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Research Article / Araştırma Makalesi

The Evaluation of Dentist's Knowledge of Antibiotics and Prophylaxis in Turkey

Türkiye'deki Diş Hekimlerinin Antibiyotik ve Profilaksi Bilgilerinin Değerlendirilmesi

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ABSTRACT

Introduction: Inappropriately prescribed antibiotics accelerate the formation of antibiotic-resistant bacteria. This circumstance creates a problematic situation in terms of public health. This study aims to measure dentists' antibiotic/prophylaxis knowledge and awareness of antibiotic resistance in Turkey based on two case scenarios.

Materials Methods: Dentists in Turkey are invited by open invitation posts on various social media applications for our twelve-question online survey. The scoring was shaped based on answers to measure antibiotic/prophylaxis knowledge. The collected data were statistically analyzed by SPSS Statistics 22.

Results: 321 participants answered all questions included in the study. The statistical analyses showed a significant difference based on knowledge of antibiotics and prophylaxis in the evaluations according to gender, title, graduation time, and workplace.

Conclusion: Inappropriate antibiotic prescription by dentists is common in Turkey. Dentists should receive more undergraduate lessons, and taking reminder antibiotic courses at regular intervals after graduation can contribute to keeping their knowledge up to date.

Keywords: antibiotic knowledge, antibiotic prophylaxis, antibiotic resistance, dentistry, online survey

ÖZ

Amaç: Uygun olmayan şekilde reçete edilen antibiyotikler, antibiyotiğe dirençli bakterilerin oluşumunu hızlandırır. Bu durum halk sağlığı açısından olumsuz bir durum yaratmaktadır. Bu çalışma, diş hekimlerinin Türkiye'de antibiyotik direnci konusundaki antibiyotik/profilaksi bilgi ve farkındalıklarını iki olgu senaryosuna dayanarak ölçmeyi amaçlamaktadır.

Gereç ve Yöntemler: Türkiye'deki diş hekimleri, on iki soruluk çevrimiçi anketimiz için çeşitli sosyal medya uygulamalarında açık davet gönderileri ile davet edilmişlerdir. Puanlama, antibiyotik/profilaksi bilgisini ölçmeye yönelik cevaplara göre şekillendirilmiştir. Toplanan veriler SPSS Statistics 22 tarafından istatistiksel olarak analiz edilmiştir.

Bulgular: 321 katılımcı çalışmaya dahil olan tüm soruları yanıtladı. İstatistiksel analizler antibiyotik ve profilaksi bilgisi baz alındığında; cinsiyet, unvan, mezuniyet zamanı ve işyerine göre yapılan değerlendirmelerde anlamlı farklılık göstermiştir.

Sonuçlar: Türkiye'de diş hekimleri tarafından uygunsuz antibiyotik reçetesi yaygındır. Diş hekimleri daha fazla lisans dersi almalı ve mezun olduktan sonra düzenli aralıklarla hatırlatma antibiyotik dersleri alması bilgilerini güncel tutmaya katkıda bulunabilir.

Anahtar kelimeler: antibiyotik bilgisi, antibiyotik profilaksisi, antibiyotik direnci, diş hekimliği, çevrimiçi anket

INTRODUCTION

Although most dental procedures require local intervention rather than antibiotic therapy, these antimicrobial agents are the most commonly prescribed drugs by dentists for both therapeutic and prophylactic reasons[1]. Antibiotic usage indications(except prophylaxis) are limited. The antibiotic treatment indication in dental infections are swelling extending beyond the alveolar process, cellulitis, trismus, lymphadenopathy, a temperature higher than 101°F, severe pericoronitis, and osteomyelitis[2]. There is no antibiotic indication in cases including caries, gingivitis, pulpitis, and localized periapical or periodontal infections. Antibiotics can be prescribed therapeutically for patients with systemic conditions and life-threatening situations after local intervention[3]. The American Heart Association(AHA) recommends antibiotic prophylaxis only in the prosthetic cardiac valve, previous infective endocarditis, congenital heart diseases, and cardiac transplantation patients for dental procedures involving manipulation of the gingiva, the periapical region, or perforation of the oral mucosa[4]. Also, The American Dental Association does not recommend antibiotic prophylaxis since January 2015[5]. The adverse effects of antibiotics, such as the risk of adverse reactions and the development of resistant strains, outweigh the benefits of the drugs[6].

Today antibiotic effectiveness is gradually decreasing, and antibiotic resistance is becoming a severe problem for public health[7]. Excessive and incorrect antibiotic use creates resistant strains, increasing treatment failure incidence, mortality, and health care costs[8]. In 2015, the World Health Organization(WHO) published a global action plan to fight antibiotic resistance[9]. Also, the World Dental Federation(FDI) emphasized the critical role of dentists in this fight and invited all dentists to prescribe these drugs rationally[10].

