ile *Bartonella henselae* veya *Bartonella quintana* arasında çapraz reaksiyonlar görülebilir (29). Kompleman fiksasyon testi geçmişte yaygın olarak bir tanı yöntemi olarak kullanılmıştır. Teşhis eşikleri, akut form için 40'tan büyük faz II antikor titreleridir ve kronik form için 200'den büyük faz I titreleridir. Bu test spesifiktir ancak immünofloresandan daha düşük bir duyarlılığa sahiptir (29).

Tedavi

Hastalığın başlangıcı ile serolojik tanı arasındaki önemli miktarda zaman nedeniyle, Q ateşi tanısı ve etkili antibiyotik tedavisine başlanması genellikle gecikir (28).

Hem çocuklarda hem de yetişkinlerde akut formun tedavisi, doksisiklin verilmesinden oluşurken, kalıcı fokalize enfeksiyon, doksisiklin ve hidroksiklorokin gibi en az iki antibiyotik ile tedavi edilmelidir (3).

Akut Q ateşi birçok vakada kendi kendini sınırlayan bir hastalıktır ve semptomatik tedavi ile bile çoğu hastada olumsuz sekel bırakmadan düzelir (30).

Diğer çalışmalar, akut Q ateşi hastalarında doksisiklin tedavisinin ateş süresini önemli ölçüde kısalttığını bildirmiştir (25,30).

Önleme

Hayvanlarla çalışan veya doğum ürünleri kullanan kişiler arasında maruziyeti en aza indirmek için çeşitli önlemler alınmalıdır. Birkaç veri mevcut olmasına rağmen, enfeksiyonu önlemek için farklı aşılar geliştirilmiştir (3).

Çocuklarda Q Ateşi

Çocuklarda *C. burnetii* hakkında çok az seroepidemiyolojik veri vardır (2,31). *C. burnetii* enfekte çiftliklerinin yakınında yaşayanlara aerosollerle olarak bulaştığı için, yetişkinlerle aynı riski taşıdıkları tahmin edilmektedir ve çocuklar için yetişkin seroprevalans verilerini kullanabilir (31). En yüksek prevalans oranları, 5-14 yaş arası sağlıklı erkek ve kızların sırasıyla %37 ve %70'inin daha önce *C. burnetii* enfeksiyonu kanıtına sahip olduğu Hollanda'dan bildirilmiştir (31).

Pediyatrik Q ateşi vakaları salgınlar dışında, literatürde seyrek olarak bildirilmeye devam etmektedir (32,33).

Çocuklarda akut Q ateşi, yetişkinlerde olduğu gibi, öncelikle spesifik olmayan ateşli bir hastalık olarak ortaya çıkar ve akut Q ateşinin gerçek yükünü bilinmez hale getirir (31,33). Tipik akut Q ateşi klinik görünümü, grip benzeri hastalık, pnömoni veya solunum yolu enfeksiyonları gibi yaygın çocukluk çağı patojenlerini taklit eder; pediyatrik vakalarda sıklıkla yorgunluk, öksürük, baş ağrısı ve ateş görülür. Bu spesifik olmayan klinik belirtiler ve semptomlar göz önüne alındığında, çocuklarda akut Q ateşinin doğru bir şekilde teşhis edilmesi zordur (33). Hastalık seyri genellikle hafiftir ve komplike değildir ve akut Q ateşi hastalarının %1-5'i kadarında kronik bir formunu geliştiği tahmin edilmektedir (4,33,34).

Yakın zamanda yayınlanmış bir sistematik derleme çalışmasına göre, *C. burnetii*'nin çocukların sağlığı üzerindeki gerçek etkisi bilinmemektedir; akut veya kronik Q ateşi olan çocukların uzun süreli uzun süreli takibi bildirilmemiştir. Q ateşinin hem akut hem de kronik formları yeterince bildirilmemiştir ve yeterince teşhis edilmemiştir. Sağlık hizmeti sunucuları, kültür negatif endokardit veya osteomiyelitli pediatrik hastalarda Q ateşini düşünmelidir. Ayrıca, çocuklarda kronik Q ateşi için standartlaştırılmış tedavi protokolleri hala mevcut değildir. Doksisiklin ve hidroksiklorokin, çocuklarda Q ateşi endokarditini veya osteomiyelitini tedavi etmek için en çok kullanılan tedavi kombinasyonudur, ancak çeşitli başka antibiyotik kombinasyonları da çeşitli sonuçlarla bildirilmiştir. İnterferon gama gibi yardımcı tedavilerin kullanımı karışık sonuçlar doğurmuştur (32).

