# ODÜ TIP DERGİSİ

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# ODU TIP DERGİSİ

# ODU MEDICAL JOURNAL

# (ODU MED J)

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**(ODU MED J)**

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Levine WC, Pope V, Bhoomkar A, Tambe P, Lewis JS, Zaidi AA, et al. Increase in endocervical CD4 lymphocytes among women with nonulcerative sexually transmitted diseases. J Infect Dis. 1998;177(1):167–174.

**Chapter of an edited book:** Hornbeck P. Assay for antibody production. In: Colign JE. Kruisbeek AM, Marguiles DH, editors. Current Protocols in Immunology. New York: Greene Publishing Associates; 1991. p. 105-32.

**A single-authored book:** Fleiss JL. Statistical Methods for Rates and Proportions. Second Edition. New York: John Wiley and Sons; 1981. p. 105-32.

**An editorial book:** Balows A. Mousier WJ, Herramaflfl KL, editors. Manual of Clinical Microbiology. Fifth Edition. Washington DC: IRL Press. 1990. p. 105-32.

**Paper:** Entrala E, Mascaro C. New structural findings in Cryptosporidium parvum oocysts. Eighth International Congress of Parasitology (ICOPA VIII); October 10-14; Izmir-Türkiye: 1994. p. 1250-75

**Thesis:** Erakinci G. Searching for antibodies against parasites in donors. Izmir: Ege University Health Sciences Institute. 1997.

**Electronic format:** Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis (serial online) l995 Jan-Mar (cited 1996 June 5): 1(1): (24 screens). Available from: URL: http:/ www.cdc.gov/ncidodlElD/cid.htm.

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Title

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Keywords

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgement

References (up to 40)

Except for the references and the English abstract, the full text should not exceed 4500 words.

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**Structure**

Title

Abstract (average 100-300 words)

Keywords

Introduction

Case report

Discussion

Conclusion

Acknowledgement

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Title

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Keywords

Introduction

The review also includes subtitles suitable for the text.

Conclusion

Acknowledgement

References (up to 50)

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**ODU TIP DERGİSİ/ODU MEDICAL JOURNAL**
**(ODU MED J)**

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## CONTENTS

**EDITORIAL**

## PREFACE

With the philosophy that success is dependent on continuity and stability, we take pride in sharing another issue of our magazine with you on this journey. Each new year opens new doors for the medical community. With every scientific advancement, we aim to make our mark through our magazine. Your valuable contributions of scientific studies and writings will elevate our magazine to even greater heights in the academic arena. Hoping that this issue of our magazine, with its rich content penned with different perspectives, interesting topics, and current approaches, will contribute to all our readers, I wish you enjoyable readings.

Dr. Hatice Hanci

Editor-in-Chief

**ODU TIP DERGİSİ/ODU MEDICAL JOURNAL (ODU MED J)** **December 2024;11(3):115-121**

**ARAŞTIRMA MAKALESİ/ RESEARCH ARTICLE** **DOI:** 10.56941/odutip.1537385

# Urogenital Anomalies Identified on Examination of Pediatric Patients Before Circumcision

Mevlut Keles[1], Abdullah Cirakoglu[1], Erdal Benli[1]
Ibrahim Yazici[1], Nurullah Kadim[1], Ahmet Yuce[1]

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**Abstract**

**Objective:** Circumcision is included in European urology guidelines as a treatment choice only for severe phimosis, while it is a procedure routinely performed for socio-cultural reasons in many different countries. Parents bring their children to urology clinics requesting circumcision. Before circumcision, it is very important to perform full urogenital examination because many urogenital anomalies that require treatment may be identified so. In this study, we aimed to determine the urogenital anomalies identified in children before circumcision.

**Material and Method:** This study retrospectively investigated findings of 190 pediatric cases attending our urology for circumcision between September 2015 and September 2021. Each child had standard examinations of penis, urethra, testis and scrotum. The presence and laterality of undescended testis, presence and laterality of retractile testis, presence and degree of phimosis, presence and localization of hypospadias, presence and degree of buried penis, presence direction, and angle of penis chordee-curvature, presence of penoscrotal web, presence and laterality of hydrocele, presence of urethral stenosis, and presence of urethral duplication were recorded. Complete phimosis was noted when the foreskin could not be retracted or when less than half of the glans penis could be seen when retracted; partial phimosis was noted when more than half of the glans penis could be seen but not the whole penis; and no phimosis was noted when the foreskin could be easily retracted without difficulty and the glans penis could be seen completely. When grading the buried penis, fully and partially buried penis were recorded.

**Results:** In our study assessing the examination findings of 190 pediatric cases attending our urology clinic for circumcision between September 2015 and September 2021, a total of 127 children had urogenital anomalies (66%). Buried penis (46 cases, 24%) was the most frequently encountered urogenital anomaly. Undescended testis was the second most common (19 cases, 10%), while retractile testis (15 cases, 7%) was the third most common anomaly. Accordingly, phimosis was identified in 11 cases, penile curvature in 6 cases, hypospadias in 3 cases, hydrocele in 3 cases, penoscrotal web in 1 cases and urethral meatus duplication in 1 case.

**Conclusion:** Circumcision is performed for both medical reasons and socio-cultural reasons in many countries. However, these patients may have serious urogenital anomalies. Careful physical examination is very important for patients attending for circumcision.

**Key Words:** Circumcision, Genital anomaly, Urogenital anomaly, Pediatric patient

**Sünnet için Başvuran Çocuk Hastalarda Muayenede Saptanan Ürogenital Anomaliler**

**Özet**

**Amaç:** Sünnet Türkiye'de ve birçok ülkede sosyo-kültürel nedenlerle rutin olarak uygulanan bir işlemdir. Ebeveynler çocuklarını üroloji kliniklerine sünnet talebiyle getirmektedirler. Bu çocukların tam bir ürogenital muayeneden geçmesi çok önemlidir çünkü bu muayene ile tedavi gerektiren birçok ürogenital anomali tespit edilebilir. Bu çalışmada sünnet için kliniğimize getirilen çocuklarda saptanan ürogenital anomalileri belirlemeyi amaçladık.

**Materyal ve Metot:** Bu çalışmada Eylül 2015-Eylül 2021 tarihleri arasında üroloji kliniğimize sünnet için başvuran 190 çocuk olgunun muayene bulguları retrospektif olarak incelendi. Her çocuğun standart penis, üretra, testis ve skrotum muayeneleri yapıldı. İnmemiş testis varlığı ve lateralitesi, retraktil testis varlığı ve lateralitesi, fimosis varlığı ve derecesi, hipospadias varlığı ve lokalizasyonu, gömülü penis varlığı ve derecesi, penis kordi-eğriliğinin varlığı ve açısı, penoskrotal web varlığı, hidrosel varlığı ve lateralitesi, üretral stenoz varlığı ve üretral duplikasyon varlığı araştırıldı. Sünnet derisi geri çekilemediğinde veya geri çekildiğinde penis başının yarısından daha azı görülebildiğinde tam fimozis; penis başının yarısından fazlası görülüp penisin tamamı görülemiyorsa parsiyel fimozis; sünnet derisi zorlanmadan kolayca geri çekilebildiğinde ve glans penis tam görüldüğünde fimozis olmadığı kaydedildi. Gömük penis derecelendirilirken, tam ve kısmi gömülü penis kaydedildi.

**Bulgular:** Eylül 2015-Eylül 2021 tarihleri arasında Ordu Üniversitesi Eğitim ve Araştırma Hastanesi üroloji kliniğine sünnet için başvuran 190 çocuk olgunun muayene bulgularının değerlendirildiği çalışmamızda toplam 127 çocukta ürogenital anomali saptandı (%66). Gömük penis (46 olgu, %24) en sık karşılaşılan ürogenital anomaliydi. İnmemiş testis ikinci sıklıkta (19 olgu, %10), retraktil testis (15 olgu, %7) üçüncü sıklıkta anomaliydi. Bunları takiben 11 olguda fimozis, 6 olguda penil eğrilik, 3 olguda hipospadias, 3 olguda hidrosel, 1 olguda penoskrotal web ve 1 olguda üreteral meatus duplikasyonu saptandı.

**Sonuç:** Sünnet, Türkiye'de olduğu gibi birçok ülkede hem tıbbi hem de sosyo-kültürel nedenlerle yapılan küçük cerrahi bir uygulamadır. Ancak çalışmamızın da ortaya koyduğu gibi bu nedenle başvuran hastalarda ciddi oranlarda ürogenital anomalilerle karşılaşılmaktadır. Bu hastalarda dikkatli fizik muayene çok önemlidir.

**Anahtar kelimeler:** Sünnet, Genital anomali, Ürogenital anomali, Çocuk hasta

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## INTRODUCTION

Male circumcision (MC) is the partial or full surgical removal of the foreskin covering the penis (prepuce) (1). The history of MC dates back to ancient times. Circumcised children are encountered among Egyptian mummies dated to 6000 years ago (2). MC is mandatory for Jews and must be performed on the eighth day of life (3). MC is mandatory in Islam and generally the choice is to perform it on the seventh day of life (4). MC is a procedure performed for religious, socio-cultural and medical reasons in many different countries. The European Association of Urology Pediatric Urology guidelines mention secondary phimosis as the only definite indication for MC. Additionally, primary phimosis with recurrent urinary tract infections (UTIs) in patients with urogenital anomalies, recurrent balanoposthitis are mentioned as MC indications (5-7). Whether the reason is definite surgical indication or socio-cultural, it is probable that urologists around the world encounter children attending clinics for examination before MC. It is very important to perform full urogenital examination for children during this type of circumcision appointment. This examination may identify many urogenital anomalies requiring treatment. In this study, we aimed to determine the urogenital anomalies identified in children brought to our clinic for MC.

## MATERIALS AND METHODS

Our study obtained local ethics committee permission (No: 26/2022). Within the scope of the study, the examination findings of 190 pediatric cases attending the urology clinic of Ordu University Education and Research Hospital for circumcision between September 2015 and September 2021 were retrospectively investigated. The study included male children with standard penis, urethra, testis and scrotum examinations performed. Children attending due to primary urologic pathologies (e.g., undescended testis, inguinal hernia, hydrocele) and with MC performed along with surgical correction of the basic pathology were not included in the study. Standard examination of children brought to the clinic only for MC researched the presence and laterality of

undescended testis, presence and laterality of retractile testis, presence and degree of phimosis, presence and localization of hypospadias, presence and degree of buried penis, presence, direction, and angle of penile chordee-curvature, presence of penoscrotal web, presence and laterality of hydrocele, presence of urethral stenosis, and presence of duplication in urethral meatus. Results were recorded. Buried penis classification determined as complete buried penis if the glans penis tissue is not palpable at the level of the symphysis pubis. If penile glandular tissue was palpable at the level of symphysis pubis it called patrial buried penis. When rating phimosis, full phimosis was considered when the prepuce could not be retracted or less than half of the glans penis could be seen when retracted; partial phimosis was considered with more than half of the glans penis was observed when the prepuce was retracted, but the full glans could not be seen; and no phimosis was considered when the prepuce skin could be easily retracted without force and the full glans penis was observed. When rating buried penis, full and partial buried penis were recorded.

In the study, the rate of cases with urogenital anomalies among total cases was identified. As the study variables were categoric, assessment was performed with frequency analysis. Frequencies were calculated as definite (n) and percentage (%). Chi-square test performed to determine frequency changes between groups and p values less than 0.05 considered as statistically significant. SPSS 22 program (IBM software, Pointe Claire, Quebec, Canada) used for statistical analysis.

## RESULTS

In our study assessing the examination findings of 190 pediatric cases attending the Ordu University Education and Research Hospital urology clinic for circumcision between September 2015 and September 2021, urogenital anomalies were identified in a total of 127 children (66%).