This study aims to measure antibiotic/prophylaxis knowledge and awareness of resistance among dentists in Turkey based on an online survey that includes two case scenarios. In addition, we target to evaluate the differences amongst sex, graduate year, specialty, and workplace.

MATERIALS AND METHOD

The Research and Ethics Board of the Selcuk University Dentistry Faculty reviewed and approved the study(2022/14). All participants confirmed the informed consent form before answering the questions. Dentists who work in Turkey are invited by e-mail or open invitation posts on social media to participate. Our volunteers completed an online 12-question survey. The first part is demographic data, including gender, experience, specialty, and workplace. The second part consists of eight questions about antibiotic and prophylaxis knowledge, including two case scenarios. All questions are given in **Table 1**.

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Table 1. Survey Questions

Question 1 - Gender:	A)Female B)Male
Question 2 - Field of specialty:	A) Oral and maxillofacial surgery B) Oral and maxillofacial radiology C) Endodontics D) Orthodontics E) Pedodontics F) Periodontology G) Prosthodontics H) Restorative dentistry I) General dental practitioner
Question 3 - Clinical experience:	A) <5 years B) 6-10 years C) 11-15 years D) > 15 years
Question 4 - Your institution:	A) Private clinic B) Oral and Dental Health Center, Public Health Center, Public Hospital C) University
Question 5 - In which of the following clinical situations would you prescribe antibiotics?	A) Patient demand B) Lymphadenopathy C) Mild pericoronitis D) Multiple tooth extraction E) Swelling extending beyond the alveolar process F) Osteomyelitis G) Dry socket H) Trismus I) Severe pain İ) Temperature higher than 38°C J) Cellulitis K) Severe pericoronitis L) Drained alveolar abscess M) Periapical abscess
Question 6 - In which patient group or groups do you prefer to apply antibiotic prophylaxis?	A) Myocardial infarction B) Pulmonary shunt C) Presence of cardiac prosthetic valve D)History of infective endocarditis E) Pacemaker F) Unrepaired congenital heart disease G)Inflammatory rheumatic disease H) Cardiac transplantation
Question 7 - Which of the dental procedures do you prefer to use antibiotic prophylaxis?	A) Routine local anesthesia B) Suture removal C) Subgingival curettage D) Extraction of primary teeth E) Spontaneous loss of primary teeth F) Fluoride applications G) Impacted tooth extraction H) Filling I) Cyst operation
Question 8 - Case 1	A 48-year-old male patient with no systemic disease applied to the clinic with a severe toothache, which increased significantly while drinking tea and relieved when drinking cold water. The pain developed three days ago and kept him awake last night and is stabbing like a sharp knife. The patient cannot clearly say which tooth hurts but describes it as spreading from the left jaw to the upper jaw. He reported that analgesics have a short-term effect. Intraoral examination shows caries in the left mandibular first molar tooth. No swelling was observed in the intraoral or extraoral examination. In the relevant tooth area, the gingival health is good and the tooth is not mobile. In the periapical radiograph; The lamina dura of both roots of the tooth is intact. The tooth appears to be in function and can be restored.
• Do you use antibiotics in this case?	A) Yes B)No
• Are you worried about the effectiveness of anesthesia?	A) Yes B)No
Question 9 - Case 2	A 38-year-old healthy female patient applied to the clinic with severe toothache. The pain started within the last 48 hours and is described by the patient as deep and throbbing. Although the pain may start spontaneously, it is not affected by heat or cold. When the patient bites and presses with her finger, she can distinguish that the pain originates from the right mandibular first molar tooth. The analgesics used last for a few hours. In intraoral examination; it is seen that the right mandibular first molar tooth is a tooth with a crown and no abnormality can be observed. In the relevant tooth area, there is no swelling, gingival health is good, and the tooth is not mobile. In extraoral examination; no swelling. A periapical radiograph shows a very slight enlargement of the periodontal membrane around the distal root.
• Do you use antibiotics in this case?	A) Yes B)No
• Are you worried about the effectiveness of anesthesia?	A) Yes B)No
Question 10 - What is your most frequently prescribed antibiotic?	A)Amoxicillin B) Amoxicillin + Clavulanic acid C) Metronidazole
Question 11 - Did you hear about antibiotic resistance?	A) Yes B)No
Question 12 - What do you think is the most important factor causing antibiotic resistance?	A)Uncontrolled use by patients B) Unnecessary prescription by healthcare professional C)Easy access to antibiotics D) Other

The fifth question is about antibiotic indications. This question has 14 options; 7 of them are true. The sixth and seventh questions are about prophylaxis knowledge. Sixth has eight options; 4 of them are true. Seventh has nine options; 4 of them are true. Each true answer has 4 points; the total points of these three questions are 60 points. The eighth and ninth questions are case scenarios used in a study of antibiotic prescription in the UK11. The first is related to acute irreversible pulpitis, and the second is acute apical periodontitis. These two are 20-point questions. Each participant gets an overall score from answers to these five questions. The sub-scales that create this score include antibiotic indications, prophylaxis knowledge, and case scenarios. All participants can see their overall score at the end of the online survey.

