Evaluation of Irrational Antibiotic Use in Patients Presenting to Çukurova University Faculty of Dentistry

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Abstract

Aim: Rational drug use has gained increasing importance in recent years. In our country, the use of antibiotics for dental problems is generally high. This study aims to investigate the unnecessary use of antibiotics for dental issues.

Methods: In this descriptive and cross-sectional study, patients over the age of 18, with no mental disorders, who presented with dental complaints to Çukurova University Faculty of Dentistry between January 2024 and October 2024 were included. In addition to routine examinations, patients were assessed in the Department of Oral and Maxillofacial Radiology to determine the necessity of antibiotic use. The frequency values of the collected data were calculated. The chi-square test or Fisher's exact test was applied to analyze relationships between variables. The significance level was set at $p<0.05$.

Results: A total of 109 female and 101 male individuals participated in the study, with a mean age of 39.4±15.3 years. Among the patients, 90% were found to use antibiotics unnecessarily, while 83% insisted on doctors prescribing antibiotics. Additionally, 35% of antibiotic users did not adhere to the recommended duration prescribed by the doctor, and 82.4% did not check the expiration dates of the antibiotics. Unnecessary antibiotic use was significantly associated with education level, income status, and the presence of systemic diseases.

Conclusions: The rate of unnecessary antibiotic use for dental problems is alarmingly high. These findings highlight the necessity of effectively managing patient demands and enhancing patient education in the antibiotic prescription processes of clinical practice.

Keywords: *Antibiotics; dentistry; antibiotic resistance; self medication*

1. Introduction

The irrational and unnecessary use of medications is a significant global issue. According to the World Health Organization (WHO), more than half of all medicines worldwide are inappropriately prescribed, dispensed, or consumed, and nearly half of the patients fail to use these medications correctly. Additionally, it is reported that one-third of the world's population lacks access to essential medicines.[1] In 1985, the WHO introduced the concept of "Rational Use of Medicines" (RUM), defining it as the process in which "patients receive medications appropriate to their clinical needs, in the right doses, for an adequate duration, and at the lowest cost to both themselves and society".[1] The misuse of antibiotics, particularly in non-bacterial infections and inappropriate doses, is classified as irrational medication use.

The overuse of medications, especially antibiotics, has gained global attention in recent years. Inappropriate and excessive antibiotic use poses a significant challenge worldwide and in our country. One of the most critical consequences of improper antibiotic usage is the development of antibiotic resistance.[2] In our country, the rate of antibiotic consumption has increased significantly since these medications became covered by health insurance.[3] As of 2024, antibiotics remain the most consumed drugs in terms of both cost and volume.[4] Among Southeast European countries, our nation has the highest rate of antibiotic use.[5] Dentistry is a healthcare field where antibiotics and analgesics are commonly prescribed. Antibiotics in dental treatments are not first-line therapies but are rather used as adjuncts when systemic symptoms are present. Antibiotic treatment is indicated in cases such as fever, lymphadenopathy, fatigue, malaise, and trismus, while symptoms like pain and swelling alone do not justify their use.[6] Antibiotic prophylaxis is recommended for immunosuppressed

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patients, those with infective endocarditis, metabolic disorders, indwelling catheters or shunts, mitral valve prolapse, or prosthetic heart valves. Acute conditions requiring antibiotic therapy include necrotizing ulcerative gingivitis, stage 3-grade C/incisor molar pattern periodontitis, acute periapical abscess, cellulitis, pericoronitis, and infections spreading into the deep fascial spaces of the head and neck.[7] In our country, antimicrobial agents are prescribed in 82.4% of dental prescriptions.[8] This rate is 4.2% in Belgium, 9% in Wales, and 11.3% in Canada.[9–11] A study conducted in Izmir revealed that 74.4% of antibiotic use among 203 dental patients was unnecessary.[12] Current data on the unnecessary use of antibiotics for dental problems in our country are limited, and there is a need for updated, community-based field studies on this issue. This study aims to determine the prevalence of unnecessary antibiotic use among patients with dental problems and to identify the underlying reasons for this issue.

