Cumhuriyet Dental Journal, 28(3): 361-369, 2025
DOI: https://doi.org/10.7126/cumudj.1656296

Cumhuriyet Dental Journal

| cdj.cumhuriyet.edu.tr | Founded: 1998 Available online, ISSN: 1302-5805 Publisher: Sivas Cumhuriyet Üniversitesi

Knowledge, Attitudes and Behaviors of Tunisian Dentists on the Prescription of Antibiotics

Aymen Ben Hadj Khalifa[1,a,*], Hanen Boukhris[2,b], Ghada Ayari[3,c], Dhia Eddine Ben Mansour[4,d], Chiraz Baccouche[3,e]

[1]*Laboratory of Biological, Clinical and Dento-Facial Approach, Faculty of Dental Medicine, University of Monastir, Monastir, Tunisia.*
[2]*Department of Prosthodontics, Faculty of Dental Medicine, University of Monastir, Monastir, Tunisia.*
[3]*Department of Endodontics, Tahar Sfar Hospital, Mahdia, Tunisia.*
[4]*Faculty of Dental Medicine, University of Monastir, Monastir, Tunisia.*
**Corresponding author*

Research Article

History

Received: 15/03/2025
Accepted: 24/07/2025

ABSTRACT

Objectives: The misuse of antibiotics in dentistry contributes to antimicrobial resistance. Understanding dentists' knowledge, attitudes, and behaviors is crucial for promoting rational antibiotic use. This study aims to assess Tunisian dentists' knowledge levels on antibiotic prescription, as well as their attitudes, behaviors and current practices regarding antibiotic use.

Materials and Methods: A descriptive cross- sectional KAP study including 16 questions was delivered to Tunisian dentists based on an online questionnaire. The questionnaire is composed of 2 parts, a knowledge assessment based on the indication or not of antibiotics in specific clinical conditions then the respondents were categorized based on the scores they obtained. The second part based on non-clinical situations aims to assess their attitudes regarding the prescription of antibiotics.

Results: A total of 258 dentists were included in the study. Most Tunisian dentists (84.5%) showed an average level of knowledge regarding the indications of antibiotic. There is no statistically significant relationship between knowledge levels and their years of experience. For non-clinical factors, the high rate of prescribing antibiotics is only when it is necessary to delay treatment (33.7%). Participants disagreed on prescribing antibiotics when requested by patients and when pressed for time with rates of 83.3% and 55.4% respectively. However, dentists have shown a lack of individual practices aimed at improving the prescription of antibiotics including participation in continuing training on prescription (15.5%).

Conclusions: This study highlighted shortcomings in antibiotic prescribing in our dental practice. Targeted action plans for the latter could be a first step in the implementation of a policy on the proper use of antibiotics in dentistry.

Keywords: Knowledge, attitude, antibiotic, resistance, dentists.

[a] *aymen.haj.khalifa@gmail.com* *0000-0001-5080-4179*
[c] *ghadaayari1990@gmail.com* *0009-0003-8976-2799*
[e] *chiraz.baccouche@gmail.com* *0000-0002-2980-9191*
[b] *boukhris15@gmail.com* *0000-0001-7574-1872*
[d] *dhyabenmansour21@gmail.com* *0009-0007-7271-4087*

How to Cite: Ben Hadj Khalifa A, Boukhris H, Ayari G, Ben Mansour DE, Baccouche C. (2025) Knowledge, Attitudes and Behaviors of Tunisian Dentists on the Prescription of Antibiotics, Cumhuriyet Dental Journal, 28(3): 361-369.

Introduction

Bacterial resistance poses a significant challenge to public health by amplifying mortality rates, illness rates, and healthcare expenses.[1] The World Health Organization identifies it as a paramount global health menace.[2] While the emergence of resistance is a natural occurrence, its escalation is fueled by the overuse and improper administration of antibiotics.[1]

Various parties contribute to this misuse, including healthcare providers such as doctors, dentists, and the general population. In the field of dentistry, antibiotics are frequently prescribed, even though they should only be used when a patient's immune system cannot manage an infection or when there are signs of systemic complications.[1,3–5]

In general, dentists prescribe about 10% of these antibiotics, therefore, pinpointing the determinants linked to improper prescribing could facilitate the introduction of effective educational measures and enhance the prudent utilization of antibiotics among this group of practitioners. Yet there is a substantial portion of these prescriptions likely being deemed unsuitable.[1,6,7]

However, literature suggests that dentists' knowledge and practices regarding antibiotic prescription vary significantly.[8–11] This variation can have significant implications for public health and antibiotic resource management. Therefore, it is important to have sufficient knowledge and awareness of the use of antibiotics

Improving dentists' awareness of recommended antibiotic indications can enhance their prescribing practices. As of now, there is a dearth of information concerning dentists' antibiotic use and their adherence to dental association guidelines.

This study aims to assess Tunisian dentists' knowledge levels on antibiotic prescription, as well as their attitudes, behaviors and current practices regarding antibiotic use. A better understanding of these aspects could guide the development of more effective and educational guidelines to

promote prudent and appropriate antibiotic use in dental practice.

Materials and Methods

A cross-sectional descriptive study was carried out to evaluate knowledge and attitude of Tunisian dentists about antibiotics use and prescription. Ethical approval for the study was granted by the Ethics Committee of the Faculty of Dental Medicine, University of Monastir (Reference No. 2025013).