Buried penis (46 cases, 24%) was the most frequently encountered urogenital anomaly. Undescended testis was the second most common (19 cases, 10%), while retractile testis (15 cases, 7%) was the third most common anomaly. Following these, phimosis was identified in 11 cases (5%), penile curvature in 6 cases (3%), hypospadias in 3 cases (1%), hydrocele in 3 cases (1%), penoscrotal web in 1 case (0.5%) and duplication of the ureteral meatus in 1 case (0.5%).

There were no statistically significant differences between sides of undescended testis, retractile testis and hydrocele cases (p values are given in the table). Additionally, there were no statistically significant difference between complete and partial phimosis cases. But the

frequency of partially buried penis is statistically significantly higher than the frequency of fully buried penis (p=0.008).

Results are summarized in Tables 1 and 2.

**Table 1.** Scrotal and testicular pathologies identified on physical examination

| | Right | Left | Bilateral | Total | p* |
|---|---|---|---|---|---|
| **Undescended testis** | 7 (3%) | 3 (1%) | 9 (4%) | 19 (10%) | 0.229 |
| **Retractile testis** | 8 (4%) | 4 (2%) | 3 (1%) | 15 (7%) | 0.247 |
| **Hydrocele** | - | 2 (1%) | 1 (0.5%) | 3 (1%) | 0.564 |

*: Chi-square test

**Table 2.** Penile and prepuce pathologies identified during physical examination

| | Full | Partial | Total | p* |
|---|---|---|---|---|
| **Phimosis** | 5 (3%) | 6 (3%) | 11 (6%) | 0.763 |
| **Buried penis** | 14 (7%) | 32 (16%) | 46 (24%) | 0.008 |

*: Chi-square test

## DISCUSSION

Male circumcision is one of the oldest surgical procedures. It is performed in many countries for religious and socio-cultural reasons. However, many clinical pathologies lead to MC indications. The leading cause among these pathologies is phimosis. However, the presence of phimosis should be divided into primary (physiologic) phimosis and secondary (pathologic) phimosis. For children attending with phimosis, the definite indication for MC should be secondary (pathologic) phimosis (5-7). In primary (physiologic) phimosis, there are indications for MC for cases resistant to medical treatment, with recurrent balanoposthitis, and recurrent urinary infections accompanying urinary tract anomalies (5-7). The European urology guidelines recommend that MC be performed in clinics that abide by protocols related to hygiene, special equipment, pain protocols and follow-up and that can manage complications (8). Abiding by this situation has critical importance in terms of pediatric health. Additionally, it is very important that MC be planned and performed by qualified clinicians after performing appropriate urogenital examination. This is because correction operations in children for anomalies like hypospadias, epispadias, penile chordee, buried penis and micropenis may require use of the foreskin (prepuce tissue) (7,9). Urogenital examinations performed in appropriate environments by qualified clinicians may identify pathologies requiring preservation of the prepuce, and prevent inappropriate MC. With routine urogenital examination before MC, accompanying comorbid pathologies like undescended testis, retractile testis, hydrocele, and inguinal hernia may be identified in children brought to the clinic by parents for circumcision, and follow-up and treatment may be planned. Unfortunately in developing countries, it is a frequently encountered situation that MC is performed by unsuitable people in inappropriate conditions. This situation may cause difficulties

due to inability to identify comorbid pathologies and for repair of pathologies that require the foreskin to be used. Benli et al. (10) documented that the majority of MC were performed in inappropriate environments by people without clinical competence in a study analyzing 501 cases. Similarly, Geçit et al. (11) retrospectively investigated 62 pediatric patients attending with complications after MC and found increased complication rates related to MC performed by uneducated people in inappropriate environments. The common outcome of both studies indicates that serious complications may develop linked to MC performed by unqualified people in inappropriate conditions, while many additional pathologies cannot be identified due to not performing examination before MC causing delays in diagnosis and treatment. The results obtained from our study planned from this perspective found urogenital anomalies were identified in 127 male children (66%) out of 190 bought to our clinic by parents requesting MC. According to our information, there is no other study in the literature performing a similar assessment and documenting statistical data. In our study, 24% of cases (46 cases) had buried penis identified. Matsuo et al. (12) identified the rate of buried penis in Japanese children as 3.7% in the only study in the literature about buried penis incidence. Compared with our results, there appears to be a serious difference in incidence. The reason for this may be that objective metric measurements were not used in our data based on physical examination and we may not have been able to clearly differentiate buried penis from similar pathologies like micropenis. This is an important limitation in terms of our study. The anomaly identified with second highest frequency in our study was undescended testis at 10% (19 cases). Undescended testis is identified at rates of 1-4.6% of term births and 1.1-40% rates for preterm infants (13). In our study, 47% of cases with undescended testis were bilateral. In the literature, we see that nearly 30% of undescended testis cases have bilateral undescended testis identified at diagnosis (14). In terms of undescended testis, the results of our study appear not compatible with the literature. Because our results showed there is no difference between side of the undescended testes, but in the literature it is obvious that right undescended testis is more frequently seen than left. In our study, the rate for retractile testis was 7%. In the literature, the retractile testis incidence was reported to be 2-45% according to the study by Stec et al. (15). However, as both the cause of descending testis and the differentiation between undescended testis and retractile testis cannot be performed with definite boundaries, incidence data may not be reliable. The retractile testis rate identified in our study appears to be compatible with the literature. As undescended testicle cases,

there is no difference between side of the retractile testes. Our data is insufficient to detect statistical significance of these pathologies. This is the main limitation of our study. But in buried penis, we found statistical significance between complete buried penis and partial buried penis cases. We think that superior number of buried penis cases revealed this significance. In addition, we think that the most important contribution of our study is the earlier detection of urogenital anomalies, because despite of many other countries where MC is performed only therapeutic purposes, in out society MC is performed for cultural and religious purposes also.

## CONCLUSION

In conclusion, apart from these frequently identified anomalies, many pathologies like penile chordee, penoscrotal web, hypospadias, hydrocele, and urethral meatus anomalies may by treated after identification during urogenital examination performed systematically in appropriate conditions before MC. For this reason, MC should be performed after full and systematic urogenital examination assessing the child before the procedure by qualified clinicians in centers providing appropriate conditions.

**Ethics Committee Approval:** Prior to the study, the approval of Ordu University Clinical Research Ethics Committee' numbered 26/2022 and dated 11/02/2024 was obtained.

**Author Contributions:** Conception - Abdullah Cirakoglu, Mevlut Keles; Design - Mevlut Keles; Supervision - Erdal Benli; Data Collection and/or Processing - Mevlut Keles, Ibrahim Yazici; Analysis and/or Interpretation - Ahmet Yuce, Nurullah Kadim; Literature Search - Mevlut Keles, Erdal Benli; Writing - Mevlut Keles; Critical Review - Abdullah Cirakoglu, Erdal Benli

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## REFERENCES

1. Oxford University Press. Oxford English Dictionary. Available from: http://www.oxforddictionaries.com/definition/english/circumcise

2. Totaro A, Volpe A, Racioppi M, Pinto F, Sacco E, Bassi PF. Circumcision: History, Religion and Law. Urologia Journal. 2011;78(1):1-9.

3. The Torah-The Pentateuch. Bereishit. Genesis. Chapter 17.

4. Sahih Al-Bukhari. Vol 6. Riyadh) KSA (AlSalfiyya printing; 2010. p. 388).

5. Hiraoka M, Tsukahara H, Ohshima Y, Mayumi M. Meatus tightly covered by the prepuce is associated with urinary infection. Pediatr Int. 2002;44(6):658-662.

6. Ellison JS, Dy GW, Fu BC, Holt SK, Gore JL, Merguerian PA. Neonatal Circumcision and Urinary Tract Infections in Infants With Hydronephrosis.Pediatrics. 2018;142(1):e20173703.

7. Tekgül S, Riedmiller H, Gerharz E, Hoebeke P, Kocvara R, Nijman R, et al. Guidelines on paediatric urology. European Association of Urology. 2015;13-5.

8. Morris BJ, Wamai RG, Henebeng EB, Tobian AA, Klausner JD, Banerjee J, et al. Estimation of country-specific and global prevalence of male circumcision. Popul Health Metr. 2016 Mar 1;14:4.

9. Johnson PRV: Childhood circumcision. Surgery (Oxford). 26(7):314-16, 2008.

10. Benli E, Koca O. Circumcision research in Bingol province. The New J Urol. 2011;6:22-5.

11. Gecit I, Benli E. Circumcision complications in our region. Van Medical Journal, 2011;18.18:155-158.

12. Matsuo N, Ishii T, Takayama JI, Miwa M, Hasegawa T. Reference standard of penile size and prevalence of buried penis in Japanese newborn male infants. Endocr J. 2014;61(9):849-53.

13. Sijstermans K, Hack WW, Meijer RW, van der Voort-Doedens LM. The frequency of undescended testis from birth to adulthood: a review. Int J Androl. 2008 Feb;31(1):1-11.

14. Berkowitz GS, Lapinski RH, Dolgin SE, Gazella JG, Bodian CA, Holzman IR. Prevalence and natural history of cryptorchidism. Pediatrics. 1993 Jul;92(1):44-9.

15. Stec AA, Thomas JC, DeMarco RT, Pope JC 4th, Brock JW 3rd, Adams MC. Incidence of testicular ascent in boys with retractile testes. J Urol. 2007 Oct;178(4Pt2):1722-4; discussion 1724-5.

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# Retrospective Analysis of Forensic Cases Admitted to the Emergency Department of a Second Level Hospital

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**Abstract**

**Objective:** In this study, we aimed to examine the demographic and epidemiological characteristics of forensic cases admitted to the emergency department and the forensic reports prepared for these cases and compare them with the literature.

**Material and Method:** This retrospective study was conducted in the emergency department of a secondary care hospital for a period of one month. Patients were grouped according to their application time; they were compared in terms of demographic characteristics, forensic report information, and clinical characteristics.

**Results:** 848 patients were included in the study. The average age of the patients was 30.9±12.5 and most were male (79.5%). While the highest rate of patients was diagnosed with assault algebra (80.2%), the rate of issuing a final report was found to be higher (87.6%). It was determined that the fewest applications were made between 00:00-07:59. No statistically significant difference was found in the comparison of forensic case or forensic report characteristics according to application time (p=0.218).

**Conclusion:** The number of applications as forensic cases is higher at certain times of the day. Since emergency departments provide uninterrupted service 24/7; emergency department physicians should continue the management of forensic cases regardless of the time of admission and show due care in preparing forensic reports.

**Key Words:** Forensic case, Forensic report, Emergency department

**İkinci Basamak Bir Hastanenin Acil Servisine Başvuran Adli Olguların Retrospektif Analizi**

**Özet**

**Amaç:** Bu çalışmada acil servise başvuran adli nitelikteki olguların demografik, epidemiyolojik özelliklerini ve bu olgulara düzenlenen adli raporları inceleyip, literatür ile karşılaştırmayı amaçladık.

**Materyal ve Metot:** Retrospektif nitelikteki bu çalışma, ikinci basamak bir hastanenin acil servisinde bir aylık süreç için yürütüldü. Hastane elektronik veri sistemi aracılığıyla başvuru saatlerine göre gruplandırılan hastalar; demografik özellikleri, adli rapor bilgileri ve klinik özellikleri açısından karşılaştırıldı.

**Bulgular:** Çalışmaya 848 hasta dahil edildi. Hastaların yaş ortalaması 30.9±12.5'di. Hastalar en yüksek oranda darp-cebir muayenesi nedeniyle başvurmuş olduğu görülürken (%80.2), kati rapor düzenlenme oranı daha yüksek saptandı (%87.6). En az başvurunun 00:00-07:59 zaman diliminde yapıldığı belirlendi. Adli vaka ya da adli rapor özelliklerinin başvuru saatine göre karşılaştırmasında istatistiksel olarak anlamlı bir fark saptanmadı (p=0.218).