2. Materials and Methods

This descriptive and cross-sectional study was conducted in compliance with the principles outlined in the 1964 Declaration of Helsinki and approved by the Non-Interventional Clinical Research Ethics Committee of the Faculty of Medicine, Çukurova University (Date: December 8, 2023; Meeting No: 139; Decision No: 19). Patients who visited the Faculty of Dentistry at Çukurova University between January 2024 and October 2024, were over 18 years of age, used antibiotics for dental reasons, had no mental disorders, and voluntarily agreed to complete the study form were included. All participants were examined by an experienced clinician following a standardized diagnostic protocol, including anamnesis, intraoral and extraoral examinations, and panoramic radiographic evaluation where necessary.

Table 1

Distribution of data by gender

		Gender			
		Female(%)	Male (%)	Total(%)	*p*
Education Level	No Education	4(3.7)	4(4)	8(3.8)	0.852
	Primary School	22(20.2)	21(20.8)	43(20.5)	
	Middle School	24(22)	26(25.7)	50(23.8)	
	High School	34(31.2)	33(32.7)	67(31.9)	
	University	25(22.9)	17(16.8)	42(20)	
Income Status	Income higher than expenses	17(15.6)	11(10.9)	28(13.3)	0.551
	Income equal/close to expenses	51(46.8)	47(46.5)	98(46.7)	
	Expenses higher than income	41(37.6)	43(42.6)	84(40)	
Systemic Disease	None	77(70.6)	80(79.2)	157(74.8)	0.507
	Hypertension	5(4.6)	4(4)	9(4.3)	
	Cardiological Disease	7(6.4)	2(2)	9(4.3)	
	Diabetes Mellitus	7(6.4)	6(5.9)	13(6.2)	
	Other	13(11.9)	9(8.9)	22(10.5)	
Antibiotic Necessity	Necessary	11(10.1)	10(9.9)	21(10)	0.963
	Unnecessary	98(89.9)	91(90.1)	189(90)	
Where was the antibiotic prescribed?	Family Health Center	29(26.6)	37(36.6)	66(31.4)	<0.001*
	Oral and Dental Health Center	37(33.9)	26(25.7)	63(30)	
	State Hospital	-†	14(13.9)	14(6.7)	
	Private Hospital	4(3.7)	1(1)	5(2.4)	
	Private Dental Clinic	33(30.3)†	15(14.9)	48(22.9)	
	Other	6(5.5)	8(7.9)	14(6.7)	
How was the antibiotic prescribed?	Prescribed by the physician as necessary	11(10.1)	10(9.9)	21(10)	0.782
	Prescribed upon patient request/insistence	92(84.4)	83(82.2)	175(83.3)	
	Not prescribed by the physician	6(5.5)	8(7.9)	14(6.7)	
How was the antibiotic used?	Used until completion as recommended by the physician/pharmacist	65(59.6)	71(70.3)	136(64.8)	0.106
	Used until symptoms subsided	44(40.4)	30(29.7)	74(35.2)	
Checking the Expiration Date	Yes	23(21.1)	14(13.9)	37(17.6)	0.169
	No	86(78.9)	87(86.1)	173(82.4)	
Total		109(100)	101(100)	210(100)	

*n(%). Chi-square or Fisher's exact test (*p<0.05). † indicates a statistically significant difference between the columns (†p values corrections with Bonferroni method).*