İsrail'den yayınlanmış bir çalışmada (35), ülkenin tüm bölgelerinden gelen toplam 16 çocukta kronik Q ateşi enfeksiyonu saptanmıştır. En yaygın enfeksiyon bölgesi kemik veya eklemdi (%50). Kalp grefti olan beş çocukta (%31) endovasküler enfeksiyon bulunmuştur. Hemen hemen tüm vakalar, kalıcı veya yükselen titreler nedeniyle uzun süreli antibiyotik rejimi ile tedavi edilmiştir.

Kronik tekrarlayan multifokal osteomiyelit, çocuklarda kronik Q ateşi enfeksiyonunun nadir bir belirtisidir. Costa ve ark. (36) Portekiz'den iki Q ateşine bağlı osteomyelit olgusunu bildirmiştir (36). Literatürde çocuklarda Q ateşi osteomiyeliti nadiren bildirilmiştir (1,36-39). Bu enfeksiyonun belirsiz bir patofizyolojisi vardır ve optimal tedavisi bilinmemektedir (1,36-38).

Yunanistan'da yapılan bir çalışmada (40), hastanede yatan çocuklar arasında Q ateşinin insidansı, epidemiyolojisi ve klinik belirtilerini araştırılmıştır. İki yıllık bir süre boyunca, çeşitli klinik belirtileri olan 1.200 çocuk, indirekt immünofloresan (IFA) yöntemi ile *C. burnetii* enfeksiyonu için prospektif olarak test edilmiştir. Sekiz (%0,67) hastada akut Q ateşi saptanmıştır. Kronik enfeksiyon vakası ise tespit edilmemiştir. Çok değişkenli analiz, 11-14 yaş arası çocukların ve kırsal bölgelerden peynir tükettiklerini bildiren çocukların bu hastalık için yüksek risk altında olduğunu göstermiştir. Akut Q ateşinin klinik belirtileri pnömoni (iki hasta), menenjit (iki), uzamış ateş (iki), hepatit (bir) ve hemolitik-üremik sendrom (bir) olarak bildirilmiştir. Q ateşi, uzamış ateşi olan vakaların %2,9'unu, menenjit vakalarının %1,2'sini ve pnömoni vakalarının %0,5'inde saptanmıştı. Başvuru anında ateş ve baş ağrısı en sık görülen semptomlar olarak bildirilmişti (40).

Japonya'da yapılan bir seroprevelans çalışmasında (41) atipik pnömonili çocuklar arasında Q ateşi pnömonisi prevalansı, indirekt immünofloresan testi ile %34,5 olarak saptanmıştır. Bu çalışmada, *C. burnetii*'nin Japonya'daki çocuklarda atipik pnömoninin önemli bir nedeni olarak düşünülmesi gerektiği vurgulanmıştır (41).

Hollanda salgınında 44 çocuk bildirilmiştir (toplam bildirimlerin %1,2'si). Bu olgularda hiçbir komplikasyon bildirilmemiştir (42).

Ülkemizden ise çok nadir olarak Q ateşi çocuk vakaları bildirilmiştir.

Seroprevelans ve klinik çalışmalar ise mevcut literatürde rastlanmamıştır.

SONUÇ

Sonuç olarak, ülkemiz Q ateşinin görülebildiği ülkeler arasındandır. İleriye dönük seroprevelans çalışmaları ve klinik çalışmalara ihtiyaç duyulmaktadır.

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REVIEW
DERLEME

Current Approach to The Child with Pica

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ABSTRACT

Pica is an eating disorder that is characterized by the ingesting of non-food substances. Although pica is common in young children, it is an overlooked condition. Although the etiology of pica is not known for certain, some hypotheses are emphasized. The prevalence of pica varies according to societies. Pica is a clinical diagnosis based on the The Diagnostic and Statistical Manual of Mental Disorders-V diagnostic criteria. In children, pica management can be achieved with a multidisciplinary approach. It should be acted on together with child psychiatry. Patient and family education are important. If there are nutritional deficiencies such as iron or zinc deficiency, it should be replaced. This review provides important information about the current approach to the child with pica. It will also shed light on the evaluation of children with a history of pica.