**Sonuç:** Adli olguların başvuru sayısı günün belli saatlerinde daha fazladır. Acil servislerde 7/24 kesintisiz hizmet verildiğinden; acil servis hekimleri başvuru saatinden bağımsız olarak adli olguların yönetimini sürdürmeli, adli rapor hazırlanmasında gereken özeni göstermelidir.

**Anahtar kelimeler:** Adli vaka, Adli rapor, Acil servis

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## INTRODUCTION

Forensic case is defined as the occurrence of a physical or mental illness or death as a result of intent, negligence, imprudence or carelessness caused by the person himself/herself or external

factors (1,2). Traffic accidents, falls, assault cases, occupational accidents, poisonings, burns, electric and lightning strikes, all kinds of asphyxia cases, penetrating tool injuries, firearm injuries, cases of abuse or suspicion of abuse and suicide attempts are considered as forensic cases (3,4).

Documents prepared by physicians regarding the medical conditions of forensic cases and required to be reported to the judicial authorities by Article 280 of the Turkish Penal Code are characterized as forensic reports (3,5).

In this study, forensic cases admitted to a secondary emergency department (ED) and forensic reports prepared for these cases were examined. It was also aimed to evaluate the relationship between the time of presentation to the ED and demographic and clinical characteristics of forensic cases and forensic report characteristics.

## MATERIALS AND METHODS

Patients admitted to the ED a secondary care hospital, between 01.01.2021 and 31.01.2021 and evaluated as forensic cases were retrospectively analyzed. The diagnoses, demographic characteristics, admission times, consultation information and treatment processes of the patients were accessed through the hospital registration system. Forensic reports issued to the patients were also examined to determine the life-threatening conditions of the patients, the need for simple medical intervention and the type of forensic report issued to the patients. As a result, a data set containing all the information obtained was created. Patients whose data entries were missing in the hospital registration system or whose forensic report information could not be accessed were not included in the study. In addition, all age group patients were included in the study.

Patients were divided into three groups as 08:00-15:59, 16:00-23:59 and 00:00-07:59 according to the time of presentation to the ED. These three groups were compared in terms of demographic characteristics, forensic report information and clinical features.

### Statistical Analysis

The data collected in our study underwent statistical analysis using the SPSS (Statistical Package for Social Sciences) program version 21.0 (SPSS Inc., Chicago, IL, USA). Statistical analysis was performed using descriptive statistics (frequency, percentage distribution). The continuous variables were represented using either the mean±standard deviation or the median with the interquartile range (median, 25th-75th percentiles), depending on the distribution of the data. The categorical variables were represented using frequency and percentage. The normality of the data was assessed using the Kolmogorov-Smirnov test and distribution graphs. The

distinction between the groups was assessed using the Student's t-test (for data that followed a normal distribution) or the Mann-Whitney U test (for data that did not follow a normal distribution). The Chi-square test was utilized to compare categorical data. The accepted level of statistical significance was determined to be $p<0.05$

## RESULTS

During the one-month period in which the study was conducted, 848 patients who were evaluated as forensic cases in the ED, for whom forensic reports were issued and whose records were accessed completely were included in the study. The mean age of the patients was calculated as 30.9±12.5 years. Of the patients included in the study, 79.5% were male. When the diagnoses of the patients accepted as forensic cases were analyzed, the highest rate was assault and battery (80.2%) and the lowest rate was electric shock (0.4%). Again, since the study was conducted in January, it was observed that 4% of the patients were issued a forensic report with the diagnosis of carbon monoxide intoxication. When the admission times of the patients were analyzed, it was determined that the least number of admissions were made at 00:00-07:59 (14.9%). A similar number of admissions were observed at 08:00-15:59 and 16:00-23:59 (43.50% and 41.6%). It was also determined that 3.5% of the patients were consulted to any department and 2.6% of the patients were hospitalized. When the forensic reports of the patients included in the study were examined, it was determined that most of the reports were issued as definitive reports (87.6%), 2.7% of the reports contained the phrases “life is in danger” and 64% of the reports contained the phrases “cannot be resolved with simple medical intervention”. Demographic-clinical characteristics and forensic report data of the patients in the study are listed in Table 1.

**Table 1.** Demographic-clinical characteristics of the patients and forensic report data

| | **n (%)** |
|---|---|
| **Age** | 30.9±12.5 |
| **Gender** | |
| Male | 674 (79.5) |
| Female | 174 (20.5) |
| **Forensic case nature** | |
| Assault | 680 (80.2) |
| Traffic accident | 41 (4.8) |
| Occupational accident | 36 (4.2) |
| Carbon monoxide intoxication | 34 (4) |
| Suicidal attempt | 29 (3.4) |
| Falling | 17 (2) |
| Penetrating sharps injury | 8 (1) |
| Electric shock | 3 (0.4) |
| **Application time** | |
| 08:00-15:59 | 369 (43.5) |
| 16:00-23:59 | 353 (41.6) |
| 00:00-07:59 | 126 (14.9) |
| **Consultation** | |
| No | 818 (96.5) |
| Yes | 30 (3.5) |
| **Treatment process** | |
| Discharge | 826 (97.4) |
| Hospitalization | 22 (2.6) |
| **Type of report** | |
| Final | 743 (87.6) |
| Provisional | 105 (12.4) |
| **Life-threatening** | |
| No | 825 (97.3) |
| Yes | 23 (2.7) |

Data are expressed as mean±standard deviation and n(%).

Patients grouped according to the time of admission were compared in terms of age, gender, consultation with any department and the end of treatment and no statistically significant difference was found (Table 2).

Again, these three groups of patients were compared in terms of the type of forensic report issued, life-threatening status and simple medical intervention requirements and no statistically significant difference was found (Table 2).

**Table 2.** Comparison of variables according to admission hours

| | Application Hours | | | p |
|---|---|---|---|---|
| | **08:00-15:59 (*n*=369)** | **16:00-23:59 (*n*=353)** | **00:00-07:59 (*n*=126)** | |
| **Age** | 30.8±13.5 | 31.5±12.2 | 29.3±10.2 | 0.218 |
| **Gender** | | | | |
| Male | 295 (79.9) | 273 (77.3) | 106 (84.1) | 0.258 |
| Female | 74 (20.1) | 80 (22.7) | 20 (15.9) | |
| **Consultation** | | | | |
| No | 354 (95.9) | 343 (97.2) | 121 (96.0) | 0.643 |
| Yes | 15 (4.1) | 10 (2.8) | 5 (4.0) | |
| **Treatment process** | | | | |
| Discharge | 359 (97.3) | 346 (98.0) | 121 (96.0) | 0.476 |
| Hospitalization | 10 (2.7) | 7 (2.0) | 5 (4.0) | |
| **Type of report** | | | | |
| Final | 323 (87.5) | 312 (88.4) | 108 (85.7) | 0.735 |
| Temporary | 46 (12.5) | 41 (11.6) | 18 (14.3) | |
| **Life-threatening** | | | | |
| No | 357 (96.7) | 348 (98.6) | 120 (95.2) | 0.097 |
| Yes | 12 (3.3) | 5 (1.4) | 6 (4.8) | |

Data are expressed as mean±standard deviation and n(%). $\chi^2$: Chi-square test analysis was used to compare two different groups and $p<0.05$ was accepted as significant

## DISCUSSION

Since EDs are the most common place of presentation for forensic cases, forensic reports are most frequently prepared by ED physicians (2). Since forensic reports are of great importance in terms of the functionality of the law, emergency physicians should show the necessary care and attention while preparing these reports (3,6).

Although the minimum age range of the patients in our study was 0 and the maximum age range was 80, the mean age was found to be similar to the literature (7,8). This finding of the mean age is related with the fact that most of the patients included in the study (68.9%) were below the age of 35 years.

As in the literature, the male gender ratio was higher in this study (9,10). It was thought that men were more involved in forensic events in relation to their higher presence in social life.

In previous studies, the most common diagnosis of forensic cases was traffic accident and the second most common diagnosis was battery (6,11). In our study, it was observed that the most common diagnosis was assault. The reason for this is that forensic reports given during the detention/prison entry-exit process were also included in this group. Again, the rate of forensic reports issued for carbon monoxide intoxication was higher in our study than in the study of Kukul

et al. The reason for this is related to the fact that only January data were collected in our study and this diagnosis is more common especially in winter months.

Similar to the study by Arslanoğlu et al, it was found that the highest number of forensic case presentations was made during the 08:00 -15:59 shift (12). In other studies in the literature, it was reported that the highest number of admissions were made during the 16:00-23:59 shift (13). In our study, although the rates of admission at 08:00-15:59 and 16:00-23:59 shifts were close, the reason for more admissions at the first shift may be related to the high rate of cases with a diagnosis of assault and battery brought from institutions. In this study, variables were compared according to the time of admission and it was determined that the characteristics of forensic cases or forensic reports did not differ according to the time of admission. The reason for this may be that EDs provide 24/7 uninterrupted service and the necessary service is provided regardless of the time.

Unlike the literature, the rate of consultation of patients with any department was low in our study (10,14). This was attributed to the high number of cases with a diagnosis of assault and battery in relation to the reasons mentioned previously.

Similar to previous studies, the treatment process of most of the patients in our study was completed as outpatients and the patients were discharged from the ED (8,12). Since the rates of forensic cases resulting from high-energy trauma or requiring long-term follow-up were low in our study, the hospitalization rate was also found to be low.

There are two types of forensic reports: provisional and final reports, and mostly provisional reports are issued as a preliminary report guiding physicians while issuing a final report.8 In our study, the rate of final reports issued was found to be higher, which is different from the literature (14,15). The reason for this was thought to be the diagnosis rates according to the nature of forensic cases.

In the forensic reports issued in our study, life-threatening and simple medical intervention status were found to be similar to the literature (6,11). The high rate of no life-threatening condition and the low rate of not resolvable with simple medical intervention is related with the high rate of assault and battery reports issued for entry and exit from detention/prison.

Forensic reports are mostly issued in EDs, and the intensity of applications of forensic cases may vary according to time periods. Regardless of the time of admission, emergency physicians should show the utmost care in approaching forensic cases and preparing forensic reports, taking into account the legal process.

## CONCLUSION

In our study, it was also found that forensic cases with the diagnosis of assault and battery were the most common patients admitted to the ED. In order to reduce the intensity in EDs, separate units can be established within the hospital for the preparation of forensic reports for such cases referred from institutions.

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## REFERENCES

1. Demirdöken ED, Karbuz A. Retrospective evaluation of forensic cases at pediatric emergency admissions. J For Med 2023;37(1):33-8.

2. Akça H, Oğlakçıoğlu A, Güneri K. Evaluation of Forensic Cases Admitted to Pediatric Emergency Department: A Single-Center Experience. Cerrahpasa Med J 2019;43(3):75-9.

3. Terece C, Kocak AO, Soğukpınar VO, Gürpınar K, Aslıyüksek H. Evaluation of forensic reports issued in emergency departments and comparison with reports issued by the Council of Forensic Medicine. Ulus Travma Acil Cerrahi Derg 2022;28(2):140-6.

4. Türkmen N, Akgöz S, Çoltu A, Ergin N. Evaluation Of Legal Cases Admitted to Uludağ University Medical School Emergency Department. Journal of Uludağ University Medical Faculty 2005;31(1):25-9.

5. Beyaztaş Yücel F. Responsibilities of the physicians about forensic report. Anadolu Psikiyatri Derg 2000;1(4):231-4.

6. Tıraşçı Y, Durmaz U, Altınal A. Retrospective Evaluation of Forensic Reports Prepared by Dicle University Forensic Medicine Department Between 2012-2015. Dicle Med J 2016;43(3):424-30.