Table 2

Distribution of Data by Antibiotic Necessity

		Antibiotic Necessity			
		Necessary (%)	Unnecessary (%)	Total(%)	*p*
Education Level	Middle school or below	3(14.3)	98(51.9)	101(48.1)	0.001*
	High School or Higher	18(85.7)	91(48.1)	109(51.9)	
Income Status	Income higher than expenses	7(33.3)	21(11.1)	28(13.3)	<0.001*
	Income equal/close to expenses	14(66.7)	84(44.4)	98(46.7)	
	Expenses higher than income	-	84(44.4)	84(40)	
Systemic Disease	None	8(38.1)	149(78.8)	157(74.8)	<0.001*
	Present	13(61.9)	40(21.2)	53(25.2)	
Who prescribed the antibiotic?	Dentist	13(61.9)	98(51.9)	111(52.9)	0.165
	Medical Doctor	8(38.1)	63(33.3)	71(33.8)	
	Self-medicated	-	28(14.8)	28(13.3)	
Where was the antibiotic prescribed?	Family Health Center	3(14.3)	63(33.3)	66(31.4)	
	Oral and Dental Health Center	7(33.3)	56(29.6)	63(30)	
	State Hospital	-	14(7.4)	14(6.7)	
	Private Hospital	5(23.8)	-	5(2.4)	
	Private Dental Clinic	6(28.6)	42(22.2)	48(22.9)	
	Other	-	14(7.4)	14(6.7)	
Where was the antibiotic prescribed?	FMC/SH/PH	8(38.1)	77(40.7)	85(40.5)	0.377
	OHDC/PDC	13(61.9)	98(51.9)	111(52.9)	
	Other	-	14(7.4)	14(6.7)	
How was the antibiotic used?	Used until completion as recommended by the physician/pharmacist	15(71.4)	121(64)	136(64.8)	0.500
	Used until symptoms subsided	6(28.6)	68(36)	74(35.2)	
Checking the Expiration Date	Yes	5(23.8)	32(16.9)	37(17.6)	0.544
	No	16(76.2)	157(83.1)	173(82.4)	
Total		21(100)	189(100)	210(100)	

*n(%). Chi-square or Fisher's exact test (*p<0.05). FHC: Family Health Center, ODHC: Oral and Dental Health Center, PDC: Private Dental Clinic, PH: Private Hospital, SH: State Hospital*

All patients provided written informed consent prior to participation in the study. Exclusion criteria were defined as having hearing, visual, or speech impairments, psychiatric disorders, or declining participation in the study. Patients who completed the form were examined in the Department of Oral Diagnosis and Maxillofacial Radiology, and the necessity of their antibiotic use was recorded. The form collected the following data: Demographic information: age, gender, education level, and income status; systemic disease history; antibiotic usage information: necessity, place of prescription, method of prescription, method of use, and whether the expiration date was checked.

The patients' age was summarized as mean ± standard deviation (min–max), while other data were presented as frequencies and percentages. Relationships between categorical variables were analyzed using the Chi-square test or Fisher's exact test. When a significant relationship was detected, column ratios were compared to determine the parameter causing the significance (p-values were adjusted using the Bonferroni method). A significance level of p<0.05 was considered. Statistical analyses were performed using SPSS 20.0 software (Chicago, IL, USA).

3. Results

A total of 210 individuals participated in the study, including 109 women (mean age: 40.1 ± 15.9, min: 18, max: 69) and 101 men (mean age: 38.7 ± 14.7, min: 18, max: 66), with an overall mean age of 39.4 ± 15.3 (min: 18, max: 69). The prevalence of the analyzed variables by gender is presented in Table 1. Among the participants, 51.9% had a high school education or higher, and 46.7% reported income levels equal to or close to their expenses. Additionally, 74.8% of the participants had no systemic diseases, and 90% of the patients were found to use antibiotics unnecessarily. Antibiotics were most frequently prescribed at primary healthcare centers (31.4%), oral and dental health centers (30%), and private dental clinics (22.9%). A statistically significant relationship was observed

between gender and the location where antibiotics were prescribed (p<0.001). Upon evaluating the significant associations, it was found that antibiotics were prescribed more frequently in state hospitals for male patients (13.9%) compared to female patients (0%). Conversely, in private dental clinics, antibiotics were prescribed more frequently for female patients (30.3%) than for male patients (14.9%). Furthermore, 83.3% of the patients reported requesting or insisting on antibiotics, 35.2% used antibiotics only until their symptoms subsided, and 82.4% did not check the expiration date of the antibiotics.