Statistical Analyses

All statistical analyses were done with SPSS Statistics 22(SPSS 18.0, IBM/SPSS® Inc, Chicago, USA). Normality was assessed with the Shapiro-Wilk Test. Because the distribution of the data did not meet the requirements for normality and homogeneity of variances assumptions, the non-parametric Kruskal-Wallis one-way analysis of variance by ranks was used. All pairwise multiple comparison procedures were done via Dunn's Method. Cronbach's alpha test analyzed internal consistency, and validity was evaluated by the Kaiser-Meyer-Olkin(KMO) and Bartlett's test. The confidence interval was 95%, and $p < 0.05$ was considered statistically significant.

RESULTS

The number of 531 dentists participated in our study. However, after the questionnaire answers inspection, only 321 participants answered all the questions. Therefore, we excluded the rest of the participants from the study.

Demographic characteristics of the participants and percentage of antibiotic knowledge

Descriptive demographic data of the participants: 54.2%(174) are female, 45.7% (147) are male, 49.2% (158) less than five years, 21.4% (69) 6-10 years, 9.9% (32) 10-15, 19.3% (62) more than 15 years of dentists with clinical experience; 37.3%(120) of all participants have completed specialty training or Ph.D., and 62.6% (201) are general practitioners; 34.2% (110) of the work at university, 40.1% (129) at Oral and Dental Health Center-Public Health Center-State Hospital, and 25.5% (82) of them work in a private clinic.

Evaluation of survey

Cronbach's alpha test was applied for internal consistency. The coefficient was 0.515 for our 12-question survey. In the "Alpha if item deleted" section, Question 10, Question 11, Question 12, the subquestions about anesthesia effectiveness of Question 8 and Question 9 were indicated as responsible items, which decreased the coefficient. We exclude these questions from our survey. Since the questions mentioned above are based on personal comments and experiences, it can be predicted to lower the coefficient. Antibiotic usage inquiry in the 8th and 9th questions decreased our coefficient less than the others. We found it appropriate to keep these questions reflecting the practical application of theoretical knowledge. New Cronbach's alpha coefficient was 0.643. Cronbach himself said high alpha values are unnecessary if the results are interpretable12. In addition, some researchers say that the alpha value may be misleading when the questionnaire or the test is not more than ten items13. Because as the number of items increases, the coefficient also increases. Considering our study, we have eight questions besides demographic data. We think we have created a reliable survey because we have removed the ones affecting the alpha value.

KMO and Bartlett's test assessed validity. The KMO coefficient was 0.622. According to Bartlett's test, variances are equal(hemogenous) across groups ($p < 0.001$).

Evaluation of Overall Score

The overall score mean is 75,3±16,9(range 16-100). All group's median values are given in **Table 2**. Female dentists have more antibiotic/prophylaxis knowledge than males(P=0,024). There was a statistically significant difference between dentists with less than five years of clinical experience and those with 11-15 and more than 15 years of clinical experience. There was no significant difference between dentists with less than five years and 6-10 years of experience(p=0,412) and between 11-15 years and more than 15 years of experience(p=0,328). In addition, working at a university was associated with more antibiotic/prophylaxis knowledge than working in Oral and Dental Health Centers-Public Health Centers-Public Hospitals(p<0,001), and private clinics(p<0,001).

Table 2. Demographic features and overall scores

		n	Overall Score(median)
Gender	Male	174	80
	Female	147	76
Experience	<5 year	158	84
	6-10 year	69	80
	11-15 year	32	68
	>15 year	62	56
Title	General Dentist	201	72
	Specialist / PhD Degree	120	84
Work-place	PODHC	129	68
	Dentistry Faculty	110	84
	Private	82	76

The results of the statistical analysis are shown in **Table 3**. The survey answer frequencies and percentages are presented in **Table 4**.