7. Erdoğan Çetin Z, Teyin A, Birben B, Çetin B, Şahiner GG, Hamamcı M. Evaluation of Judical Reports Prepared in the Emergency Department. Bozok Med J 2018;8(4):34-40.

8. Seviner M, Kozacı N, Ay MO. Analysis of Judicial Cases at Emergency Department. Cukurova Medical Journal 2013;38(2):250-60.

9. Karasu M, Baransel Isır A, Aydın N, Dülger E. Assessing the Forensic Reports Documented bt Forensic Medicine Department of Medicine Faculty of Gaziantep University between 1998 and 2005 Years. Gaziantep Med J 2009;15(1):10-5.

10. Mutlu Kukul F, Bütün C, Yücel Beyaztaş F, Eren ŞH, Korkmaz İ. Evaluation of Forensic Cases Admitted to Cumhuriyet University Hospital. ADÜ Tıp Fakültesi Dergisi 2009;10(3):23-8.

11. Hakkoymaz H, Keten HS, Artuç S. Evaluation of Medico-Legal Reports in Respect of the Turkish Penal Code. J Kartal TR 2014;25(3):177-80.

12. Arslanoğlu A, İlhan MN, Bumin MA. The Features of Forensic Cases Treated in the Van Military Hospital Emergency Room. Gazi Med J 2007;18(1):22-5.

13. Levent S, Pamukçu Günaydın G, Şahin Kavaklı H, Kurtoğlu Çelik G, Coşkun S. A Retrospectıve Seasonal Analysis of Forensic Cases Admitted to an Emergency Department in a year. J For Med 2015;29(1):1-5.

14. Korkmaz T, Kahramansoy N, Erkol Z, Saricil F, Kilic A. Evaluation of the Forensic Patients Presenting to the Emergency Department and Legal Reports. Haseki Med J 2012;50(1):14-21.

15. Yemenici S, Sayhan MB, Salt Ö, Yılmaz A. Evaluation of Medicolegal Reports Prepared in Emergency Department. Journal of Harran University Medical Faculty 2017;14(3):179-86.

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# Exploring the Impact of Prophylactic Antibiotics During Cesarean Delivery on Neonatal Microbiota: A Comprehensive Review Article

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**Abstract**

The use of prophylactic antibiotics during cesarean sections (CS) significantly impacts neonatal health by influencing the early colonization of the gut microbiota. Administered before surgical incision, these antibiotics cross the placenta, exposing the fetus to microbial disruptions at a critical stage of immune system development. This study examines the effects of perinatal antibiotic exposure on neonatal gut microbiota composition and its long-term health implications. Findings indicate that antibiotics disrupt microbial diversity, reduce beneficial bacteria like Bifidobacterium, and promote colonization by opportunistic pathogens. Such alterations have been linked to increased risks of obesity, inflammatory bowel disease, and metabolic disorders later in life. Maternal antibiotic use also affects vertical microbial transmission, altering the maternal vaginal and gut microbiota and exposing newborns to antibiotic residues through breast milk. While prophylactic antibiotics effectively reduce perinatal infections, their widespread use raises concerns about antibiotic resistance and long-term health consequences. Experimental studies show that even a single dose during critical developmental windows can predispose neonates to chronic diseases. This study highlights the need for careful evaluation of antibiotic use during the perinatal period to minimize adverse effects on neonatal microbiota and optimize long-term health outcomes. Identifying modifiable risk factors and refining clinical guidelines are essential steps toward balancing the benefits of infection prevention with the risks of microbiota disruption.

**Key Words:** Prophylactic Antibiotics, Cesarean Section, Neonatal Microbiota, Microbial Diversity

**Sezaryen Doğumlarda Kullanılan Profilaktik Antibiyotiklerin Yenidoğan Mikrobiyotası Üzerindeki Uzun Vadeli Etkileri: İnceleme Makalesi**

**Özet**

Sezaryen doğumlarda (CS) kullanılan profilaktik antibiyotikler, yenidoğan sağlığı üzerinde önemli etkiler yaratarak bağırsak mikrobiyotasının erken kolonizasyonunu etkilemektedir. Cerrahi kesiden önce uygulanan bu antibiyotikler plasentayı geçerek fetüsü, bağışıklık sisteminin gelişiminde kritik bir aşamada mikrobiyal bozulmalara maruz bırakmaktadır. Bu çalışma, perinatal dönemde antibiyotik maruziyetinin yenidoğan bağırsak mikrobiyotası üzerindeki etkilerini ve bunun uzun vadeli sağlık sonuçlarını incelemektedir. Bulgular, antibiyotiklerin mikrobiyal çeşitliliği bozduğunu, Bifidobacterium gibi faydalı bakterilerin azalmasına ve fırsatçı patojenlerin kolonizasyonunun artmasına yol açtığını göstermektedir. Bu tür değişimlerin, ilerleyen yaşamda obezite, inflamatuvar bağırsak hastalıkları ve metabolik bozukluklar riskini artırdığı tespit edilmiştir. Anneye uygulanan antibiyotikler ayrıca, maternal vajinal ve bağırsak mikrobiyotasını değiştirerek mikrobiyal dikey geçişi etkilemekte ve anne sütü yoluyla antibiyotik kalıntılarına maruz kalmaya neden olmaktadır. Profilaktik antibiyotikler perinatal enfeksiyonları etkili bir şekilde azalttığı halde, yaygın kullanımları antibiyotik direnci ve uzun vadeli sağlık üzerindeki olumsuz etkilerle ilgili endişelere yol açmaktadır. Deneysel çalışmalar, kritik gelişim dönemlerinde tek bir terapötik dozun bile yenidoğanlarda kronik hastalıklara yatkınlık oluşturabilecek mikrobiyota değişimlerine neden olabileceğini göstermektedir. Bu çalışma, perinatal dönemde antibiyotik kullanımının dikkatle değerlendirilmesi gerektiğini, yenidoğan mikrobiyotasına yönelik olumsuz etkilerin en aza indirilmesi ve uzun vadeli sağlık sonuçlarının optimize edilmesi için modifiye edilebilir risk faktörlerinin belirlenmesinin önemini vurgulamaktadır. Enfeksiyon önlemenin faydaları ile mikrobiyota bozulmalarının risklerini dengelemek amacıyla klinik kılavuzların yeniden gözden geçirilmesi kritik öneme sahiptir.

**Anahtar kelimeler:** Profilaktik Antibiyotikler, Sezaryen Doğum, Yenidoğan Mikrobiyotası, Mikrobiyal Çeşitlilik

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## INTRODUCTION

Human and microbial genomes have co-evolved over millennia, forming an intricate and inseparable relationship between their metabolic and survival systems. The gut microbiota, a complex ecosystem comprising bacteria, viruses, and unicellular eukaryotes, plays a central role in this symbiosis. While the term "microbiota" refers to all microorganisms inhabiting the human body, "microbiome" encompasses their collective genomes, gene products, and metabolic activities (1,2). Humans, as superorganisms, consist of approximately 10% human cells and 90% microbial cells (1,3). Although the human genome consists of around 35,000 genes, bacterial genomes collectively contribute over two million genes, making their genetic repertoire about 150 times larger than that of humans—a concept referred to as the hologenome (4). The surface area occupied by gut bacteria spans approximately 400 $m^2$, and their collective weight ranges between 1.5-2 kg (5,6). The gut microbiota includes roughly 100 trillion cells ($10^{14}$), including bacteria, viruses, and unicellular eukaryotes (7).

Each individual's gut microbiota is unique, much like a fingerprint, consisting of both shared and individualized microbial compositions. This microbial diversity is shaped by endogenous and exogenous factors, including geographic location, genetic predisposition, mode of birth, age, lifestyle, diet, antibiotic use, and medical history. For instance, Firmicutes bacteria generally increase with age, whereas Bacteroidetes tend to decrease. Dietary habits also play a pivotal role, with high-protein and animal-fat diets influencing the abundance of Bacteroides, while carbohydrate-rich and vegetarian diets favor Prevotella. Resistant starch consumption has been associated with an increase in the Ruminococcus family. Antibiotic use, however, disrupts the microbiota, leading to transient or lasting dysbiosis depending on the antibiotic type and the stage of life during which it is administered (1,2,7).

The colonization of the gut microbiota begins at birth through bacterial transmission from the mother and surrounding environment (7). While neonatal flora was historically considered sterile, evidence now suggests the presence of microbiota in meconium, likely derived from the maternal microbiota, thereby shaping the neonatal gut even before birth (4). During delivery, the mode of birth significantly influences microbiota development. Vaginal

delivery (VD) exposes the newborn to microorganisms from the maternal genitourinary tract, whereas cesarean section (CS) primarily transfers skin flora. Research by Jakobsson et al. indicates that CS deliveries result in reduced gut microbiome diversity and lower *Bacteroidetes* abundance (11).

The long-term effects of gut microbiota colonization on health and disease are an area of growing scientific interest. The microbial composition established during infancy serves as a blueprint for lifelong health. Early interactions between commensal microorganisms and the mucosal surfaces are critical for immune system development (13). Although postnatal factors are thought to dominate microbiota development, prenatal influences are increasingly recognized as contributors to the infant microbiome (14). Perinatal factors such as delivery mode, feeding type, gestational age, and exposure to medications—particularly antibiotics—affect gut colonization, with maternal antibiotic use during pregnancy being a significant modifier (15,16).

Prophylactic antibiotics administered during CS prior to surgical incision cross the placenta, exposing the fetus to antibiotics at a crucial stage of microbiome development. Evidence suggests that newborns delivered via CS face higher risks of obesity, though the extent to which this is attributable to perinatal antibiotic exposure remains unclear. Investigating the microbiota in meconium can provide insights into how intrauterine factors influence the earliest stages of gut colonization.

This study focuses on the long-term health impacts of antibiotics administered during cesarean sections, specifically examining disruptions to the neonatal gut microbiota. By exploring how early microbial imbalances contribute to health outcomes, this research aims to uncover pathways that link early-life microbial disruptions with the development of chronic health conditions.

## GENERAL INFORMATION

### Microbiota

Human and microbial genomes have co-evolved, forming a symbiotic relationship that integrates their metabolic activities. The gut microbiota, consisting of archaea, bacteria, viruses, and fungi, plays a vital role in human health (17,18). While "microbiota" refers to these microorganisms collectively, "microbiome" describes their genomes (4). Humans, as superorganisms, comprise 10% human cells and 90% microbial cells, with the microbiota possessing a gene pool 150 times larger than the human genome (1). An adult’s gut microbiota includes around $10^{14}$ cells, weighing 1.5–2 kg,

and is now considered an "organ" with significant physiological influence (6).

The gut microbiota is most abundant in the colon, where it outnumbers human cells in the body. Its composition is influenced by factors such as diet, age, and lifestyle. Advanced molecular methods, including 16S rRNA sequencing and metagenomic analysis, have enabled a deeper understanding of the microbiota's diversity and functionality (22). Dysbiosis, an imbalance in the microbiota, is linked to conditions like obesity, diabetes, and cancer (23,24). The Firmicutes-to-Bacteroidetes ratio, often associated with diet, plays a key role in metabolic health (24).

The Human Microbiome Project, launched in 2007, has provided valuable insights into the microbiota, yet many areas remain unexplored. Continued research is essential to fully understand its implications for health and disease (1).

**Formation of the Microbiota**

The gut microbiota is unique to each individual, influenced by factors such as birth mode (CS or VD), diet, age, genetics, lifestyle, antibiotic use, and past illnesses (18). While early studies suggested that microbiota formation began at birth, recent evidence shows that colonization starts during the intrauterine period, with bacteria such as *Escherichia, Shigella*, and *Streptococcus* detected in meconium (8,25). These bacteria, transferred from the mother, shape the neonatal microbiota even before birth (4).