The prevalence of the data examined according to the necessity of antibiotic use is shown in Table 2. There was a significant relationship between education status and antibiotic necessity (p=0.001). In patients with secondary school or lower education level, unnecessary antibiotic use (51.9%) was significantly higher than necessary use (14.3%), while unnecessary antibiotic use (48.1%) was significantly lower than necessary use (85.7%) in patients with high school or higher education level. There was a significant relationship between income status and necessity of antibiotic use (p<0.001). In those whose income exceeded their expenses, unnecessary antibiotic use (11.1%) was significantly lower than necessary use (33.3%), while in those whose expenses exceeded their income, unnecessary antibiotic use (44.4%) was significantly higher than necessary use (0%). Unnecessary antibiotic use was significantly higher in those without systemic disease than in those with systemic disease (p<0.001). There is no significant relationship between where the antibiotic is prescribed, how it is used, and whether the patient checks the expiration date of the antibiotic and the necessity of using the antibiotic (p>0.05).

4. Discussion

This study highlights the prevalence of unnecessary antibiotic use among patients with dental problems. According to the findings, 90% of participants who used antibiotics for dental reasons were using them unnecessarily, 83.3% insisted on being prescribed antibiotics, and 82.4% did not check the expiration dates of the antibiotics they used. Antibiotics were most commonly prescribed at primary healthcare centers (31.4%), oral and dental health centers (30%), and private dental clinics (22.9%), primarily by dentists (52.9%) and physicians (33.8%).

Consistent with some studies in the literature, our study also found no significant difference in unnecessary antibiotic use between genders. However, considering previous findings indicating that women generally tend to use medications more frequently, the absence of such a difference in our study may be attributed to the sample size or the demographic characteristics of our study population.[13–15]

In this study, unnecessary antibiotic use was significantly higher among patients with a middle school or lower education level (51.9%) compared to those with appropriate use (14.3%). Similarly, Şengül and Aykıl, in their evaluation of the rational use of medicines scale, found that individuals with postgraduate education levels achieved the highest scores.[16] In the study conducted by Çanakçı and Çanakçı, no significant relationship was found between socioeconomic status and patients who used antibiotics unnecessarily for dental problems.[13] These differences are thought to stem from variations in the populations studied and the sampling methods used. A significant difference was observed in antibiotic use based on patients' income levels in this study. However, no significant difference was reported in studies conducted in Aydın and at Trakya University.[13,16] These discrepancies may be attributed to regional differences and the numerical evaluation of income in the Trakya University study, which differs from the approach used in this research. The use of necessary antibiotics for dental diseases was found to be significantly higher among individuals with chronic illnesses. However, Şengül and Akyıl's study did not report a significant difference.[16]

In Southern (16%) and Eastern European (19%) countries, dental problems are the second most common reason for self-medication with antibiotics after upper respiratory infections.[17] In Cameroon, 21.2% of individuals used antibiotics for dental issues without consulting a doctor.[18] Similarly, in Pakistan, 57% of individuals with dental problems reported self-medicating.[19] In Izmir, only 49.3% of patients visiting a dental faculty stated that they always used medication as prescribed by a doctor.[20] In Mersin, 31.3% of patients visiting family health centers reported obtaining medications without a prescription.[21] In Istanbul, 39% of patients reported using medications without consulting a dentist[14] while this rate was 57.2% in Adana, with 34.3% of these medications being antibiotics.[22] In Ankara, the rate was 64.3%.[23] Despite the ban on the sale of antibiotics without a prescription under the Rational Use of Medicines initiative in our country, this measure has paradoxically led to an increase in antibiotic use.[3] Patients frequently insist on being prescribed antibiotics, and in this study, 83.3% of participants reported doing so. Similarly, Gül et al. found that 64% of patients insisted on antibiotic prescriptions, with 69.4% of them stating that their requests were fulfilled. Although physicians are knowledgeable about rational drug use, the increased workload and reduced consultation times contribute to higher rates of antibiotic prescriptions.[24]

In a study conducted at Trakya University, 51% of antibiotics were prescribed at oral and dental health centers, while 45% were prescribed at family health centers.[13] Among the antibiotics prescribed at oral and dental health centers, 9% were deemed necessary, compared to 8% of those prescribed at family health centers. A significant difference was observed in the necessity of antibiotic prescriptions between oral and dental health centers and family health centers.[13] In the present study, although no significant difference was observed, 33.3% of antibiotics prescribed at oral and dental health centers and 14.3% of those prescribed at family health centers were found to be necessary.