This study targeted dentists practicing in Tunisia, whether in private clinics or governmental hospitals. To be included, participants were required to hold at least a Bachelor of Dental Surgery degree or an equivalent qualification. Dental students and dental assistants were excluded.

A cover letter outlining the purpose of the study and requesting the dentist to voluntarily participate was included with the survey. Practitioners were asked to answer yes or no to antibiotics prescription in conjunction with clinical and non-clinical conditions relating to their patients.

Responses were voluntary, anonymous and confidential. Any questionnaire not fully completed is excluded from this study.

The questionnaire was distributed as an electronic form created on Google Forms. Before launching the survey, the questions were evaluated in a pilot study to ensure clarity and allow for any necessary modifications. The finalized form was distributed directly via email and shared in online forums and professional groups for Tunisian dentists on Facebook and WhatsApp.

The questionnaire was based on that designed and used for the first time by Palmer et al.[12,13], then modified with some additional questions for the Tunisian context. The validated16-question survey encompassed information on the following:

1- The dentist's demographic data: gender, age and years of experience. The experiment was classified into two groups: less than 5 years (inexperienced) and 5 years or more (experienced). This threshold was chosen on the basis of other similar studies and reflects a critical stage in professional practice where clinicians gain more autonomy and maturity in their decisions.

2- The dentist's knowledge: it evaluates the level of knowledge on prescription of antibiotics in clinical conditions in a patient in good general health without any systemic spread.

3- The dentist's attitude: it evaluates the attitude towards the prescription of antibiotics in non-clinical conditions.

Scores

The question of the knowledge part consists of answering "yes", "Occasionally" or "no" to a clinical condition in a patient in good general health. For each participant, the knowledge score was calculated as follows, correct answers were valued at 1 point, whereas incorrect answers were rated at 0 points. It was taken into consideration that the answer "occasionally" is considered a "yes". Therefore, the cumulative knowledge score of a questionnaire could vary between 0 and 12, based on information sourced from recommendations, expert literature and guidelines.

Of the 12 propositions of clinical conditions, the correct answer is "Yes" for pericoronitis, suppurative alveolitis, cellulitis, replantation of avulsed teeth and acute ulcerative gingivitis.[11,14–19]

The respondents were categorized based on the scores they obtained[20]: 1) good knowledge (above80% correct answers), 2) intermediate knowledge (between 50% and 80% correct answers), and 3) poor knowledge (fewer than 50% correct answers).

Data analysis

Descriptive analyses were performed on the demographic data and general responses of the participants. The Student's T-test was used to measure the differences between the average scores of the participants with respect to the demographic variable years of experience (≤5 years, >5 years). Differences with a p-value ≤ 0.05 were considered as statistically significant. The data collected was entered into and analyzed using the software SPSS version 22.0 whereas graphs and tables were made by Microsoft Excel.

Results

A total of 258 complete responses were collected. The professional characteristics and demographic data for the dentists participating in the survey are summarized in Table 1. Our sample consisted of 67 men (25.7%) and 191 women (74.3%). The most of participants (59.3%) are aged between 20 and 29, while 1.9% are over 60 years old. Nearly three-quarters (74.8%) of the study participants are inexperienced, having less than five years of professional experience.

Table 1. Dental practitioners' characteristics

Variables	N (%)
Gender	
Male	67 (25.7)
Female	191 (74.3)
Age (Years)	
20-29	153 (59.3)
30-39	70 (27.1)
40-49	24 (9.3)
50-59	6 (2.3)
+60	5 (1.9)
Experience (Years)	
Inexperienced (0–5 years)	193 (74.8)
Experienced (+5 years)	65 (25.2)

Table 2. Antibiotics prescription regarding dental diagnoses and clinical signs

Should antibiotics be prescribed in the case of?	Yes(%)	Occasionally(%)	No(%)
Acute pulpitis	1.2	26	72.8
Acute Apical Abscesses with sufficient drainage	27.5	47.7	24.8
Acute Apical Abscesses without sufficient drainage	91.9	7.8	0.4
Chronic apical periodontitis	36	30.6	33.3
Pericoronitis	66.7	27.9	5.4
Cellulitis	95.3	3.9	0.8
Dry socket	30.6	33.7	35.7
Suppurative alveolitis	85.3	11.6	3.1
Trismus	76	17.8	6.2
Replantation of teeth	77.1	17.4	5.4
Periodontal abscess	68.6	24	7.4
Necrotizing ulcerative gingivitis	70.9	18.6	10.5

Table 3. Ranges, mean, standard deviation (SD) of scores and respondents' level of knowledge

	Number of questions	Number of correct answers		Mean ± SD	Level of knowledge
		Minimum	Maximum		
Antibiotics prescription regarding clinical signs and dental diagnoses	12	4.0	11.0	7.43 ± 1.34	Intermediate

Table 2 displays the results of antibiotics prescription concerning clinical signs and dental diagnoses.

The participants scored between 4 to 11 correct answers of 12 questions, with an average of 7.43 correct answers with a standard deviation of 1.34. This indicates an intermediate level of knowledge based on their scores (Table 3).

Table 4 illustrates the distribution of knowledge levels among individuals based on their years of experience and there is no statistically significant relationship between them. 91.9% of participants have an average level of knowledge and only 6.6% have a good one (Table 4).