The mode of birth is one of the most influential factors in early microbiota formation. Vaginal delivery exposes newborns to the mother's vaginal microbiota, including *Lactobacillus* and *Prevotella*, whereas cesarean section leads to colonization by skin flora, such as *Streptococcus* and *Corynebacterium* (8,26). These early colonization patterns impact health throughout life, with VD-associated microbiota generally promoting higher diversity and beneficial bacterial species like *Bifidobacterium* and *Bacteroides*. In contrast, CS is associated with delayed colonization of *Bacteroidetes* and higher prevalence of *C. difficile* (15,27).

Immunological and metabolic disorders have also been linked to birth mode. Studies indicate that CS increases risks of inflammatory bowel disease, celiac disease, and obesity. For instance, Blustein et al. reported that children born via CS were 1.83 times more likely to develop obesity by age 11, especially if born to obese mothers (25,26). These findings highlight the lasting impact of birth mode on microbiota and subsequent health outcomes.

**Diet**

Diet significantly influences the gut microbiota. Breastfed infants typically have microbiota dominated by *Bifidobacterium* and

*Lactobacillus*, while formula-fed infants exhibit a higher prevalence of *Enterococcus*, *Bacteroides*, and *Clostridia* (4,7). Studies show that breastfed babies have a healthier gut microbiota composition compared to formula-fed ones, with reduced colonization of pathogens like *C. difficile* (15). In adults, fiber-rich diets promote Firmicutes species that metabolize complex carbohydrates, while animal-based diets favor bile-resistant species like *Bacteroides* (16,27). Comparative studies, such as those by Filippo et al., reveal that diets rich in plant-based foods are associated with *Prevotella* dominance, while meat-based diets correlate with higher *Bacteroides* levels (25).

**Age**

The gut microbiota undergoes rapid changes in early life, stabilizing around age three. Vaginally delivered infants acquire microbiota resembling the maternal vaginal flora, whereas cesarean-delivered infants are colonized by skin flora (4). Breastfeeding fosters *Bifidobacterium* dominance, which decreases with the introduction of solid foods (4-6). In aging individuals, beneficial bacteria like Bifidobacterium and *F. prausnitzii* decline, while pro-inflammatory species such as *E. coli* and *Proteobacteria* increase, contributing to age-related health challenges (28-29).

**Genetic Structure**

Genetics also play a role in microbiota composition. Studies on twins show that monozygotic twins share more similar microbiotas than dizygotic twins, suggesting a genetic influence. The *Christensenellaceae* family, highly heritable, is linked to lower body mass index (29-30).

**Lifestyle**

Physical activity enhances gut microbiota diversity and supports metabolic health. Active individuals, including athletes, exhibit higher microbial richness compared to sedentary individuals, with increased populations of beneficial bacteria like *Akkermansiaceae* and *Faecalibacterium* (25-27). Exercise also modulates gut flora, promoting bacteria linked to improved inflammatory and metabolic parameters. Combining regular exercise with dietary modifications can help prevent or manage chronic diseases (2,27).

**Geographic Location**

Gut microbiota composition varies significantly across geographic regions due to environmental factors, diet, and microbial pressures. Seasonal food availability also influences microbiota diversity, with fiber-rich diets during rainy seasons favoring *Bacteroides* and *Prevotella*, while dry seasons reduce their abundance (26). Differences in genetic backgrounds, regional diets, and sanitation levels further shape

microbiota profiles, making geographic factors critical in microbial diversity (27-28).

Studies comparing rural and urban populations have revealed distinct patterns. For example, African children consuming fiber-rich diets exhibit higher microbial diversity, dominated by *Prevotella*, *Xylanibacter*, and *Treponema*, compared to Italian children with animal-based diets, who have more *Firmicutes* and *Proteobacteria* (27-28). Similarly, rural indigenous Africans, with low colon cancer risk, have gut microbiotas enriched with butyrate-producing bacteria and *Prevotella*, unlike African Americans, whose microbiotas are dominated by *Bacteroides* and secondary bile acids (30).

Comparisons between rural communities in Venezuela and Malawi and urban populations in the USA highlight the dominance of *Prevotella* in rural microbiotas versus *Bacteroides* in urban samples. These variations align with dietary differences, such as higher fiber consumption in rural areas. Metagenomic analyses suggest adaptations in rural microbiotas, including enhanced glycan metabolism for energy extraction from breast milk, a potential response to limited nutrition (32).

Finally, studies comparing Bangladeshi children in slums and affluent American children show lower *Bacteroides* and richer *Prevotella* and Oscillospira in Bangladeshi children, reflecting dietary and environmental influences on microbiota composition (33).

**Antibiotic Use**

Antibiotics, widely used in healthcare and agriculture, significantly impact gut microbiota. Exposure can occur via short-term high doses or long-term low doses from contaminated food and water. Studies highlight the adverse effects of antibiotics on microbial diversity and balance, critical for health. For instance, clindamycin exposure reduces *Bacteroides* diversity for up to two years (35). Broad-spectrum antibiotics, like fluoroquinolones, can decrease microbial diversity by 25% and disrupt core taxa, increasing the *Bacteroidetes*/*Firmicutes* ratio (36). Antibiotic-associated diarrhea, often linked to *C. difficile*, affects 5–29% of users, further underscoring the risks of overuse (37).

**Medications: Impact on Microbiota**

Medications such as proton pump inhibitors (PPIs), laxatives, and NSAIDs also alter the microbiota. PPIs, by suppressing gastric acid, increase pathogenic bacteria like C. difficile and Salmonella spp. (11). Meta-analyses link PPIs to small intestine bacterial overgrowth and heightened risks of NSAID-induced enteropathy (27). Combined use of PPIs and NSAIDs, however, may reduce gastrointestinal bleeding.

**Prebiotic Use: Impact on Microbiota**

Prebiotics, indigestible food components, selectively promote beneficial bacteria like *Bifidobacterium* and *Lactobacillus*. Natural sources include artichokes, bananas, asparagus, and flaxseed. Prebiotic intake enhances short-chain fatty acid production, intestinal integrity, and immune function while reducing inflammation and body weight (9-11, 27). In newborns, formula containing prebiotics increases beneficial bacteria and lowers atopic disease risks (39). Regular prebiotic consumption helps restore gut microbiota balance and diversity.

**Probiotic Use: Impact on Microbiota**

Probiotics are live microorganisms that, when consumed adequately, enhance gut health by modulating microbiota composition, reducing pathogenic bacteria, and providing immune support. Common probiotics include *Lactobacillus spp., Bifidobacterium spp.*, and *Saccharomyces boulardii*, found in breast milk, fermented dairy products, and bioactive supplements (39,40). Regular probiotic consumption has shown benefits for gastrointestinal disorders like Crohn's disease and irritable bowel syndrome, as well as metabolic conditions such as obesity. Studies highlight increased *Bifidobacteria* and *Lactobacilli* diversity with consistent probiotic use (32).

**Placental Microbiome**

Recent research challenges the notion that the intrauterine environment is sterile. Studies have identified bacterial DNA in amniotic fluid, placenta, and fetal tissues, suggesting maternal gut microbiota may influence fetal development via the placenta (36,42). Commonly detected bacteria include *Firmicutes, Bacteroidetes, and Proteobacteria*, overlapping with the maternal oral microbiota. However, contamination and pseudo-kitome issues complicate the confirmation of a true placental microbiome (23,24).

Despite debates, maternal microbiota metabolites, such as SCFAs, are known to cross the placenta, shaping fetal immune development. Pregnancy-related microbiota changes, such as reduced diversity and increased Proteobacteria, are considered adaptive to support fetal growth. A fiber-rich diet during pregnancy further enhances beneficial outcomes, protecting offspring from asthma through immune modulation mechanisms like HDAC9 inhibition and Treg cell activation (1-7,33).

**Neonatal Microbiota**

Contrary to the belief that microbiota development begins at birth, studies suggest that colonization starts prenatally. Microorganisms have been detected in the placenta, amniotic fluid, and meconium of newborns, indicating

vertical transmission from the mother via the bloodstream, vaginal tract, or dendritic cells (46-47). The neonatal microbiota is highly dynamic, influenced by factors such as birth mode, antibiotic exposure, breastfeeding, and the transition to solid foods. While the microbiota in newborns has low diversity, it is dominated by beneficial *Bifidobacterium* species, particularly in breastfed infants, alongside *Streptococcus, Bacteroides, and Clostridia* (50-51).

By age three, the gut microbiota stabilizes, though it remains distinct from adult microbiota. Modern lifestyle factors like cesarean delivery, antibiotics, and reduced environmental exposures are linked to immune-related diseases, emphasizing the importance of the "critical window" for microbiota development in early life (27). Studies have demonstrated that early-life antibiotic use can increase the risk of diseases such as asthma, highlighting the long-term impact of neonatal microbiota disruption (41).

### Placental Microbiome

Research into the placental microbiome has revealed bacterial DNA and microorganisms in amniotic fluid and placenta, challenging the notion of a sterile intrauterine environment. Commonly detected bacteria include *Firmicutes, Bacteroidetes, and Proteobacteria*, which overlap with the oral microbiota. These findings suggest maternal microbiota influences fetal development via the placenta (11,24). However, contamination and kit microbiome issues have raised debates about whether the placenta hosts a true microbiome (23-26).

During pregnancy, maternal microbiota undergoes adaptive changes, such as decreased diversity and increased *Proteobacteria*. These changes support fetal immune development by modulating bacterial metabolite pools, such as SCFAs. Fiber-rich diets during pregnancy are particularly beneficial, potentially reducing asthma risk in offspring through immune regulation mechanisms like HDAC9 inhibition and Treg activation (28-33).

## ANTIBIOTIC EXPOSURE AND THE MICROBIOTA

### Impact of Antibiotics on Microbiota

Broad-spectrum antibiotics are commonly used in infancy to prevent infections, but their overuse disrupts gut microbiota, reduces diversity, and may increase susceptibility to diseases like *C. difficile* infection (7,21). Early antibiotic exposure alters microbial populations, favoring *Proteobacteria, Actinobacteria,* and *Lactobacillus*, and is linked to long-term health risks such as asthma, metabolic disorders, and IBD (19,20,26). Studies in murine models also demonstrate that antibiotics disrupt microbiota-related bile acid and glucose metabolism, increasing fat accumulation and colonic SCFA levels (23).

**Perinatal Antibiotic Exposure and Microbiota**

Perinatal antibiotic exposure, including maternal and neonatal use, impacts gut colonization and is associated with complications like bronchopulmonary dysplasia, obesity, and increased antibiotic resistance (27). Antibiotics prescribed during pregnancy, particularly Beta-Lactams, are commonly used to prevent GBS infections and maternal morbidity during cesarean delivery (28-29). Prophylactic antibiotics cross the placenta, affecting neonatal microbiota development at a critical stage (34).

Antibiotics used in late pregnancy have been linked to increased birth weight, while those used earlier are associated with lower birth weights and changes in fetal fat accumulation (21,22). Early-life antibiotic exposure disrupts the neonatal microbiota, increasing obesity risk and influencing metabolic phenotypes (8,9). CS births, which involve higher antibiotic exposure, are particularly associated with altered gut microbiota and long-term health risks.

Identifying modifiable perinatal risk factors could help mitigate complications like obesity and immune-related disorders later in life. Addressing antibiotic use during this critical window is essential for promoting healthy microbiota development and reducing long-term health risks.

**CONCLUSION**

This study underscores the complex relationship between prophylactic antibiotic use during cesarean sections (CS) and neonatal health outcomes. Antibiotics administered before surgical incision cross the placenta and influence microbial colonization at a critical stage of gut development, which is vital for immune system modulation. Early disruptions in gut microbiota due to antibiotics have been linked to long-term health risks, including obesity, inflammatory bowel disease, and metabolic disorders.