Table 3. Statistical analysis of all groups and p values

Female	Male			p=0,024*
<5 years	6-10 years	11-15 years	>15 years	p<0,001*
		0-5 years	15 and above	p<0,001*
		0-5 years	11-15 years	p<0,001*
		0-5 years	6-10 years	p=0,412
		6-10 years	15 and above	p<0,001*
		6-10 years	11-15 years	p=0,013
		11-15 years	15 and above	p=0,328
General Dentist (GD)	**Specialist / PhD Degree**			**p<0,001***
PODHC	Dentistry Faculty	Private		p<0,001*
		PODHC	Dentistry Faculty	p<0,001*
		PODHC	Private	p=0,007
		Dentistry Faculty	Private	p<0,001*

**There is statistically difference.*

Table 4. Question answer details and frequancies

Question 5 - Antibiotic Indications	Frequency	Percent
Cellulitis	248	77
Temperature higher than 38°C	247	76,9
Severe pericoronitis	242	75,3
Lymphadenopathy	240	74,7
Swelling extending beyond the alveolar process	227	70,7
Osteomyelitis	222	69,1
Dry socket	111	34,6
Periapical abscess	101	31,5
Trismus	99	30,8
Multiple tooth extraction	60	18,7
Drained alveolar abscess	58	18,1
Severe pain	58	18,1
Mild pericoronitis	28	8,7
Patient demand	16	5
Question 6 - Antibiotic Prophylaxis Indications(Patient Group)	**Frequency**	**Percent**
History of infective endocarditis	297	92,5
Presence of cardiac prosthetic valve	292	90,9
Inflammatory rheumatic disease	269	83,8
Cardiac transplantation	265	82,5
Pulmonary shunt	200	62,3
Unrepaired congenital heart disease	179	55,7
Myocardial infarction	141	43,9
Pacemaker	81	25,2
Question 7 - Antibiotic Prophylaxis Indications(Intervention)	**Frequency**	**Percent**
Cyst operation	285	88,7
İmpacted tooth extraction	267	83,1
Subgingival curettage	213	66,3
Extraction of primary teeth	118	36,7
Routine local anesthesia	18	5,6
Filling	12	3,7
Suture removal	12	3,7
Spontaneous loss of primary teeth	1	0,3
Fluoride applications	0	0
Question 8 - Case 1(Irreversible Pulpitis)	**Frequency**	**Percent**
Do you use antibiotics in this case?		
Yes	27	7,5
No	295	92,4
Question 9 - Case 2(Acute Apical Periodontitis)	**Frequency**	**Percent**
Do you use antibiotics in this case?		
Yes	70	21,8
No	251	78,1

DISCUSSION

A report indicates that 40-50% of the antibiotics prescribed worldwide in 2015 were unnecessary[14,15]. The rate of antibiotic prescriptions by dentists is 3-11% of all antibiotic drugs, and this rate makes the role of dentists in the formation of resistant bacteria important[16,17]. Studies have shown that antibiotic prescription is standard for inappropriate dental indications [18,19]. Unnecessary prescription causes adverse side effects such as anaphylactic shock, gastrointestinal disturbances, and resistance development[20]. One of the most important causes of increasing antimicrobial resistance is the overuse of antibiotics[1415]. The use of inappropriate broad-spectrum antibiotics, wrong drug selection, wrong dose, and duration have been reported as other essential causes[15]. In addition, patients are giving up the drugs earlier than recommended[21]. The adverse effects of antibiotic prescription have encouraged researchers to investigate the antibiotic prescribing habits of dentists[22,23].

In our study, demographic characteristics of dentists revealed statistically significant differences in their antibiotic knowledge levels. In contrast, a survey conducted in Spain in 2010 reported that demographic data such as gender, age, post-graduate qualification, and region of employment did not make a significant difference in antibiotic prescribing habits[14]. Spain's dental education system may implement standardized education and a constantly updated curriculum. Our country's core curriculum was prepared in 2016 and is slowly spreading.

Our survey shows that female dentists have higher antibiotic/prophylaxis knowledge. A recent study in our country showed that male dentists tend to prescribe antibiotics twice as much[16]. The same survey stated dentists working in the public hospital preferred to prescribe antibiotics three times more than dentists working in the faculty. Our results are parallel with this research. Dentists in the faculty had higher antibiotic/prophylaxis knowledge than dentists in the public and private clinics. These results show the academicians and their specialty students in our country follow current scientific guidelines and reduce the use of antibiotics.

Dentists with experience of fewer than ten years have higher antibiotic knowledge than dentists with an experience of more than ten years. However, the results are close to previous studies. This difference can be associated with the lessons taught to newly graduated dentists based on contemporary textbooks. The main reason is older dentists need to update themselves.

The extensive training and professional experience of specialists result in more rational antibiotic use, and our findings support this. Similar studies have revealed a positive relationship between prescribing the proper indication, postgraduate education, and expertise[19]. Therefore, it may be more appropriate for dentists to take more undergraduate lessons and after-graduate instruction, keep their knowledge up to date, or take reminder antibiotic courses at specific intervals to optimize antibiotic use.