Keywords: Child, eating disorder, iron deficiency, pica, zinc deficiency

ÖZ

Pika, gıda dışı maddelerin yutulması ile karakterize olan bir yeme bozukluğudur. Pika küçük çocuklarda sık görülmesine rağmen gözden kaçan bir durumdur. Pika etiyolojisi kesin olarak bilinmemekle birlikte bazı hipotezler üzerinde durulmaktadır. Pika prevalansı toplumlara göre değişmektedir. Pika, Teşhis ve Mental Bozuklukların İstatistiksel El Kitabı-V tanı kriterlerine dayalı bir klinik tanıdır. Çocuklarda multidisipliner bir yaklaşımla pika yönetimi sağlanabilir. Çocuk psikiyatrisi ile birlikte hareket edilmelidir. Hasta ve aile eğitimi önemlidir. Demir veya çinko eksikliği gibi beslenme eksiklikleri varsa yerine konmalıdır. Bu derleme pikalı çocuğa güncel yaklaşım hakkında önemli bilgiler sunmaktadır. Pika öyküsü olan çocukların değerlendirilmesine de ışık tutacaktır.

Anahtar Kelimeler: Çocuk, yeme bozukluğu, demir eksikliği, pika, çinko eksikliği

INTRODUCTION

This review provides important information about the current approach to the child with pica. It will also shed light on the evaluation of children with a history of pica.

The Latin word pica means a magpie bird that eats whatever it finds. Today, pica refers to the persistent, compulsive craving for and eating of substances generally considered indigestible. This behaviur should be disagreeing with cultural practices and remain beyond the normal developmental phase of occasional indiscriminate for at least one month. Pica is most commonly seen in children aged 24 or 36 months. Children with learning disabilities and attention deficit hyperactivity disorder have a significant history of pica (1,2). The materials ingested as a result of pica depend on their availability in the environment as well as conscious selection factors. Various substances may be craved, including clay (geophagia), raw starch (amylophagia), dirt (coniophagia or chthonophagia), ice (pagophagia), raw, raw potatoes (gemelophagia), hair (trichophagia), fibrous plant roots (phytobezoar), paint chips (plumbophagia], sand, pebbles/stones (lithophagia), sharp objects (acuphagia), glass (hyalophagia), uncooked rice (ryzophagia), paper (xylophagia), soap (sapophagia), burned matches (cautopyreiophagia), feces (coprophagia), vomitus (emetophagia), wooden materials, sponge, polyurethane foam, grass, leaves, paper, chalk, baby talcum powder, crayons, pencil erasers, cigarette butts, ashes, charcoal, coins, buttons, cloth, eggshells and insects. By far, geophagia and amylophagia are among the most common types of pica. By far, geophagia and amylophagia are among the most common types of pica (3).

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ETIOLOGY

Three evidence-based perspectives have been described in order to explain the etiology of pica: biomedical, psychiatric, or behavioral. According to the biomedical view, that pica is a result of nutritional deficiencies, indicates that it may be due to neurological impairment and/or defective neurochemical transmission. An example of this is the relationship between iron deficiency and pica in young children and pregnant women. Unfortunately, this link does not provide a clear indicator of the direction of the relationship (i.e., Do deficiencies cause pica or does pica lead to deficiencies?). However, there are studies showing that pica disappear after iron treatment in individuals with iron deficiency anemia (4). A neurological impairment hypothesis suggests that pica is the result of brain damage, dementia, or defective neurochemical transmission. Pica may be caused by faulty dopaminergic neurotransmission (5).

According to the psychiatric view, that pica is an appearance of another mental illness or a form of obsessive-compulsive disorder. Studies showing that serotonin reuptake inhibitors are beneficial in the treatment of pica support this view (5)

According to the behavioral/learning perspective, pica is explained as a result of some rewarding outcome resulting from pica behavior or due to an individual's failed discrimination of appropriate consumables. Therefore, pica behavior may be learned or the result of poor stimulus control (5).