Table 4. Knowledge of the practitioners about appropriate use of antibiotics by years of experience

	Knowledge level			
	Poor	Average	Good	p
Inexperienced (between 0 and 5 years)	03 (1.1%)	175 (67.8%)	15 (5.8%)	
Experienced (more than 5 years)	01 (0.4%)	62 (24.1%)	02 (0.8%)	0.359
Total	04 (1.5%)	237 (91.9%)	17 (6.6%)	

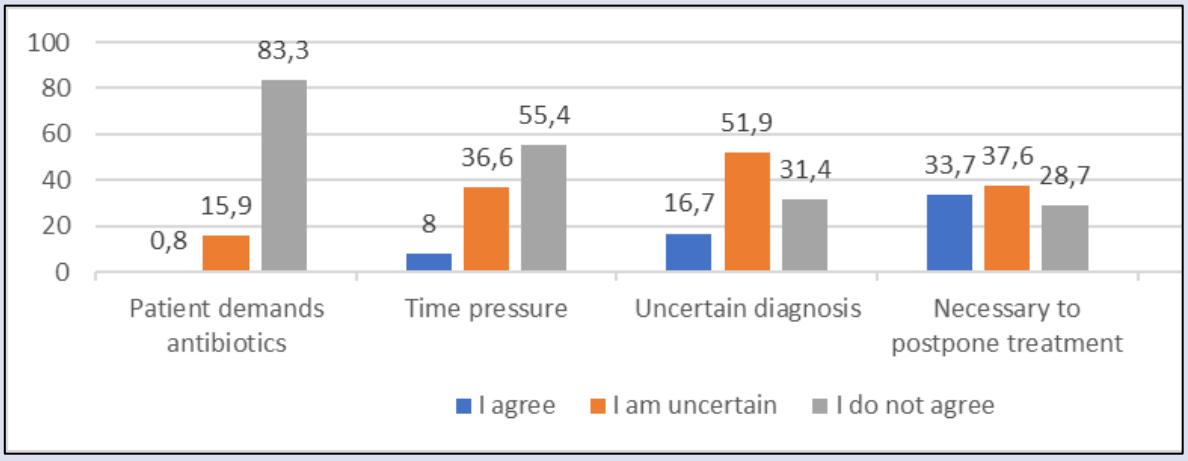

Figure 1. Attitudes of surveyed dentists towards antibiotics prescription for non-clinical factors.

Figure 1 highlighted the attitudes of participants towards antibiotics prescription for non-clinical factors; the high rate of prescribing antibiotics is only when it is necessary to delay treatment. Participants disagreed on prescribing antibiotics when requested by patients and when pressed for time with rates of 83.3% and 55.4% respectively.

Table 5 displayed the surveyed dentists' answers to queries concerning their practices regarding training related to the new guidelines for prescribing antibiotics and which showed a lack of involvement in the evolution and ignorance of new updates.

Table 5. Responses of the surveyed dentists to questions regarding their practice regarding training and concerning the new recommendations for prescribing antibiotics

	Yes(%)	No(%)
Participation in training or an update on the prescription of antibiotics in dentistry	15.5	84.5
Knowledge of the WHO aware classification	9.3	90.7
Knowledge of the WHO Antimicrobial Stewardship concept	9.3	90.7

Discussion

Knowledge part

It is the first study in Tunisia which aims to study the different therapeutic uses of antibiotics in dentistry and to determine the non-clinical factors which influence this prescription among Tunisian dentists. Therefore, the present study provided insight into knowledge, attitudes, and practices regarding antibiotic indications, as well as adherence of therapeutic prescribing to clinical guidelines. These objectives take into consideration the potential impact of inappropriate prescribing on antimicrobial resistance.

The results of this survey revealed that respondents had different levels of knowledge on different aspects. The average level of knowledge prevails with a rate of 91.9% of participants. But overall, there was a lack of consistency and adherence to the guidelines of specialist literature. In 2001, Palmer et al.[13] stated in his research that there is no rational basis in the use of antimicrobials with 29% and since then studies have begun to evaluate this problem which is increasing every year. Unnecessary use of antibiotics in inappropriate situations was found in this study as well as other studies worldwide in the same context.[11,18,20–23]

Surprisingly, the study found that roughly 27% of respondents held the belief that antibiotics should be used in patients with acute pulpitis, despite clear evidence[15,24] indicating that such treatment offers no benefits in such cases. In most cases, dental infections - both chronic and acute - can be effectively treated by eliminating the source of infection, performing pulp extirpation, draining abscesses, or extracting the affected tooth, all without the need for antibiotics. [24]

Antibiotics are generally unnecessary for these types of infections.[11] However, there are exceptions where antibiotics may be warranted, such as when there is evidence of systemic involvement or when the infection spreads rapidly and extensively.[15,17–19,25–27]

This high rate of antibiotic prescription in cases of acute pulpitis, in our study, is close to the values found in the study by Al-Haroni et al.[20] with 32% and Segura-Egea[26] with rate of 31.5%. Other similar studies were carried out by Köhler et al.[10] and Parekh et al.[28] respectively found an antibiotic prescription rate of 2.5% and 5.1% in cases of acute pulpitis.