Most patients consult the dentist for inflammatory conditions associated with pain. A significant percentage of toothache is due to acute and chronic infections of pulpal origin, which require intervention rather than antibiotics. However, dentists tend to unnecessarily prescribe pulpal pathologies without systemic spread, alveolar osteitis, and irreversible pulpitis[15,20]. In studies in England, Kuwait, and Turkey, half or more than half of dentists said they prescribed antibiotics for dry sockets[21-23]. According to the results of our study, 34.6% of the participants stated that they would prescribe antibiotics in dry socket cases. Although it is a low rate according to the abovementioned studies, we found a very high rate considering dentistry science. We do not know whether the problem here is due to the malpractice fear or the lack of knowledge and diagnosis. More detailed studies should be planned to clarify.

The management of odontogenic infections is extraction or root-canal treatment[24]. Clinical trials have shown that antibiotics do not reduce pain or swelling in treating localized apical pathologies[24,25]. Furthermore, antibiotics are only adjunctive treatments and cannot replace local procedures[26]. However, our study observed a high tendency to prescribe antibiotics in cases of a periapical abscess 31.1%(101) and drained alveolar abscess 17.9%(58). Consistent with our study, a survey of dentists in Belgium associated antibiotics with the most common diagnosis of a periapical abscess (51.9%)[27]. These results reveal the tendency of dentists to overprescribe antibiotics to improve the effectiveness of local anesthesia in cases of localized swelling[28].

Two scenarios asked in our questionnaire were imitating the clinical conditions of irreversible pulpitis and acute apical periodontitis. Each scenario had typical acute dental pain clinical signs and symptoms[29]. According to our survey results, 7.5% of dentists preferred to prescribe antibiotics in cases of irreversible pulpitis and

21.8% in cases of acute apical periodontitis. However, there are different attitudes toward antibiotic prescribing around the world. A systematic review reported various antibiotic prescription rates for irreversible pulpitis and acute apical periodontitis. At the same time, 4.3% of Belgian dentists prescribed antibiotics for irreversible pulpitis, and this rate increased to 46% in Croatia[30]. Antibiotic rates in Italy, Romania, and Greece were 2-3 times higher than those in the Netherlands, Sweden, and Estonia[31]. A recent survey in North East England found that 27% of respondents were frequently prescribed antibiotics for acute pulpitis pain[32]. In a study investigating patients who went to a dental clinic outside working hours, 50% of the participants stated that they gave antibiotics alone without any diagnosis or local treatment[33]. A recent systematic review researching the reason for these differences identified possible causes such as access, antibiotic beliefs, patient factors, and treatment skills[34]. The present survey results are consistent with studies examining dentists' attitudes toward managing acute dental pain. Inadequacy in diagnosing, the shortness of the appointment times, and doubts about the effectiveness of local anesthesia can cause unnecessary antibiotics prescriptions.

It has been reported that challenging anesthetizing can occur in half of the irreversible pulpitis cases[35]. In the first scenario, 52.8% of dentists were concerned about anesthesia's effectiveness. Local changes in the nervous tissue occur due to inflammation and cause a high response to hot or cold stimuli[36]. Some dentists are confused about inflammation and infection, contributing to the increase in inappropriate antibiotic prescriptions. In such cases, alternative anesthesia methods would be the correct approach[37].

In the guidelines published by the AHA in 2007, antibiotic prophylaxis is recommended only for dental procedures involving manipulation of the gingival tissues or periapical tissue of the teeth or perforation of the oral mucosa in patients with underlying high-risk heart conditions[38]. In our survey, participants indicated that they would administer antibiotic prophylaxis for patients with prosthetic heart valves(90.9%), a history of infective endocarditis(92.5%), and unrepaired congenital heart disease(55.7%), and cardiac transplantation(82.5%). However, antibiotic prophylaxis is also preferred in extreme conditions, not in the high-risk class, such as pulmonary shunt(62.3%) and rheumatic disease(83.8%).

A recent study in Croatia confirmed that experience and education are essential factors in managing patients at risk of IE[39,40]. Studies report that newly graduated or newly completed dentists have more up-to-date information[41,42]. At the same time, dentists working in university/hospital facilities were found to be more willing and knowledgeable in making decisions regarding treating patients at high risk than dentists working in private clinics[39]. One of the reasons for this resistance of dentists in private practice should be the concern of being exposed to legal action due to malpractice. The 2007 AHA guideline aimed to reduce antibiotic prophylaxis in patients at moderate risk of developing IE. After that, dentists' antibiotic prophylaxis significantly decreased the practice[43]. In addition, studies have shown dentists need clarification in determining the level of risk for IE[39,40].