In a study conducted in Istanbul, 50% of patients reported using medication for the duration recommended by their doctor.[14] However, in the study by Yapıcı et al., 43.7% of patients stated that they discontinued the medication earlier than recommended.[21] Similarly, in Adana, 36.5% of patients reported stopping antibiotics before finishing the prescribed course.[22] In Özçelikay's study, 23.9% of patients indicated that they did not use medications for the recommended duration.[25]

One limitation of this study is that it was conducted in a single-center and included all patients regardless of specific symptoms. The single-center design of this study may limit the generalizability of the findings. Therefore, future multi-center studies involving diverse geographic regions and socioeconomic groups are recommended. Other limitation of this study is that it did not include data on the exact timing of antibiotic use in relation to symptom onset. Future studies may investigate whether the day of initiation affects the necessity of antibiotic use. However, as demonstrated in the findings, a key strength of the study is the collaboration between family physicians and dentists, who are the primary prescribers of antibiotics. Moreover, these findings may contribute to the development of health policies focused on managing patient demands, regulating prescription practices, and enhancing public awareness. Additional strengths of this study include its relatively large and gender-balanced sample size, the multidimensional evaluation of antibiotic use behavior and the analysis of associations with education level, income status, and systemic disease presence.

5. Conclusion

Irrational drug use remains a significant issue in our country. Despite various legal regulations aimed at addressing this problem, the desired outcomes have not been achieved. Unnecessary antibiotic use persists, driven by patient insistence and the heavy workload of physicians. Irrational antibiotic use is particularly prevalent in dentistry. To prevent inappropriate antibiotic use, the primary focus should be on educating patients. As evidenced by the findings in the literature, the problem is not limited to unnecessary prescriptions; patients also fail to adhere to recommended dosages and durations of use. The findings may also serve as a guide in shaping national antibiotic use policies. This highlights the need for comprehensive strategies to promote rational drug use and enhance patient compliance.

Statement of ethics

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee (Date: December 8, 2023; Meeting Number: 139; Decision No: 19) and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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Conflict of interest statement

The authors declare that they have no conflict of interest.

Author contributions

HDY: Study design, data collection or processing, statistical analysis, writing. AIC: Study design, concept, literature search, writing.