The management approach of acute periapical abscess by the respondents provides evidence of the overuse of antibiotics. Approximately 99% of respondents would prescribe antibiotics prior to drainage, and 55.2% would do so even with drainage. Farkaš[29] indicated in his study that dentists prescribe antibiotics in 84.7% of cases of periapical abscess. However, unless there is systemic involvement, the effective management of uncomplicated abscesses typically involves drainage and removal of the underlying cause.[15,26]

In the majority of localized or diffuse odontogenic infections, resolving the infection can be achieved by addressing the cause and/or performing drainage. However, there are situations where immediate drainage or removal of the cause may not be feasible. In such cases, and particularly when there is evidence of systemic involvement, the use of antibiotics can be considered to prevent or limit the local and metastatic spread of infection.[15,17,19,25,30]

Nevertheless, there are specific clinical scenarios, such as cases of pericoronitis, cellulitis accompanied by extensive infection or systemic complications, where the prescription of antibiotics is considered appropriate to eradicate the infection and prevent its spread.[31] This study showed that more than 94% of participants were in favor of antibiotic therapy to treat pericoronitis, cellulitis and suppurative alveolitis excluding dry socket with 64.3%. These results are closer than those found in studies of Teoh[11], Al-Haroni[20] and Salako[8] with the exception of cases of trismus of infectious origin.

In the case of dry socket, an indication concerns only patients at high risk of infective endocarditis.[11,32,33] For suppurative alveolitis, the use of curative antibiotic therapy is recommended until disappearance of local infectious signs.[34] The prescription of antibiotics must always be clean and adequate to avoid any risk of diffusion and sepsis.[35]

Despite evidence-based practices suggesting that local treatment alone is sufficient for dry socket and pericoronitis, many respondents routinely prescribed antimicrobials. This indicates a lack of adherence to

established guidelines and the use of antibiotics when they may not be necessary.[8]

In case of dental reimplantation, the International Dental Trauma Association[36] recommends antibiotics in order to prevent any alveolar superinfection and reduce the risk of root resorption which was proven by 94.6% of participants in our study as well as other studies.[8,11,20]

Most respondents support the use of antibiotics for treating periodontal abscesses (92.6%) and ulcero-necrotic gingivitis (89.5%). These findings align with previous studies conducted by Al-Haroni[20] which reported percentages of 82.6% and 80%, and Salako[8] which reported percentages of 72% and 65% respectively. However, a study by Köhler[10] showed significantly lower percentages of 10% and 43.5% respectively.

If drainage of periodontal abscess does not occur spontaneously, surgical drainage is essential.[23] This act is considered sufficient. Curative antibiotic therapy is therefore not indicated in the treatment of periodontal abscesses in patients in good health. Therefore, participants should take this recommendation into consideration.[16,37]

Prescribing antibiotics is typically unwarranted for patients with gingivitis.[38] However, in cases of ulcerative necrotizing gingivitis, systemic antimicrobials might be considered if there are systemic symptoms like fever or malaise or if local treatments prove ineffective. Regarding patients with periodontitis, several research studies have demonstrated that adjunctive antibiotic use is beneficial only in specific clinical scenarios. For example, individuals who exhibit continued attachment loss after mechanical therapy, acute periodontal infections, those with treatment-resistant or aggressive forms of periodontitis, or systemic health issues like diabetes may derive advantages from systemic antibiotic treatment.[39,40]

In dental practice setting, the use of systemic antimicrobials for the management of chronic periodontitis is contraindicated.[41] Antimicrobial prescription should be a supplementary measure, used in conjunction with meticulous biofilm removal. It should be limited to specific periodontal conditions where there is a likelihood of tissue invasion by organisms, such as aggressive or necrotizing ulcerative diseases. Antimicrobials may also be considered when attempts to drain an abscess are unsuccessful, and the patient exhibits systemic signs of illness like lymphadenopathy and /or fever.[16,41]

It was found that dentists tend to prescribe antibiotics for conditions like irreversible pulpitis, limited odontogenic diseases, and alveolar osteitis, even though antibiotics are not necessary in these cases. The decision to prescribe is often based on the severity of the patient's symptoms rather than clinical signs. Dentists have a strong inclination to provide a sense of assurance to distressed patients in pain, making them feel well taken care of, and prescribing antibiotics was seen as one way to achieve this goal.

The survey findings revealed that a significant number of Tunisian dentists would prescribe antimicrobial agents for dental conditions where their use is not justified. This indicates a tendency among these dentists to rely on antibiotics unnecessarily.

The intermediate level of knowledge of respondents is preferable to that of the doctors participating in the AL-Haroni study[20] who show a low level of knowledge. This good level of Tunisian dentist could be explained by a good training with an educational program that always follows the news regarding dental pathologies and their appropriate treatment.

There was no significant relationship between knowledge level and years of experience. This correlation suggests that individuals with greater experience tend to have higher levels of general knowledge, which is not the case in our study. The advantageous prescribing model for young people can be attributed to the fact that young graduates display higher levels of confidence and possess more up-to-date knowledge than their older graduates. This was found in the Cope[21] study where newly qualified practitioners scored higher in basic medical knowledge than those who graduated 5 or more years ago.

Like ours, a study by Teoh[11] shows that inexperienced participants with 0 to 5 years of experience have better knowledge than participants with more years of experience. Knowledge acquired during training remains relevant, eve, after 5 years. Less experienced practitioners actively seek updated recommendations, ensuring optimal treatment. Over time, prescribing decisions increasingly relies on outdated guidelines and personal habits[42].