Maternal antibiotic use during labor impacts neonatal microbiota through direct transfer via the umbilical cord and indirect effects on the maternal vaginal and gut microbiome, altering vertical microbial transmission. Antibiotic residues in breast milk further expose breastfed infants, compounding these effects. While prophylactic antibiotics reduce perinatal infection rates, their role in altering microbial diversity and promoting antibiotic resistance remains a concern.

Studies highlight a reduction in *Bifidobacterium* colonization and persistent microbiota alterations in infants exposed to intrapartum or postnatal antibiotics. Experimental evidence shows that even a single therapeutic dose of antibiotics during critical windows of microbiome development can predispose neonates to chronic conditions like obesity and inflammatory diseases. Identifying modifiable risk factors, such as the timing and necessity of antibiotic use during the perinatal period, offers opportunities

to mitigate these risks and promote healthier long-term outcomes.

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## REFERENCES

1. Macpherson AJ, de Agüero MG, Ganal-Vonarburg SC. How nutrition and the maternal microbiota shape the neonatal immune system. Nat Rev Immunol. 2017;17(8):508-517.doi:10.1038/nri.2017.58
2. Martino C, Dilmore AH, Burcham ZM, Metcalf JL, Jeste D, Knight R. Microbiota succession throughout life from the cradle to the grave. Nat Rev Microbiol. 2022;20(12):707-720. doi:10.1038/s41579-022-00720-9
3. Sato Y, Sakurai K, Tanabe H, Kato T, Nakanishi Y, Ohno H, Mori C. Maternal gut microbiota is associated with newborn anthropometrics in a sex-specific manner. J Dev Orig Health Dis. 2019;10(6):659-666. doi:10.1017/S2040174419000286
4. Haro C, Garcia-Carpintero S, Alcala-Diaz JF, Gomez-Delgado F, Delgado-Lista J, Perez-Martinez P, Rangel Zuniga OA, Quintana-Navarro GM, Landa BB, Clemente JC, Lopez-Miranda J, Camargo A, Perez-Jimenez F. The gut microbial community in metabolic syndrome patients is modified by diet. J Nutr Biochem. 2016;27:27-31. doi:10.1016/j.jnutbio.2015.08.012
5. Koren O, Goodrich JK, Cullender TC, Spor A, Laitinen K, Bäckhed HK, Gonzalez A, Werner JJ, Angenent LT, Knight R, Bäckhed F, Isolauri E, Salminen S, Ley RE. Host remodeling of the gut microbiome and metabolic changes during pregnancy. Cell. 2012;150(3):470-80. doi:10.1016/j.cell.2012.07.008
6. Thorburn AN, McKenzie CI, Shen S, Stanley D, Macia L, Mason LJ, Roberts LK, Wong CH, Shim R, Robert R, Chevalier N, Tan JK, Mariño E, Moore RJ, Wong L, McConville MJ, Tull DL, Wood LG, Murphy VE, Mattes J, Gibson PG, Mackay CR. Evidence that asthma is a developmental origin disease influenced by maternal diet and bacterial metabolites. Nat Commun. 2015;6:7320. doi:10.1038/ncomms8320
7. Sarkar A, Yoo JY, Valeria Ozorio Dutra S, Morgan KH, Groer M. The association between early-life gut microbiota and long-term health and diseases. J Clin Med. 2021;10(3):459. doi:10.3390/jcm10030459
8. Liang D, Leung RKK, Guan W, Au WW. Involvement of gut microbiome in human health and disease: Brief overview, knowledge gaps and research opportunities. Gut Pathog. 2018;10(1):1-9. doi:10.1186/s13099-018-0230-4

9. Jiménez E, Marín ML, Martín R, Odriozola JM, Olivares M, Xaus J. Is meconium from healthy newborns actually sterile? Res Microbiol. 2008;159(3):187-193. doi:10.1016/j.resmic.2007.12.007

10. Collado MC, Rautava S, Aakko J, Isolauri E, Salminen S. Human gut colonisation may be initiated in utero by distinct microbial communities in the placenta and amniotic fluid. Sci Rep. 2016;6:1-13. doi:10.1038/srep23129

11. Milani C, Duranti S, Bottacini F, Casey E, Turroni F, Mahony J. The First Microbial Colonizers of the Human Gut: Composition, Activities, and Health Implications of the Infant Gut Microbiota. Microbiol Mol Biol Rev. 2017;81(4):1-67. doi:10.1128/MMBR.00036-17

12. Bäckhed F, Roswall J, Peng Y, Feng Q, Jia H, Kovatcheva-Datchary P, Li Y, Xia Y, Xie H, Zhong H, Khan MT, Zhang J, Li J, Xiao L, Al-Aama J, Zhang D, Lee YS, Kotowska D, Colding C, Tremaroli V, Yin Y, Bergman S, Xu X, Madsen L, Kristiansen K, Dahlgren J, Wang J. Dynamics and Stabilization of the Human Gut Microbiome during the First Year of Life. Cell Host Microbe. 2015;17(6):852. doi:10.1016/j.chom.2015.05.012

13. Dierikx TH, Visser DH, Benninga MA, van Kaam AHLC, de Boer NKH, de Vries R, Van Limbergen J, De Meij TGJ. The influence of prenatal and intrapartum antibiotics on intestinal microbiota colonisation in infants: A systematic review. J Infect. 2020;81(2):190-204. doi:10.1016/j.jinf.2020.04.011

14. Russell SL, Gold MJ, Hartmann M, Willing BP, Thorson L, Wlodarska M, Gill N, Blanchet MR, Mohn WW, McNagny KM, Finlay BB. Early life antibiotic-driven changes in microbiota enhance susceptibility to allergic asthma. EMBO Rep. 2012;13(5):440-7. doi:10.1038/embor.2012.32

15. Cox LM, Yamanishi S, Sohn J, Alekseyenko AV, Leung JM, Cho I, Kim SG, Li H, Gao Z, Mahana D, Zárate Rodriguez JG, Rogers AB, Robine N, Loke P, Blaser MJ. Altering the intestinal microbiota during a critical developmental window has lasting metabolic consequences. Cell. 2014;158(4):705-721. doi:10.1016/j.cell.2014.05.052

16. García-Mantrana I, Selma-Royo M, González S, Parra-Llorca A, Martínez-Costa C, Collado MC. Distinct maternal microbiota clusters are associated with diet during pregnancy: impact on neonatal microbiota and infant growth during the first 18 months of life. Gut Microbes. 2020;11(4):962-978. doi:10.1080/19490976.2020.1712987

17. Ma J, Li Z, Zhang W, Zhang C, Zhang Y, Mei H, Zhuo N, Wang H, Wang L, Wu D. Comparison of gut microbiota in exclusively breast-fed and formula-fed babies: a study of 91 term infants. Sci Rep. 2020;10(1):15792. doi:10.1038/s41598-020-72851-7

18. Ho NT, Li F, Lee-Sarwar KA, Tun HM, Brown BP, Pannaraj PS, Bender JM, Azad MB, Thompson AL, Weiss ST, Azcarate-Peril MA, Litonjua AA, Kozyrskyj AL, Jaspan HB, Aldrovandi GM, Kuhn L. Meta-analysis of effects of exclusive breastfeeding on infant gut microbiota across populations. Nat Commun. 2018;9(1):4169. doi:10.1038/s41467-018-06473-x

19. Al Nabhani Z, Dulauroy S, Marques R, Cousu C, Al Bounny S, Déjardin F, Sparwasser T, Bérard M, Cerf-Bensussan N, Eberl G. A Weaning Reaction to Microbiota Is Required for Resistance to Immunopathologies in the Adult. Immunity. 2019;50(5):1276-1288.e5. doi:10.1016/j.immuni.2019.03.020

20. Goodrich JK, Davenport ER, Beaumont M, Jackson MA, Knight R, Ober C, Spector TD, Bell JT, Clark AG, Ley RE. Genetic Determinants of the Gut Microbiome in UK

Twins. Cell Host Microbe. 2016;19(5):731-43. doi:10.1016/j.chom.2016.04.017

21. Sarkar A, Yoo JY, Valeria Ozorio Dutra S, Morgan KH, Groer M. The Association between Early-Life Gut Microbiota and Long-Term Health and Diseases. J Clin Med. 2021;10(3):459. doi:10.3390/jcm10030459

22. Boudry G, Charton E, Le Huerou-Luron I, Ferret-Bernard S, Le Gall S, Even S. The relationship between breast milk components and the infant gut microbiota. Front Nutr. 2021;8:1-21. doi:10.3389/fnut.2021.644666

23. Arrieta MC, Stiemsma LT, Amenyogbe N, Brown E, Finlay B. The intestinal microbiome in early life: Health and disease. Front Immunol. 2014;5:427. doi:10.3389/fimmu.2014.00427

24. Bergström A, Skov TH, Bahl MI, Roager HM, Christensen LB, Ejlerskov KT. Establishment of intestinal microbiota during early life: A longitudinal, explorative study of a large cohort of Danish infants. Appl Environ Microbiol. 2014;80(9):2889-900. doi:10.1128/AEM.00342-14

25. Duranti S, Lugli GA, Mancabelli L, Armanini F, Turroni F, James K. Maternal inheritance of bifidobacterial communities and bifidophages in infants through vertical transmission. Microbiome. 2017;5(1):1-13. doi:10.1186/s40168-017-0248-5

26. Duranti S, Lugli GA, Milani C, James K, Mancabelli L, Turroni F. Bifidobacterium bifidum and the infant gut microbiota: an intriguing case of microbe-host co-evolution. Environ Microbiol. 2019;21(10):3683-95. doi:10.1111/1462-2920.14756

27. Turroni F, Milani C, Duranti S, Lugli GA, Bernasconi S, Margolles A. The infant gut microbiome as a microbial organ influencing host well-being. Ital J Pediatr. 2020;46(1):1-13. doi:10.1186/s13052-020-0773-8

28. Vallès Y, Artacho A, Pascual-García A, Ferrús ML, Gosalbes MJ, Abellán JJ. Microbial succession in the gut: directional trends of taxonomic and functional change in a birth cohort of Spanish infants. PLoS Genet. 2014;10(6):e1004406. doi:10.1371/journal.pgen.1004406

29. Yatsunenko T, Rey FE, Manary MJ, Trehan I, Dominguez-Bello MG, Contreras M, Magris M, Hidalgo G, Baldassano RN, Anokhin AP, Heath AC, Warner B, Reeder J, Kuczynski J, Caporaso JG, Lozupone CA, Lauber C, Clemente JC, Knights D, Knight R, Gordon JI. Human gut microbiome viewed across age and geography. Nature. 2012;486(7402):222-7. doi:10.1038/nature11053

30. Kalbermatter C, Fernandez Trigo N, Christensen S, Ganal-Vonarburg SC. Maternal Microbiota, Early Life Colonization and Breast Milk Drive Immune Development in the Newborn. Front Immunol. 2021;12:683022. doi:10.3389/fimmu.2021.683022

31. Penders J, Stobberingh EE, van den Brandt PA, Thijs C. The role of the intestinal microbiota in the development of atopic disorders. Allergy. 2007;62(11):1223-36. doi:10.1111/j.1398-9995.2007.01462.x

32. Hu J, Nomura Y, Bashir A, Fernandez-Hernandez H, Itzkowitz S, Pei Z, Stone J, Loudon H, Peter I. Diversified microbiota of meconium is affected by maternal diabetes status. PLoS One. 2013;8(11):e78257. doi:10.1371/journal.pone.0078257

33. Ardissone AN, De La Cruz DM, Davis-Richardson AG, Rechcigl KT, Li N, Drew JC, Murgas-Torrazza R, Sharma R, Hudak ML, Triplett EW, Neu J. Meconium microbiome analysis identifies bacteria correlated with premature birth. PLoS One. 2014;9(3):e90784. doi:10.1371/journal.pone.0090784