References

1.World Health Organisation (WHO). Promoting rational use of medicines.Available from:https://www.who.int/activities/promoting-rational-use-of-medicines (21.01.2025)
2.Çakır N. Rasyonel olmayan antibiyotik kullanımının ekonomik sonuçları. KLIMIK Derg. 2001;14(2):35-40.
3.Karabay O, Hosoglu S. Increased antimicrobial consumption following reimbursement reform in Turkey. J Antimicrob Chemother. 2008;61(5):1169-1171. [Crossref]
4.Dünya ve Türkiye İlaç Pazarı. Available from: https://www.ieis.org.tr/tr/dunya-ve-turkiye-ilac-pazari (01.02.2025)
5.Versporten A, Bolokhovets G, Ghazaryan L, et al. Antibiotic use in eastern Europe: a cross-national database study in coordination with the WHO Regional Office for Europe. Lancet Infect Dis. 2014;14(5):381-387. [Crossref]
6.Bayındır Y. Dental infeksiyonlarda doğru antibiyotik kullanımı. Journal of Turgut Ozal Medical Center. 2003;10(4):213-216.
7.Ahmadi H, Ebrahimi A, Ahmadi F. Antibiotic therapy in dentistry. Int J Dent. 2021;2021. [Crossref]
8.Türkiye Cumhuriyeti Sağlık Bakanlığı Türkiye İlaç ve Tıbbi Cihaz Kurumu. Türkiye'de diş hekimlerinin yazdığı reçetelerde antibakteriyel kullanımının araştırılması. Sağlık Bakanlığı, ISBN: 978-975-590-654-6, Sağlık Bakanlığı Yayın No: 1073 TİTCK Yayın No: 18, Ankara. 2017.
9.Marra F, George D, Chong M, et al. Antibiotic prescribing by dentists has increased: Why? J Am Dent Assoc. 2016;147(5):320-327. [Crossref]
10.Karki AJ, Holyfield G, Thomas D. Dental prescribing in Wales and associated public health issues. Br Dent J. 2011;210(1). [Crossref]
11.Mainjot A, D'Hoore W, Vanheusden A, et al. Antibiotic prescribing in dental practice in Belgium. Int Endod J. 2009;42(12):1112-1117. [Crossref]
12.Kandemir S, Ergül N. Grievances in cases using antibiotics due to orodental problems and assessment of the need for antibiotics. Int Dent J. 2000;50(2):73-77. [Crossref]
13.Çanakçi FG, Çanakçi BC. Dental ağrı şikâyeti ile Trakya Üniversitesi, diş hekimliği fakültesine başvuran hastaların bilinçsiz antibiyotik kullanımının değerlendirilmesi. Mersin Üniversitesi Sağlık Bilimleri Dergisi. 2021;14(1):14-22. [Crossref]
14.Koyuncuoğlu CZ, Kırmızı Nİ, Ceylan İ, et al. Diş Hekimliği Kliniklerine Başvuru Öncesinde Hastaların İlaç Kullanımı İle İlgili Tutumlarının Araştırılması. Marmara Pharm J. 2017;21(1):165-176. [Crossref]
15.Başaran M, Küçük Ö. Dental ağrı geçmişi olan hastaların akılcı ilaç kullanımına yönelik bilgi ve davranışlarının değerlendirilmesi. Selcuk Dental Journal. 2021;8(1):8-14. [Crossref]
16.Şengül BN, Akyil S. Farklı kuşaklarda akılcı ilaç kullanımı ve sağlık algısının incelenmesi. Hemşirelik Bilimi Dergisi. 2022;5(3):169-178. [Crossref]
17.Grigoryan L, Burgerhof JGM, Haaijer-Ruskamp FM, et al. Is self-medication with antibiotics in Europe driven by prescribed use? J Antimicrob Chemother. 2007;59(1):152-156. [Crossref]
18.Agbor MA, Azodo CC. Self medication for oral health problems in Cameroon. Int Dent J. 2011;61(4):204-209. [Crossref]
19.Baig Q, Muzaffar D, Afaq A, et al. Prevalence of self medication among dental patients. Pakistan Oral & Dental Journal. 2012;32(2):292-295.
20.Yılmaz M, İltuş Kırbıyıkoğlu F, Ariç Z, et al. Determination of rational drug use by patients at a dentistry faculty hospital. ERÜ Sağlık Bilimleri Fakültesi Dergisi. 2014;2(1):39-47.
21.Yapıcı G, Balıkçı S, Uğur Ö. Birinci basamak sağlık kuruluşuna başvuranların ilaç kullanımı konusundaki tutum ve davranışları. Dicle Medical Journal. 2011;38(4):458-465. [Crossref]
22.Pınar N, Karataş Y, Bozdemir N, et al. Medicine use behaviors of people in the city of Adana. TAF Prev Med Bull. 2013;12(6):639-650. [Crossref]
23.Gül S, Öztürk DB, Yilmaz MS, et al. Evaluation of public knowledge and attitudes regarding self medication with antibiotics in Ankara. Turk Hijyen ve Deneysel Biyoloji Dergisi. 2014;71(3):107-112. [Crossref]
24.Serçe Ö, Bakır M. Poliklinik başvurularında fizik muayene süresini uzun tutmak antibiyotik reçete edilmesini azaltıyor. Güncel Pediatri. 2013;11(2):45-50. [Crossref]
25.Özçelikay G. A pilot study on rational drug use. Journal of Faculty of Pharmacy of Ankara University. 2001;30(2):9-18. [Crossref]