Typically, clinical experience leads to increased confidence and improved judgment and decision-making. Unexpectedly, the surveyed dentists did not exhibit greater expertise in basic medical or clinical areas despite accumulating more years of experience.[9] Possible reasons for this could include a lack of interest, limited exposure to such cases, or the dentists' failure to remain updated on advancements in managing odontogenic infections and antimicrobial therapy. This lack of engagement could be due to a lack of participation in relevant courses, journals, or discussion groups.[9]

Attitudes towards non-clinical conditions

Indeed, the specter of postoperative infection can haunt any clinician tasked with conducting oral procedures. Some practitioners may opt to use antibiotics as a safeguard against potential complications, particularly those who are less seasoned in their practice. [43]

Admittedly antibiotics only find their indication in well-defined clinical situations. But sometimes a prescription in the face of a situation of diagnostic uncertainty or postponement of the act can help maintain clinical silence and prevent a complication. This prescription is always unjustified and should not be an easy solution.

The current study found that factors such as time pressures and difficulties in reaching a definitive diagnosis influenced the prescribing behavior of most participants. These findings are consistent with the results of other surveys conducted on this topic. Study in Wales[21] showed when dentists faced limited clinic time, the odds of them prescribing antibiotics increased by a factor of ten. An

interesting finding from the study is that in Switzerland[10], 39% of dentists admitted that antibiotics were prescribed occasionally when they were unsure of a particular diagnosis.

Most participants affirmed that patients' waiting for antibiotic prescriptions and the lack of working time do not justify its prescription with percentages of 55.3% and 83.3% respectively. The results are the same for Al-Haroni in Yemen[20], Salako in Kuwait[8] and Köhler in Switzerland[10]. While in the study of Teoh[11] only 18% oppose the prescription of antibiotics according to patient expectations.

No or uncertain diagnosis is a factor that influences prescription of antibiotics. This number turns out to be 9% in Scotland and England.[13] It was 20 in Kuwait[8] and 28% in Yemen[20].

The findings in Köhler's study[10], revealed that 14.9% of dentists reported occasionally administering antibiotics upon patient request. However, when faced with an uncertain diagnosis, the rate of antibiotic administration increased to 39.1%.[10] Furthermore, the rate increased further to 48.4% when treatment postponement was necessary.[10] In Croatia[29], patient demand and treatment uncertainty are the non-clinical conditions that drive dentists to prescribe antibiotics with 43.4% and 41.5% respectively.

The inappropriate administration of antibiotics primarily in response to patient requests, uncertainty and challenges related to antibiotic prescription by dentists is a significant concern that was highlighted in multiple articles[8,10,12,13,20,44]. Fortunately, this issue is not widespread in our study, as only 1 % of dentists reported prescribing antibiotics in response to patient requests.

Addressing time constraints in dental practice is challenging as it is not feasible to allocate additional time for unforeseen patients while maintaining the long-term viability of the practice. The literature emphasizes various non-clinical factors that contribute to this issue, including medico-legal considerations, apprehension regarding online feedback, and pressure exerted by auxiliary staff to prescribe antibiotics.[22,45,46] It is notable and reassuring to witness that the majority of respondents demonstrate a responsible approach by refraining from prescribing antibiotics for non-scientific reasons. Only a small minority of participants engage in such practices, which can be deemed irrational and an inappropriate use of antibiotics. Moreover, our data reveals that a substantial portion of practitioners (33%) would prescribe antibiotics when deemed necessary to delay treatment.

A considerable number of practitioners hold the belief in the use of empirical antibiotic therapy, particularly when definitive treatment is to be delayed, regardless of the actual necessity of such medication.[8]

In a study in Kuwait[8], a relationship was found between the misuse of antibiotics and the high workload encountered in many dental centers. As a result, the decision to prescribe antibiotics may be influenced more by personal convenience than by patients' actual needs. Despite extensive evidence in the literature emphasizing that antibiotics should not be used as a substitute for proper surgical and aseptic operative techniques, this practice persists.[15]

Practice and improvement

Since their graduation, only 15% of participants have taken part in any courses or symposiums focused on antibiotic therapy. This lack of continuous education is likely to have an impact on their adherence to the rigorous guidelines governing the appropriate usage of antibiotics in dental practice. The survey results indicate clear evidence of both antibiotic overuse and underuse, emphasizing the urgent need for improved education and compliance in this area. It is crucial to address these findings to promote responsible antibiotic practices among dental professionals and ensure optimal patient care.

In a study assessing the lack of knowledge that leads to irrational use of antibiotics among Thai dentists, the introduction of a mobile application was found to be the most effective approach to improve understanding and promote judicious use of medications.[47]

This study reveals how urgent action is needed to modulate antibiotic prescribing and combat the phenomenon of antimicrobial resistance. Then, developing effective strategies to improve antibiotic prescribing practices in primary dental care relies on the successful implementation of behavior change interventions. The initial step in creating these interventions is to identify the factors that are linked to inappropriate antibiotic prescriptions. Studies prove that clinical antibiotic prescription audit in dental practice has been reported to potentially enhance general dental practitioners' prescribing attitudes towards antimicrobials, thereby offering a means to rectify the irrational use of antibiotics in certain situations.[48] Another study conducted in England that showed the result of antimicrobial stewardship messages. A significant reduction in antibiotic prescribing between 2010 and 2017 was noted.[49]

Conclusions

Antibiotics are one of the most widely prescribed classes of drugs in dentistry. Their abusive and unjustified use sometimes poses a real threat to public health, especially in view of the ever-increasing incidence of bacterial resistance.