Our study mirrors the antibiotic knowledge of dentists in Turkey. The results of such analyses can lead to revisions in the education system and the adoption of continuous learning. For example, authorized organizations can apply mandatory courses or exams with validity for a certain period after graduation. Also, seeing the overall scores of the participants at the end of the survey may increase their determination and enable them to try to close their deficiencies in antibiotic indications.

Limitations of the Study

This study's limitations are common in online survey limitations. One of the limitations is the difficulty of obtaining response rates and bias. An unknown number of posts were delivered, and an unknown number of dentists did open the post. The fact that the participants who had difficulty with the information questions left the survey without completing the study may have shown better results. All online procedures have a chance of getting help. In our survey, information questions can encourage volunteers to cheat. We have to mention this limitation too. Enticing answers and consistency are the other limitations.

CONCLUSION

In the limitation of the study, inappropriate antibiotic prescription by dentists is standard in Turkey. Dentists should receive more undergraduate lessons, and taking reminder antibiotic courses at regular intervals after graduation can contribute to keeping their knowledge up to date.

Değerlendirme / Peer-Review

İki Dış Hakem / Çift Taraflı Körleme

Etik Beyan / Ethical statement

Bu çalışma 11-15 Mayıs 2022 tarihleri arasında Antalya/Türkiye'de düzenlenen 15. ACBID konusunda sözlü sunum olarak sunulmuştur.

Bu çalışmanın hazırlanma sürecinde bilimsel ve etik ilkelere uyulduğu ve yararlanılan tüm çalışmaların kaynakçada belirtildiği beyan olunur.

This study was presented as a oral presentation on 15th ACBID which held in Antalya/Turkey, between 11-15 May 2022.

It is declared that during the preparation process of this study, scientific and ethical principles were followed and all the studies benefited are stated in the bibliography.

Benzerlik Taraması / Similarity scan

Yapıldı – ithenticate

Etik Bildirim / Ethical statement

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Yazarlar bu çalışma için finansal destek almadığını beyan etmiştir. | The authors declared that this study has received no financial support.

Çıkar Çatışması / Conflict of Interest

Yazarlar çıkar çatışması bildirmemiştir. | The authors have no conflict of interest to declare.

Yazar Katkıları / Author Contributions

Çalışmanın Tasarlanması | Design of Study: GG (%30), RG (%30), AA (%20), HK (%10), ED (%10)
Veri Toplanması | Data Acquisition: GG (%30), RG (%30), AA (%20), HK (%10), ED (%10)
Veri Analizi | Data Analysis: GG (%30),RG (%30), AA (%20), HK (%10), ED (%10)
Makalenin Yazımı | Writing up: GG (%30), RG (%30), AA (%20), HK (%10), ED (%10)
Makale Gönderimi ve Revizyonu | Submission and Revision: GG (%30),RG (%30), AA (%20), HK (%10), ED (%10)