EPIDEMIOLOGY

It is very difficult to estimate the true prevalence of pica in children. Pica is slightly more common in boys than girls. Population studies have shown that about one quarter of children from one to six years have practiced pica (3). The prevalence in children decreases with increasing age. However, this rate is estimated to be 10% in 12-year-olds. It is known in the society that pica is more common among very young children, individuals with autism spectrum disorder and developmental disabilities, and pregnant women (5). The results of the study involving German children aged 7-14 showed that approximately 12% of these children described pica (6). Similarly, the results of the comprehensive study involving Swiss children aged 7-13 showed that approximately 10% of these children had a history of pica. The results of the study conducted in Australia showed that the incidence of pica in children was up to 20% higher Pica is more common among children in lower socioeconomic classes. The prevalence of pica is higher in Africa compared to the rest of the world. The prevalence rate of pica could be as high as 77% in African children (7,8). Although it was shown in an old study showing the relationship between pica and iron deficiency in adults in Turkey, the frequency of pica in children has not been investigated recently (9). Geophagy is a long-known problem in Turkey. In a study by Çavdar and Arcasoy on children, they reported that geophagy is the most common type of pica in Turkey and stated that individuals with this disorder are found in 70% of the country (10). The environment and society have an important effect on the emergence of pica types. Pica is most common in rural areas in the Central Anatolian region of Turkey. The clinical presentation of pica is variable and is thought to be related to the specific nature of the comorbidities and the type of pica object (11).

Some Diseases that Accompany Pica

Conditions found to be associated with pica include mainly iron deficiency anemia, lead exposure, and parasitic infections (8,12). Recently, pica has been reported in sickle cell anemia (13).

Identified Adverse Effects due to Pica

Significant undesirable side effects may occur due to ingestion of substances that should not be eaten in children with pica. These adverse effects include potassium abnormalities and gastrointestinal conditions ranging from irritation and abdominal pain to perforation, blockage, and colon ischemia. Sometimes this can result in death (5,12,14).

CLINICAL FINDINGS

Anamnesis

Pica is a finding that is often overlooked because it is not asked in the history. Therefore, pica should be included in the anamnesis. Adolescents may deny pica behavior. Information about the living environment should be obtained. It also seems important to take a history of nutrition and accompanying diseases. Anamnesis should concentrate on the substance ingested because the clinical presentation is different according to the substance taken. There is no specific test for diagnosis. More importantly, the diagnosis is made with the clues in the anamnesis (1).

Physical examination

Findings of the underlying diseases, if any, of patients with pica can be detected in the physical examination. Pallor in iron deficiency anemia may be observed. Patients with zinc and iron deficiency have growth retardation hepatosplenomegaly, and hypogonadism (Tayanç-Reimann-Prasad syndrome) (15). Also, there may be signs of lead exposure. Parasite infestation can be seen in soil eaters, intestinal obstruction in bezoar eaters, tooth damage in hard substance eater (1).

THE DIAGNOSIS OF PICA

Since pica is a clinical diagnosis confirmed by anamnesis, there is no specific diagnostic test in children. Diagnostic tests should be planned for whatever underlying cause is considered in the anamnesis (12.). Due to the cultural differences of societies, criteria have been developed for the objective diagnosis of pica. The diagnosis of pica is made using the The Diagnostic and Statistical Manual of Mental Disorders (DSM)-V diagnostic criteria (**Table 1**). In order to diagnose of pica, the patient should be 24 months or older.

Table 1. The diagnosis criteria of pica based on the DSM-V (5,16)
The eating of non-nutritive, non-food substances is persistent for at least 1 month.
The eating of nonnutritive, nonfood substances is inappropriate to the developmental level of the individual.
The eating behavior is not part of a culturally supported or socially normative practice.
If occurring with another mental disorder (e.g., autism or intellectual disability), or during a medical condition (e.g., pregnancy), it is severe enough to warrant independent clinical attention.

Detecting conditions accompanying pica

In the literature, it is recommended to perform full-blood picture and iron studies in all children with pica and treat any nutritional deficiencies identified. It is recommended to check at least urea and electrolytes, liver function tests, calcium, phosphate, magnesium and trace elements in children with growth retardation (1). It is also suggested to examine serum lead levels in mud eaters, parasites in soil eaters and serum mercury levels in paper eaters (12). Abdominal imaging methods will be useful in children with suspected bowel obstruction (1).

MANAGEMENT

Pica can be a problematic disorder to treat and may require thorough assessment to identify the most effective treatment approach. In children, pica management can be achieved with a multidisciplinary approach. It should be acted on together with child psychiatry. Patient and family education are important. If there are nutritional deficiencies such as iron or zinc deficiency, it should be replaced. Treatment approaches are primarily preventive, educational, and directed toward modification of pica behavior. Pharmacological treatment should be rarely applied (1). Pharmacological treatment has been found beneficial in some patients with learning disabilities and attention deficit hyperactivity disorder.

CONCLUSION

Pica is actually common in childhood, often overlooked. It is very important for physicians to inform families about pica and to ask about pica in the anamnesis in revealing the underlying conditions in these children. It is seen that there is a need for studies on this subject in our country.

ETHICAL DECLARATIONS

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