Our study is the first of its kind to reveal the extent of knowledge and awareness of an important subject in daily dental practice among Tunisian dental practitioners.

The results revealed that most Tunisian participants (84.5%) reported an intermediate level of knowledge about antibiotic indications. That could explain the negligence of scientific foundations in their antimicrobial prescriptions. This situation is not unexpected because other health professionals in Tunisia[50] and dentists in other nations[8,20] have reported similar findings.

Thus, the absence of consensus among practitioners regarding the appropriate indications, timing, and specific antibiotics must be compelling evidence of excessive

antibiotics use and prompt us to question whether antibiotics overuse stems from a lack of adherence to guidelines or from a lack of awareness of them.

Given the close link between the time and workload demands faced by dentists and the structure and capacity of dental services, it is essential that governing bodies responsible for overseeing and managing dental services take proactive measures that aim to incentivize practitioners to provide the most effective and efficient treatment possible.

In fact, the presence of numerous conflicting guidelines from different countries has contributed to confusion regarding antibiotic use in dentistry. Moreover, the lack of uniform scientific background information is causing situations where one dental institution rejects certain guidelines while another one in the same country adopts them.

This perspective, which justifies the overuse of antibiotics in certain clinical situations, is deemed unacceptable due to mounting evidence indicating that such practices contribute to a significant increase in bacterial resistance.

In Tunisia, healthcare leaders must revise the guidelines that require both older and younger practitioners to update their understanding of antibiotic prescribing and subsequently prescribe antibiotics in an appropriate and wise manner. Targeted lectures and continuing education courses on this issue can be used to make the necessary changes to prevent potentially life-threatening complications. Those programs and interventions must include not only dental practitioners but also all health care providers who prescribe antibiotics as part of a serious national antimicrobial stewardship.

Our results are in line with the trend observed in other medical disciplines in Tunisia. Previous studies have reported inappropriate use of antibiotics in general practice, highlighting the need for a multidisciplinary approach to improve public health prescribing. A study conducted in Tunisian primary care and emergency departments found that 75.5% of antibiotic prescriptions for acute respiratory tract infections were inappropriate. The most common issues were related to the treatment of acute bronchitis with 65.2%.[51] This comparative perspective reinforces the relevance of our findings in a broader context of the fight against antimicrobial resistance.

A study analyzing the impact of an antibiotic prescription policy implemented in a Tunisian intensive care unit over a three-year period.[52] It highlights a significant improvement in the quality of empirical prescriptions, a notable reduction in antibiotic consumption, and a decrease in bacterial resistance. These results are attributed to improved knowledge and more rational and informed use of antibiotics.

It is evident that existing guidelines are followed in specific clinical situations, but there is a pressing need for a new, universally accepted antibiotic policy or guideline that all practitioners adhere to. Additionally, regular continuing dental education courses focused on antibiotic use and knowledge updates are necessary to improve prescribing practices in dental practice.[8,25,30]

Study limits

Study limitations include medium sample size, nonresponse in excess can be explained by work overload or lack of interest. Dentists' responses may reflect what they think or should be done rather than their actual practice.[20,53] Our recruitment method may introduce selection bias, as it may not fully represent Tunisian dentists who are less active online or lack direct professional connections. To address this, we diversified recruitment channels and promoted broad participation to improve sample representativeness. Finally, the diversity of practitioners' specialties may influence treatment approaches, affecting the study's accuracy. Practitioners in surgical or endodontic specialties may have more adapted approaches to treat infections compared to general practitioners or prosthodontists.

Acknowledgements

We would like to thank all the dentists who participated in this study.

Conflicts of Interest Statement

The authors declare no conflict of interest

References

1. Rodríguez-Fernández A, Vázquez-Cancela O, Piñeiro-Lamas M, Herdeiro MT, Figueiras A, Zapata-Cachafeiro M. Magnitude and determinants of inappropriate prescribing of antibiotics in dentistry: a nation-wide study. Antimicrob Resist Infect Control 2023;12:20.
2. WHO. Antibiotic resistance. https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance. Accessed 21 Jan 2022.
3. Teixeira Rodrigues A, Roque F, Falcão A, Figueiras A, Herdeiro MT. Understanding physician antibiotic prescribing behaviour: a systematic review of qualitative studies. Int J Antimicrob Agents 2013;41:203-212.
4. Servia-Dopazo M, Figueiras A. Determinants of antibiotic dispensing without prescription: a systematic review. J Antimicrob Chemother 2018;73:3244-3253.
5. Stein K, Farmer J, Singhal S, Marra F, Sutherland S, Quiñonez C. The use and misuse of antibiotics in dentistry. J Am Dent Assoc 2018;149:869-884.e5.
6. Marra F, George D, Chong M, Sutherland S, Patrick DM. Antibiotic prescribing by dentists has increased. J Am Dent Assoc 2016;147:320-327.
7. Chopra R, Merali R, Paolinelis G, Kwok J. An Audit of Antimicrobial Prescribing in an Acute Dental Care Department. Prim Dent J 2014;3:24-29.
8. 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;32:503-509.
9. Al-Sebaei MO, Jan AM. A survey to assess knowledge, practice, and attitude of dentists in the Western region of Saudi Arabia. Saudi Med J 2016;37:440-445.
10. Köhler M, Meyer J, Linder M, Lambrecht JT, Filippi A, Kulik Kunz EM. Prescription of antibiotics in the dental practice: a survey of dentists in Switzerland. Schweiz Monatsschr Zahnmed 2013;123:748-759.