34. Funkhouser LJ, Bordenstein SR. Mom knows best: the universality of maternal microbial transmission. PLoS Biol.

2013;11(8):e1001631. doi:10.1371/journal.pbio.1001631

35. Dror DK, Allen LH. Overview of nutrients in human milk. Adv Nutr. 2018;9(suppl_1):278S-294S. doi:10.1093/advances/nmy022

36. Walker A. Breast milk as the gold standard for protective nutrients. J Pediatr. 2010;156(2 Suppl):S3-7. doi:10.1016/j.jpeds.2009.11.021

37. Fallani M, Amarri S, Uusijarvi A, Adam R, Khanna S, Aguilera M, Gil A, Vieites JM, Norin E, Young D, Scott JA, Doré J, Edwards CA. Determinants of the human infant intestinal microbiota after the introduction of first complementary foods in infant samples from five European centres. Microbiology (Reading). 2011;157(Pt 5):1385-1392. doi:10.1099/mic.0.042143-0

38. Arrieta MC, Stiemsma LT, Amenyogbe N, Brown EM, Finlay B. The intestinal microbiome in early life: health and disease. Front Immunol. 2014;5:427. doi:10.3389/fimmu.2014.00427

39. Fernández L, Langa S, Martín V, Maldonado A, Jiménez E, Martín R, Rodríguez JM. The human milk microbiota: origin and potential roles in health and disease. Pharmacol Res. 2013;69(1):1-10. doi:10.1016/j.phrs.2012.09.001

40. Andres A, Cleves MA, Bellando JB, Pivik RT, Casey PH, Badger TM. Developmental status of 1-year-old infants fed breast milk, cow's milk formula, or soy formula. Pediatrics. 2012;129(6):1134-40. doi:10.1542/peds.2011-3121

41. Pozo-Rubio T, Capilla A, Mujico JR, De Palma G, Marcos A, Sanz Y, Polanco I, García-Novo MD, Castillejo G, Ribes-Koninckx C, Varea V, Palau F, Ortigosa L, Peña-Quintana L, Nova E. Influence of breastfeeding versus formula feeding on lymphocyte subsets in infants at risk of coeliac disease: the PROFICEL study. Eur J Nutr. 2013;52(2):637-46. doi:10.1007/s00394-012-0372-4

42. Whelan K, Quigley EM. Probiotics in the management of irritable bowel syndrome and inflammatory bowel disease. Curr Opin Gastroenterol. 2013;29(2):184-9. doi:10.1097/MOG.0b013e32835d7bba

43. Harmsen HJ, Wildeboer-Veloo AC, Raangs GC, Wagendorp AA, Klijn N, Bindels JG, Welling GW. Analysis of intestinal flora development in breast-fed and formula-fed infants by using molecular identification and detection methods. J Pediatr Gastroenterol Nutr. 2000;30(1):61-7. doi:10.1097/00005176-200001000-00019

44. Solís G, De Los Reyes-Gavilan CG, Fernández N, Margolles A, Gueimonde M. Establishment and development of lactic acid bacteria and bifidobacteria microbiota in breast-milk and the infant gut. Anaerobe. 2010;16(3):307-10. doi:10.1016/j.anaerobe.2010.03.001

45. Marques TM, Wall R, Ross RP, Fitzgerald GF, Ryan CA, Stanton C. Programming infant gut microbiota: influence of dietary and environmental factors. Curr Opin Biotechnol. 2010;21(2):149-56. doi:10.1016/j.copbio.2010.03.020

46. Musilova S, Modrackova N, Doskocil I, Svejstil R, Rada V. Influence of human milk oligosaccharides on adherence of bifidobacteria and clostridia to cell lines. Acta Microbiol Immunol Hung. 2017;64(4):415-422. doi:10.1556/030.64.2017.049

47. Martín R, Jiménez E, Heilig H, Fernández L, Marín ML, Zoetendal EG, Rodríguez JM. Isolation of bifidobacteria from breast milk and assessment of the bifidobacterial population by PCR-denaturing gradient gel electrophoresis and quantitative real-time PCR. Appl Environ Microbiol. 2009;75(4):965-9. doi:10.1128/AEM.02063-08

48. Martín R, Heilig GHJ, Zoetendal EG, Smidt H, Rodríguez JM. Diversity of the Lactobacillus group in breast milk and vagina of healthy women and potential role in the colonization of the infant gut. J Appl Microbiol. 2007;103:2638-2644. doi:10.1111/j.1365-2672.2007.03497.x

49. Scott FI, Horton DB, Mamtani R, Haynes K, Goldberg DS, Lee DY, Lewis JD. Administration of Antibiotics to Children Before Age 2 Years Increases Risk for Childhood Obesity. Gastroenterology. 2016;151(1):120-129.e5. doi:10.1053/j.gastro.2016.03.006

50. Shao X, Ding X, Wang B, Li L, An X, Yao Q, Song R, Zhang JA. Antibiotic Exposure in Early Life Increases Risk of Childhood Obesity: A Systematic Review and Meta-Analysis. Front Endocrinol (Lausanne). 2017;8:170. doi:10.3389/fendo.2017.00170

51. Alm B, Erdes L, Möllborg P, Pettersson R, Norvenius SG, Aberg N, Wennergren G. Neonatal antibiotic treatment is a risk factor for early wheezing. Pediatrics. 2008;121(4):697-702. doi:10.1542/peds.2007-1232

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# Digital and Substance Abuse Among Youth: A Public Health Nursing Perspective

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**Abstract**

This review carried out to examine the increasing prevalence of digital and substance addiction among young people, its causes and adverse effects on health. While digital addiction defined as a type of behavioral addiction that occurs when the use of social media, video games and the internet reach an excessive level, substance addiction includes the use of substances such as tobacco, alcohol, marijuana and e-cigarettes. Both types of addiction seriously affect the physical, psychological and social health of young people and reduce their quality of life. This study is based on a literature search in PubMed, Scopus and Google Scholar databases using the keywords "digital addiction", "substance abuse", "young people" and "public health nursing". Recent studies have revealed that these addictions are quite common among young people and often have common risk factors. It has been emphasized that public health nurses play an essential role in the prevention and management of addictions. Raising awareness about addictive behaviors among young people, organizing training programs, providing early interventions and providing counseling services are among the prominent strategies in this context. However, it is suggested that policymakers and health professionals should collaborate to overcome this problem by adopting a multidisciplinary approach.

**Key Words:** Digital addiction, Substance abuse, Young people, Public health nursing

**Gençler Arasında Dijital ve Madde Bağımlılığı: Halk Sağlığı Hemşireliği Perspektifi**

**Özet**

Bu derleme, gençler arasında giderek artan dijital ve madde bağımlılığının yaygınlığını, nedenlerini ve sağlık üzerindeki olumsuz etkilerini incelemek amacıyla gerçekleştirilmiştir. Dijital bağımlılık, sosyal medya, video oyunları ve internet kullanımının aşırı düzeye ulaşmasıyla ortaya çıkan bir davranışsal bağımlılık türü olarak tanımlanırken, madde bağımlılığı tütün, alkol, esrar ve e-sigara gibi maddelerin kullanımını kapsamaktadır. Her iki bağımlılık türü de gençlerin fiziksel, psikolojik ve sosyal sağlıklarını ciddi şekilde etkileyerek yaşam kalitesini düşürmektedir. Bu çalışma, "dijital bağımlılık", "madde bağımlılığı", "gençler" ve "halk sağlığı hemşireliği" anahtar kelimeleri kullanılarak PubMed, Scopus ve Google Scholar veri tabanlarında yapılan literatür taramasına dayanmaktadır. Güncel çalışmalar, gençler arasında bu bağımlılıkların oldukça yaygın olduğunu ve sıklıkla ortak risk faktörlerine sahip olduklarını ortaya koymuştur. Halk sağlığı hemşirelerinin bağımlılıkların önlenmesinde ve yönetiminde önemli bir rol oynadığı vurgulanmıştır. Gençler arasında bağımlılık davranışlarına yönelik farkındalık oluşturmak, eğitim programları düzenlemek, erken müdahaleler sağlamak ve danışmanlık hizmetleri sunmak, bu kapsamda öne çıkan stratejiler arasında yer almaktadır. Bununla birlikte, politika yapıcılar ve sağlık profesyonellerinin multidisipliner bir yaklaşım benimseyerek bu sorunun üstesinden gelmek için iş birliği yapması gerektiği önerilmektedir.

**Anahtar kelimeler:** Dijital bağımlılık, Madde bağımlılığı, Gençler, Halk sağlığı hemşireliği

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## INTRODUCTION

Digital and substance addiction are two important types of addiction that emerge with the rapidly changing technological and social dynamics of our age and negatively affect the

physical, psychological and social health of individuals. Digital addiction is a behavioral addiction characterized by individuals' excessive attachment to social media, video games, and other digital platforms. Digital addiction negatively affects the cognitive development, social relationships and academic success of individuals, especially in adolescence, making it difficult for them to have a healthy adulthood process (1). In addition, the increase in the time spent in front of the screen causes decreases in physical activity, obesity, disruptions in sleep patterns and chronic health problems (2,3).

Substance addiction, on the other hand, is an increasingly common problem among young people that occurs when individuals use substances such as tobacco, alcohol, marijuana and e-cigarettes uncontrollably. Substance addiction leads to permanent changes in brain chemistry by affecting neurobiological processes and negatively affects individuals' cognitive functions such as decision-making, attention, and emotional regulation (4). In addition, the increase in this addiction among young individuals causes serious problems both in terms of individual health and social costs (5).

The interaction between digital and substance abuse is strengthened, especially with the effect of social media and content spread on digital platforms. Advertisements and impressive content that encourage substance use published on social media platforms are an important risk factor that increases the susceptibility of young people to substance abuse (6). In addition, digital addiction facilitates the transition to substance addiction by triggering emotional problems such as loneliness, stress and anxiety in individuals (7). This situation shows that digital and substance addiction are intricately related to each other and that these types of addiction pose a multidimensional threat to public health.

Public health nurses play a critical role in the fight against addiction by providing preventive and curative services. Public health nursing, which aims to reduce addictive behaviors at both the individual and community level, makes significant contributions through educational programs, awareness-raising campaigns, and counseling services (8). Public health nurses also collaborate with psychologists, social workers and other health professionals through multidisciplinary approaches. This cooperation ensures the development and implementation of effective strategies in the fight against addictions.

This study aims to address the interactions between digital and substance abuse, the effects of these types of addiction on young individuals, and the role of public health nursing in this process. By examining the current research in the literature, it is aimed to offer solutions for the

prevention and management of addictions. In this context, the causes and effects of addictive behaviors among young people and the approaches that can be used to combat these addictions have been examined in detail.

## MATERIAL AND METHOD

This study was designed as a review study to comprehensively examine the existing literature on digital and substance abuse. Within the scope of the study, published research on digital addiction, substance abuse, youth and public health nursing were analyzed. The literature review conducted using PubMed, Scopus and Google Scholar databases. During the screening, the keywords "digital addiction", "substance abuse", "youth" and "public health nursing" were used in Turkish and English. During the selection of the studies, 60 studies published between 2013 and 2023 that provided important data on the subject were evaluated.

Inclusion criteria included that the study was methodologically sound, presented results on digital and substance abuse among young people, and was appropriate from a public health nursing perspective. However, theoretical studies, case reports and articles published before 2013 are excluded. The findings obtained from the studies were classified by thematic analysis method and presented on the axis of the effects of digital addiction, the prevalence and consequences of substance addiction, and the relationships between these two types of addiction.

This review study aims better understanding the effects of addiction types on young people and to shed light on strategies that can be applied from a public health nursing perspective. During the literature review, ethical rules were considered and all sources were cited accurately and completely.