REFERENCES

1. Robles Raya P, Javierre Miranda AP, Moreno Millán N, Mas Casals A, de Frutos Echániz E, Morató Agustí ML. [Management of odontogenic infections in Primary Care: Antibiotic?]. Aten Primaria. 2017 Dec;49(10):611–8.
2. Flynn TR. Part IV, Chapter 16, Principles of Management and Prevention of Odontogenic Infections. In: James R. Hupp, Edward Ellis III, Myron R. Tucker, editor. CONTEMPORARY ORAL AND MAXILLOFACIAL SURGERY. Elsevier; 2013. p. 296–319.
3. Stein K, Farmer J, Singhal S, Marra F, Sutherland S, Quiñonez C. The use and misuse of antibiotics in dentistry: A scoping review. The Journal of the American Dental Association. 2018 Oct 1;149(10):869–84.e5.
4. Nishimura RA, Otto CM, Bonow RO, Carabello BA, Erwin JP 3rd, Fleisher LA, et al. 2017 AHA/ACC Focused Update of the 2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation. 2017 Jun 20;135(25):e1159–95.
5. Baddour LM, Wilson WR, Bayer AS, Fowler VG, Tleyjeh IM, Rybak MJ, et al. Infective Endocarditis in Adults: Diagnosis, Antimicrobial Therapy, and Management of Complications. Circulation. 2015 Oct 13;132(15):1435–86.
6. Sollecito TP, Abt E, Lockhart PB, Truelove E, Paumier TM, Tracy SL, et al. The use of prophylactic antibiotics prior to dental procedures in patients with prosthetic joints: Evidence-based clinical practice guideline for dental practitioners--a report of the American Dental Association Council on Scientific Affairs. J Am Dent Assoc. 2015 Jan;146(1):11–6.e8.
7. Cassini A, Högberg LD, Plachouras D, Quattrocchi A, Hoxha A, Simonsen GS, et al. Attributable deaths and disability-adjusted life-years caused by infections with antibiotic-resistant bacteria in the EU and the European Economic Area in 2015: a population-level modelling analysis. Lancet Infect Dis. 2019 Jan;19(1):56–66.
8. Hawkey PM. The growing burden of antimicrobial resistance. J Antimicrob Chemother. 2008 Sep;62 Suppl 1:i1–9.
9. Organization WH, Others. Antimicrobial resistance and primary health care [Internet]. World Health Organization; 2018. Available from: https://apps.who.int/iris/bitstream/handle/10665/326454/WHO-HIS-SDS-2018.56-eng.pdf
10. Rachael England. Antibiotic stewardship in dentistry: Adopted by the General Assembly: September 2019, San Francisco, United States of America. Int Dent J. 2020 Feb;70(1):9–10.
11. Kerr I, Reed D, Brennan AM, Eaton KA. An investigation into possible factors that may impact on the potential for inappropriate prescriptions of antibiotics: a survey of general dental practitioners' approach to treating adults with acute dental pain. Br Dent J [Internet]. 2021 May 27; Available from: http://dx.doi.org/10.1038/s41415-021-3008-x
12. Cronbach LJ. Coefficient alpha and the internal structure of tests [Internet]. Vol. 16, Psychometrika. 1951. p. 297–334. Available from: http://dx.doi.org/10.1007/bf02310555
13. Herman BC. The Influence of Global Warming Science Views and Sociocultural Factors on Willingness to Mitigate Global Warming [Internet]. Vol. 99, Science Education. 2015. p. 1–38. Available from: http://dx.doi.org/10.1002/sce.21136
14. Segura-Egea JJ, Velasco-Ortega E, Torres-Lagares D, Velasco-Ponferrada MC, Monsalve-Guil L, Llamas-Carreras JM. Pattern of antibiotic prescription in the management of endodontic infections amongst Spanish oral surgeons. Int Endod J. 2010 Apr;43(4):342–50.
15. Agnihotry A, Thompson W, Fedorowicz Z, van Zuuren EJ, Sprakel J. Antibiotic use for irreversible pulpitis [Internet]. Vol. 2019, Cochrane Database of Systematic Reviews. 2019. Available from: http://dx.doi.org/10.1002/14651858.cd004969.pub5
16. Deniz-Sungur D, Aksel H, Karaismailoglu E, Sayin TC. The prescribing of antibiotics for endodontic infections by dentists in Turkey: a comprehensive survey [Internet]. Vol. 53, International Endodontic Journal. 2020. p. 1715–27. Available from: http://dx.doi.org/10.1111/iej.13390
17. Gutiérrez JL, Bagán JV, Bascones A, Llamas R, Llena J, Morales A, et al. Consensus document on the use of antibiotic prophylaxis in dental surgery and procedures. Med Oral Patol Oral Cir Bucal. 2006 Mar 1;11(2):E188–205.
18. Nabavizadeh MR, Sahebi S, Nadian I. Antibiotic prescription for endodontic treatment: general dentist knowledge + practice in shiraz. Iran Endod J. 2011 May 15;6(2):54–9.
19. Germack M, Sedgley CM, Sabbah W, Whitten B. Antibiotic Use in 2016 by Members of the American Association of Endodontists: Report of a National Survey. J Endod. 2017 Oct;43(10):1615–22.
20. Huxhagen KJ, McCullough M. Therapeutic Guidelines: Oral and Dental [Internet]. Vol. 34, Australian Prescriber. 2011. p. 63–6. Available from: http://dx.doi.org/10.18773/austprescr.2011.040
21. Palmer NO, Martin MV, Pealing R, Ireland RS. An analysis of antibiotic prescriptions from general dental practitioners in England. J Antimicrob Chemother. 2000 Dec;46(6):1033–5.
22. Salako NO, Rotimi VO, Adib SM, Al-Mutawa S. Pattern of antibiotic prescription in the management of oral diseases among dentists in Kuwait. J Dent. 2004 Sep;32(7):503–9.
23. Ocek Z, Sahin H, Baksi G, Apaydin S. Development of a rational antibiotic usage course for dentists. Eur J Dent Educ. 2008 Feb;12(1):41–7.
24. Segura-Egea JJ, Gould K, Şen BH, Jonasson P, Cotti E, Mazzoni A, et al. European Society of Endodontology position statement: the use of antibiotics in endodontics. Int Endod J. 2018 Jan;51(1):20–5.
25. Keenan JV, Farman AG, Fedorowicz Z, Newton JT. A Cochrane systematic review finds no evidence to support the use of antibiotics for pain relief in irreversible pulpitis. J Endod. 2006 Feb;32(2):87–92.
26. Swift JQ, Gulden WS. Antibiotic therapy—managing odontogenic infections [Internet]. Vol. 46, Dental Clinics of North America. 2002. p. 623–33. Available from: http://dx.doi.org/10.1016/s0011-8532(02)00031-9
27. Mainjot A, D'Hoore W, Vanheusden A, Van Nieuwenhuysen JP. Antibiotic prescribing in dental practice in Belgium. Int Endod J. 2009 Dec;42(12):1112–7.
28. Abbott P, Dowden J, Goss AN, McCullough M, Matthews J, Pope J, et al. Oral and Dental. 2007; Available from: https://research.monash.edu/en/publications/oral-and-dental
29. Rechenberg DK, Held U, Burgstaller JM, Bosch G, Attin T. Pain levels and typical symptoms of acute endodontic infections: a prospective, observational study. BMC Oral Health. 2016 May 27;16(1):61.
30. Worldwide pattern of antibiotic prescription in endodontic infections. Br Dent J. 2017 Nov 10;223(9):692.
31. Wojkowska-Mach J, Godman B, Glassman A, Kurdi A, Pilc A, Rozanska A, et al. Antibiotic consumption and antimicrobial resistance in Poland; findings and implications. Antimicrob Resist Infect Control. 2018 Nov 15;7:136.
32. Gemmell A, Stone S, Edwards D. Investigating acute management of irreversible pulpitis: a survey of general dental practitioners in North East England. Br Dent J. 2020 Apr;228(7):521–6.
33. Tulip DE, Palmer NOA. A retrospective investigation of the clinical management of patients attending an out of hours dental clinic in Merseyside under the new NHS dental contract. Br Dent J. 2008 Dec 20;205(12):659–64; discussion 648.
34. Thompson W, Tonkin-Crine S, Pavitt SH, McEachan RRC, Douglas GVA, Aggarwal VR, et al. Factors associated with antibiotic prescribing for adults with acute conditions: an umbrella review across primary care and a systematic review focusing on primary dental care [Internet]. Vol. 74, Journal of Antimicrobial Chemotherapy. 2019. p. 2139–52. Available from: http://dx.doi.org/10.1093/jac/dkz152
35. Owatz CB, Khan AA, Schindler WG, Schwartz SA, Keiser K, Hargreaves KM. The incidence of mechanical allodynia in patients with irreversible pulpitis. J Endod. 2007 May;33(5):552–6.
36. Lolignier S, Eijkelkamp N, Wood JN. Mechanical allodynia [Internet]. Vol. 467, Pflügers Archiv - European Journal of Physiology. 2015. p. 133–9. Available from: http://dx.doi.org/10.1007/s00424-014-1532-0
37. Virdee SS, Bhakta S, Seymour D. Effective anaesthesia of the acutely inflamed pulp: part 2. Clinical strategies. Br Dent J. 2015 Nov 13;219(9):439–45.
38. Wilson W, Taubert KA, Gewitz M, Lockhart PB, Baddour LM, Levison M, et al. Prevention of Infective Endocarditis [Internet]. Vol. 116, Circulation. 2007. p. 1736–54. Available from: http://dx.doi.org/10.1161/circulationaha.106.183095