11. Teoh L, Marino RJ, Stewart K, McCullough MJ. A survey of prescribing practices by general dentists in Australia. BMC Oral Health 2019;19:193.
12. Palmer NAO, Pealing R, Ireland RS, Martin MV. A study of prophylactic antibiotic prescribing in National Health Service general dental practice in England. Br Dent J 2000;189:43-46.
13. Palmer NO, Martin MV, Pealing R, Ireland RS, Roy K, Smith A, et al. Antibiotic prescribing knowledge of National Health Service general dental practitioners in England and Scotland. J Antimicrob Chemother. 2001;47:233-237.
14. Wright C. Therapeutic Guidelines: Oral and Dental. Version 2. Aust Prescr 2012;35:182-182.
15. Segura-Egea JJ, Gould K, Şen BH, Jonasson P, Cotti E, Mazzoni A, Sunay H, Tjäderhane L, Dummer PMH. European Society of Endodontology position statement: the use of antibiotics in endodontics. Int Endod J 2018;51:20-25.
16. Blair FM, Chapple IL. Prescribing for Periodontal Disease. Prim Dent J 2014;3:38-43.
17. Cope AL, Francis N, Wood F, Chestnutt IG. Systemic antibiotics for symptomatic apical periodontitis and acute apical abscess in adults. Cochrane Database Syst Rev 2018;9(9):CD010136
18. Contaldo M, D'Ambrosio F, Ferraro GA, Di Stasio D, Di Palo MP, Serpico R, Simeone M. Antibiotics in Dentistry: A Narrative Review of the Evidence beyond the Myth. Int J Environ Res Public Health 2023;20:6025.
19. Lockhart PB, Tampi MP, Abt E, Aminoshariae A, Durkin MJ, Fouad AF, Gopal P, Hatten BW, Kennedy E, Lang MS, Patton LL, Paumier T, Suda KJ, Pilcher L, Urquhart O, O'Brien KK, Carrasco-Labra A. Evidence-based clinical practice guideline on antibiotic use for the urgent management of pulpal- and periapical-related dental pain and intraoral swelling. J Am Dent Assoc 2019;150:906-921.e12.
20. Al-Haroni M, Skaug N. Knowledge of prescribing antimicrobials among Yemeni general dentists. Acta Odontol Scand 2006;64:274-280.
21. Cope AL, Francis NA, Wood F, Chestnutt IG. Antibiotic prescribing in UK general dental practice: a cross-sectional study. Community Dent Oral Epidemiol 2016;44:145-153.
22. Teoh L, Stewart K, Marino RJ, McCullough MJ. Perceptions, attitudes and factors that influence prescribing by general dentists in Australia: A qualitative study. J Oral Pathol Med 2019;48:647-654.
23. Özdemir Kabalak M, Aytac EN, Tarhan N, Karabulut E, Keceli HG. Potential barriers to the rational antibiotic use in dental and periodontal practice: A questionnaire-based online survey. Dent Med Probl 2024;61:373-383.
24. Agnihotry A, Thompson W, Fedorowicz Z, Van Zuuren EJ, Sprakel J. Antibiotic use for irreversible pulpitis. Cochrane Database Syst Rev 2019;5(5):CD004969.
25. Palmer NOA. Antibiotic prescribing in general dental practice. Prim Dent J 2014;3:52-57.
26. Segura-Egea JJ, Gould K, Şen BH, Jonasson P, Cotti E, Mazzoni A, Sunay H, Tjäderhane L, Dummer PMH. Antibiotics in Endodontics: a review. Int Endod J 2017;50:1169-1184.
27. Tampi MP, Pilcher L, Urquhart O, Kennedy E, O'Brien KK, Lockhart PB, Abt E, Aminoshariae A, Durkin MJ, Fouad AF, Gopal P, Hatten BW, Lang MS, Patton LL, Paumier T, Suda KJ, Cho H, Carrasco-Labra A. Antibiotics for the urgent management of symptomatic irreversible pulpitis, symptomatic apical periodontitis, and localized acute apical abscess: Systematic review and meta-analysis-a report of the American Dental Association. J Am Dent Assoc 2019;150:e179-216.
28. Parekh A, Balasubramanian K, Bhate P, Kalra D. Antibiotics usage, how well we know it? KAP survey among the dentist population in Mumbai. International Journal of Basic & Clinical Pharmacology 2020;9:1713-1720.
29. Farkaš M, Ivančić Jokić N, Mavrinac M, Tambić Andrašević A. Antibiotic Prescribing Habits and Antimicrobial Resistance Awareness of Dental Practitioners in Primorsko-Goranska County, Croatia. Microb Drug Resist 2021;27:1482-1488.
30. Palmer, N. (Ed). Antimicrobial Prescribing in Dentistry: Good Practice Guidelines. 3rd Edition. London, UK: Faculty of General Dental Practice (UK) and Faculty of Dental Surgery; 2020.
31. Kwon G, Serra M. Pericoronitis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 /
32. Otto CM, Nishimura RA, Bonow RO, Carabello BA, Erwin JP, Gentile F, et al. 2020 ACC/AHA guideline for the management of patients with valvular heart disease: A report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Thorac Cardiovasc Surg 2021;162:e183-353.
33. Candan M. Infective Endocarditis Prophylaxis in Dentistry: Current Perspective. Cumhuriyet Dent J 2021;24:96-104.
34. Lesclous P. Prescription des antibiotiques en pratique bucco-dentaire: Recommandations Afssaps 2011. Med Buccale Chir Buccale 2011;17:334-346.
35. Oberoi SS, Dhingra C, Sharma G, Sardana D. Antibiotics in dental practice: how justified are we. Int Dent J 2015;65:4-10.
36. Fouad AF, Abbott PV, Tsilingaridis G, Cohenca N, Lauridsen E, Bourguignon C, O'Connell A, Flores MT, Day PF, Hicks L, Andreasen JO, Cehreli ZC, Harlamb S, Kahler B, Oginni A, Semper M, Levin L. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dent Traumatol 2020;36:331-342.
37. Pantlin L. Is there a Role for Antibiotics in Periodontal Treatment? Dent Update 2008;35:493-496.
38. Mahuli SA, Zorair AM, Jafer MA, Sultan A, Sarode G, Baeshen HA, Raj AT, Sarode S, Patil S. Antibiotics for Periodontal Infections: Biological and Clinical Perspectives. J Contemp Dent Pract 2020;21:372-376.
39. Herrera D, Sanz M, Jepsen S, Needleman I, Roldán S. A systematic review on the effect of systemic antimicrobials as an adjunct to scaling and root planing in periodontitis patients. J Clin Periodontol 2002;29:136-159.
40. Kissa J, Chemlali S, Gharibi A. Systemic antibiotic prescribing patterns of dentists in Morocco: A questionnaire study. Ann Afr Med 2023;22:293-299.
41. Khattri S, Kumbargere Nagraj S, Arora A, Eachempati P, Kusum CK, Bhat KG, Johnson TM, Lodi G. Adjunctive systemic antimicrobials for the non-surgical treatment of periodontitis. Cochrane Database Syst Rev 2020;11(11):CD012568.
42. Baillie EJ, Merlo G, Van Driel ML, Magin PJ, Hall L. Early-career general practitioners' antibiotic prescribing for acute infections: a systematic review. J Antimicrob Chemother 2024;79:512-525.
43. Lodi G, Azzi L, Varoni EM, Pentenero M, Del Fabbro M, Carrassi A, Sardella A, Manfredi M. Antibiotics to prevent complications following tooth extractions. Cochrane Database Syst Rev 2021;2(2):CD003811.
44. Sancho-Puchades M, Herráez-Vilas JM, Valmaseda-Castellón E, Berini-Aytés L, Gay-Escoda C. Analysis of the antibiotic prophylaxis prescribed by Spanish Oral Surgeons. Med Oral Patol Oral Cir Bucal 2009;14:e533-537.
45. Mainjot A, D'Hoore W, Vanheusden A, Van Nieuwenhuysen JP. Antibiotic prescribing in dental practice in Belgium. Int Endod J 2009;42:1112-1117.