## RESULTS

In this review study, the findings obtained as a result of a comprehensive literature review on digital and substance addiction are presented on the axis of digital addiction, substance addiction and the interaction between these two types of addiction.

### Physical, Psychological and Social Effects of Digital Addiction

The effects of digital addiction on young people emerge in different ways in physical, psychological and social health dimensions. Karaaslan et al. (2023) found that there is a negative relationship between digital game addiction and physical activity level and that addiction increases depression levels (3). Irmak and Çelikkalp (2022), on the other hand, emphasized that digital addiction is linked to physical health problems such as obesity, scoliosis, and vision problems. Mutlu and Tamer (2020) showed that as the motivation to play

digital games increased, the body mass index also increased (2,9).

In terms of psychological effects, digital addiction leads to problems such as depression, anxiety and loneliness in young people (10,11,12). Kaya and Vangölü (2023) stated that female students' digital addiction levels were higher than boys, but this addiction negatively affected their life satisfaction (7). In the context of social effects, Deveci Çolak (2021) stated that social media addiction reduces academic achievement and weakens the social relations of individuals (13).

**Prevalence and Effects of Substance Abuse**

Substance abuse stands out as a serious public health problem, especially among young people. Johnston et al. (2020) stated that the increase in alcohol and tobacco use among young people is associated with the accessibility of substances and advertising strategies (5). Volkow et al. (2019) drew attention to the effects of addictive substances on brain chemistry, showing that this negatively affects the cognitive development processes of young people (4).

Altay and Koç (2022) found that participation in physical activity reduces the risk of substance abuse and emphasized that sports activities are an effective tool in the fight against addiction (14). Kelly et al. (2022), on the other hand, stated that social support systems increase the effectiveness of substance abuse treatment in young people (15).

**The Relationship Between Digital and Substance Abuse**

The fact that there is a close interaction between digital addiction and substance addiction has been supported by many studies. Primack et al. (2017) showed that content promoting substance use on social media platforms increases the risk of addiction among young people(6). Koç et al. (2023) stated that physical inactivity and inappropriate family environments create a bridge between digital addiction and substance addiction (16).

Delebe and Hazar (2022) found that digital addiction negatively affects academic achievement and addiction weakens individuals' social functioning (17). Bağcı and Özer (2021), on the other hand, stated that male students are more prone to digital addiction and substance use, and this situation depends on the gender factor (18). It is seen that digital addiction increases emotional problems such as stress, loneliness and anxiety in individuals and strengthens the tendency to substance use (11,12, 4).

**Findings from a Public Health Nursing Perspective**

It has been widely discussed in the literature that public health nurses play a critical role in the fight against digital and substance abuse. Demir

(2022) showed that positive attitudes towards physical education and sports reduced the levels of digital addiction (19). Altınok (2021) emphasized the importance of public health nurses providing education and counseling services in early diagnosis of addictive behaviors in young people and in combating these problems (8).

Kaya and Van Lake (2023) stated that organizing training programs to increase public health nurses' awareness of addictive behaviors is an effective approach to preventing addictions (7). Kelly et al. (2022), on the other hand, revealed that multidisciplinary approaches give successful results in addiction treatment (15).

**ARGUMENT**

Digital and substance abuse are types of addiction that are becoming increasingly common among young people and pose significant threats to public health. The literature shows that these types of addiction often share common risk factors and can trigger each other (1,5). For example, it is known that digital addiction disrupts individuals' daily life activities, reduces physical activity levels, and causes health problems such as obesity (3,9). In addition, it is stated that content promoting substance use spread on digital platforms increases the susceptibility to substance abuse among young people (6).

Substance abuse is a common health problem that negatively affects individuals' neurobiological functions, social relationships, and psychological states. Volkow et al. (2019) stated that addictive substances regress cognitive development by affecting brain chemistry (4). Kelly et al. (2022) emphasize that the lack of social support systems of young people increases their susceptibility to substance use and complicates the treatment processes (15). It is frequently stated in the literature that the relationship between digital addiction and substance addiction is strengthened as a result of digital content causing emotional problems such as loneliness, anxiety and stress in individuals (11,2).

Public health nurses play a critical role in the fight against digital and substance abuse. Kaya and Vangölü (2023) emphasized the contribution of public health nurses in the early diagnosis of addictive behaviors and the organization of education programs (7). Altınok (2021) stated that awareness activities and counseling services for the community should be increased to combat addiction among young people (8). In particular, the development of programs that limit the use of technology to prevent digital addiction stands out as an effective method to alleviate the physical and psychological effects of this addiction (10,3). Similarly, increasing the awareness levels of parents, teachers and young people in the fight

against substance addiction is among the preventive strategies (19,5).

Multidisciplinary approaches offer effective strategies in the fight against addictions. Colloboration between psychologists, social workers, public health nurses and Policy-makers gives successful results in the fight against digital and substance addiction (20,15). In particular, social awareness campaigns and educational activities have the potential to create a positive transformation throughout society (16). In addition, the promotion of sports activities stands out as an effective method to reduce the risk of both digital and substance abuse (14,17). Physical activity can contribute to the development of healthy living habits by reducing the risk factors of addiction.

In the light of these findings, digital and substance addiction should be considered as a social problem, not just an individual one. By increasing the training of public health nurses and adopting a multidisciplinary approach, the adverse effects caused by addictions can be minimized. In addition, a more comprehensive strategy for the prevention of addictions should be adopted through educational programs and public awareness activities (21,22).

## CONCLUSION

This review study addressed the physical, psychological, and social effects of digital and substance addiction, which are increasingly common among young people. It revealed the common risk factors and interactions of these types of addiction. It has been determined that digital addiction leads to health problems such as decreased physical activity levels, obesity, depression, and anxiety, as well as negatively affecting individuals' social relations and academic success. Similarly, it has been supported by the findings of the literature that substance addiction hinders the cognitive development of young people, causes neurobiological and psychological disorders, and weakens their social functioning. In particular, it is seen that the relationship between digital addiction and substance addiction is strengthened by the content spread on social media and digital platforms, and this situation reinforces the addictive behaviors of individuals.

This study emphasized once again that public health nurses have a leading role in the fight against digital and substance abuse. Nurses can detect young people's addictive behaviors at an early stage and provide services to protect and improve the health of individuals. Education programmess, counseling services and awareness-raising activities activities in society considered important strategies important strategies in the prevention of addictions. In addition, multidisciplinary approaches stand out

as an effective method to reduce both individual and social effects of addictions.

In conclusion, comprehensive approaches based on education, awareness raising, policy development and multidisciplinary cooperation should be adopted to prevent and manage digital and substance abuse. Promoting sports and physical activity programs for young people will support the adoption of healthy living habits by reducing the risk of addiction. The results of this study provide an important framework for develeloping new strategies in the fight against addictions and strengheting the role of public health nurses in this process. Future research suggests that more evidence-based studies are needed to explore and implement innovative approaches to reduce the effects of addictions.

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## REFERENCES

1. Coşkunalp S. Investigation of the relationship between digital parenting self-efficacy and problematic media use in children. [Master's Thesis, Education and Training]. YÖK National Thesis Center. 2022; (Thesis No: 761723).
2. Irmak AY, Çelikkalp Ü. School based adolescent health screening program results. TJFMPC. 2022;16(2):255-64. doi:10.21763/tjfmpc.996975.
3. Karaaslan Y, Özyurt F, Karaaslan U. Determination of physical activity level, functional capacity and depression in children with digital game addiction. J Acad Res Med. 2023;13(1):41-8. doi:10.4274/jarem.galenos.2023.28942.
4. Volkow ND, Michaelides M, Baler R. The neuroscience of drug reward and addiction. Physiol Rev. 2019;99(4):2115-40. doi:10.1152/physrev.00014.2018.
5. Johnston LD, O'Malley PM, Bachman JG, Schulenberg JE. Monitoring the future national results on drug use: 1975-2019 overview. Key findings of adolescent drug use. National Institute on Drug Abuse. 2020. https://www.drugabuse.gov/publications/research-reports/monitoring-future-national-results-drug-use.
6. Primack BA, Shensa A, Sidani JE, White EO, Lin LY, Rosen D, et al. Social media use and perceived social isolation among young adults in the U.S. Am J Prev Med. 2017; 53(1):1-8. doi:10.1016/j.amepre.2017.01.010.
7. Kaya Z, Vangölü MS, Marufoğlu M, Özdemir M. An investigation of high school students' levels of digital addiction and well-being according to some variables. E-Int J Educ Res. 2023;14(1):117-38. doi:10.19160/e-ijer.1173642.
8. Altınok M. Investigation of digital addiction and life satisfaction of high school students. Turkish Journal of Educational Sciences.

2021;19(1):262-91. doi:10.37217/tebd.689774.

9. Mutlu Bozkurt T, Tamer K. Level of motivation to participate in physical activity. Gaziantep Univ Sports Science Journal. 2020; 5(3):286-98. doi:10.31680/gaunjss.759018.

10. Mustafaoğlu R, Yasacı Z. Negative effects of playing digital games on children's mental and physical health. Journal of Addiction. 2018;19(3):51-8.

11. Gümüş H, Çalış A, Alp S, Kaynak A. Investigation of internet use in primary school students in terms of their health. Eurasian Educ Lit J. 2023;(18):41-54. doi:10.17740/eas.edu.2023-V18-04.

12. Kuşcu FN, Göde A. Emotional and behavioral disorders caused by the digital age. ASSAM Int Peer Rev J. 2024;(25):30-44. doi:10.58724/assam.1489942.

13. Deveci Topal A, Çolak S. Investigation of digital addiction levels, digital games playing status and interpersonal problem-solving skills of university students. Pamukkale Univ Educ Fac J. 2021;52:326-59. doi:10.9779/pauefd.743418.

14. Altay A, Koç H. Investigation of the relationship between motivation to participate in physical activity and motivation to play digital games in terms of differences between male and female students. Düzce Univ Sports Science Journal. 2022; 2(1):45-60. doi:10.1091262.

15. Kelly JF, Westerhoff CM, Greene MC. The role of social support networks in addiction treatment: A review of current strategies and outcomes. Addiction Res Theory. 2022; 30(3):211-23. doi:10.1080/16066359.2022.2034567.

16. Koç AK, Özkan S, Koç E. Risks of students polluting internet games: International inactivity and inappropriate family environment. ESTUDAM Journal of Public Health. 2023;8(2):[pages]. doi:10.35232/estudamhsd.1206316.

17. Delebe A, Hazar Z. Investigation of the level of digital game addiction of secondary school students according to some physical parameters and academic achievement. Spormeter Body Train Sports Science Derg. 2022;20(3):55-68. doi:10.33689/spormeter.1061035.

18. Bağcı H, Albayrak Özer E. Investigation of online game preferences and online gaming disorders of high school students. J Comput Educ Res. 2021;9(17):431-46. doi:10.18009/jcer.872685.

19. Demir G. Is the attitude towards physical education and sports a predictor of the motivation to play digital games? Spormeter Body Train Sports Science Derg. 2022; 20(3):69-79. doi:10.33689/spormeter.1075150.

20. Volkow ND, Han B, Einstein EB, Compton WM. The prevalence of substance use disorders among young people in the U.S. relative to the time elapsed since their first substance use. JAMA Pediatr. 2021;175(6):640-3. doi:10.1001/jamapediatrics.2020.6981.

21. Cüceler S, Yılmaz M, Türkleş S. Psychosocial problems experienced by individuals with substance abuse, evidence-based interventions and the role of nursing. Journal of Addiction. 2022;23(1):105-10. doi:10.51982/dependent.958710.

22. Asi Karakaş S, Ersöğütçü F. Substance abuse and nursing. Health Science Profession Journal. 2016;3(2):133-9. doi:10.17681/hsp.34389.