39. Šutej I, Par M, Lepur D, Peroš K, Pintarić H, Alajbeg I, et al. Dentists' practice and compliance with current guidelines of infective endocarditis prophylaxis- National survey study. J Clin Exp Dent. 2021 Jul;13(7):e648–52.
40. Ryalat S, Hassona Y, Al-Shayyab M, Abo-Ghosh M, Sawair F. Dentists' knowledge and practice regarding prevention of infective endocarditis. Eur J Dent. 2016 Oct;10(4):480–5.
41. Homaj M, Szotek M, Sabatowski K, Zabojszcz M, Loster BW, Sadowski M, et al. Prevention of infective endocarditis during dental extractions among Polish dentists - a contemporary nationwide survey. Folia Med Cracov. 2019;59(4):5–12.
42. Nomura R, Kokomoto K, Ohara T, Nakatani S, Ooshima T, Nakano K. Current knowledge among Japanese experienced general dentists regarding prevention of infective endocarditis. Odontology. 2018 Jul;106(3):297–305.
43. Thornhill MH, Gibson TB, Cutler E, Dayer MJ, Chu VH, Lockhart PB, et al. Antibiotic Prophylaxis and Incidence of Endocarditis Before and After the 2007 AHA Recommendations [Internet]. Vol. 72, Journal of the American College of Cardiology. 2018. p. 2443–54. Available from: http://dx.doi.org/10.1016/j.jacc.2018.08.2178