46. Pipalova R, Vlcek J, Slezak R. The trends in antibiotic use by general dental practitioners in the Czech Republic (2006-2012). Int Dent J 2014;64:138-143.
47. Pisarnturakit PP, Sooampon S, Sooampon S. Managing knowledge for health care quality: An investigation of rational antibiotic use among Thai dentists. Int J Health Plann Manage 2020;35:606-613.
48. Gross AE, Hanna D, Rowan SA, Bleasdale SC, Suda KJ. Successful Implementation of an Antibiotic Stewardship Program in an Academic Dental Practice. Open Forum Infect Dis 2019;6:ofz067.
49. Thornhill MH, Dayer MJ, Durkin MJ, Lockhart PB, Baddour LM. Oral antibiotic prescribing by NHS dentists in England 2010-2017. Br Dent J 2019;227:1044-1050.
50. Rejeb MB, Marzougui L, Fradj MB, Bouallègue O, Said-Latiri H. Résistance bactérienne et prescription antibiotique : perceptions, attitudes et connaissances d'un échantillon de médecins hospitaliers. Étude au CHU Sahloul – Sousse – Tunisie. Rev Epidemiol Sante Publique 2014;62:S230-231.
51. Bel Haj Ali K, Sekma A, Messous S, Trabelsi I, Ben Youssef J, Maghraoui H, Razgallah R, Walha A, Grissa MH, Beltaief K, Mezgar Z, Coubantini A, Bouida W, Msolli MA, Boukef R, Boubaker H, Nouira S. Appropriateness of antibiotic treatment of acute respiratory tract infections in Tunisian primary care and emergency departments: a multicenter cross-sectional study. BMC Prim Care 2022;23:295.
52. Brahmi N, Blel Y, Kouraichi N, Ben Hamouda R, Thabet H, Amamou M. Impact d'une politique de prescription d'antibiotiques dans un service de réanimation tunisien. Med Mal Infect 2006;36:460-465.
53. McMahon SR, Iwamoto M, Massoudi MS, Yusuf HR, Stevenson JM, David F, Chu SY, Pickering LK. Comparison of e-mail, fax, and postal surveys of pediatricians. Pediatrics 2003; 111: e299-e303.