

## Knowledge and Attitudes of Libyan Dentists Regarding Antibiotic Prescription in Periodontal Therapy

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### ABSTRACT

Antibiotics are widely used in dentistry, and they are essential in periodontal therapy. The study aims to evaluate the level of knowledge and awareness of dentists regarding the use of antibiotics in the treatment of periodontal disease. A questionnaire containing 14 closed-ended questions was used for this cross-sectional study and distributed to 170 volunteer dentists in the two major governorates in Tripoli. Descriptive statistics were calculated to assess the overall knowledge of dentists and their knowledge within each category of questions. The study included (58.2%) female and (41.8 %) male participants. It was revealed that the antibiotics mostly prescribed by dentists in non-surgical periodontal treatment procedures were Amoxicillin and Metronidazole (38.2 %). In periodontal surgical procedures, more than half of clinicians preferred to use antibiotics before and after periodontal surgery (55.9 %) and for one week (61.2 %). A minority of volunteers reported prescribing systemic antibiotics for gingivitis (2.9%) or chronic periodontitis (4.3%). In contrast, prophylaxis for infective endocarditis was the most common indication for antibiotic use in association with treatment of periodontal diseases, with a percentage of 77.1% among the study population. The findings of the study suggest that dentists need to be more aware of the use of antibiotics in periodontal treatment procedures.

### Keywords:

Dentists, Antibiotics, Periodontal Treatment, Periodontal Disease.

### Introduction

Periodontal disease refers to a group of inflammatory conditions that affect the gums, periodontal ligament, cementum, and alveolar bone. It typically begins as gingivitis, a reversible form of inflammation caused by plaque accumulation, which affects up to 90% of the population. If not treated, gingivitis can advance to periodontitis—a chronic and irreversible condition characterized by the loss of connective tissue attachment, destruction of the supporting bone, and eventual tooth loss [1]. Bacteria and their harmful by-products can lead to both attachment loss and bone loss. However, it is often the body's own immune response to the bacterial infection that results in even greater bone destruction, referred to as indirect bone loss, than the damage caused directly by the bacteria themselves. This immune response can be affected by various factors, including environmental influences (such as smoking), acquired conditions (like systemic diseases), and genetic predispositions [2].

Chemotherapeutic agents can modulate the host's immune response to bacteria and help minimize harmful, self-destructive immune reactions against bacterial pathogens, ultimately leading to reduced bone loss [3]. Conventional treatment for this condition typically focuses on removing or reducing subgingival microbial communities through mechanical methods like scaling, root planning, or surgical interventions. However, as the pathogenic bacteria become increasingly complex over time, systemic antibiotics may be needed as an additional measure to manage the infection. Since bacteria can penetrate periodontal tissues, mechanical therapy by itself may not always be sufficient [4]. For these reasons, adjunctive systemic antibiotics are used in periodontal treatment to help further decrease the bacterial load and promote the healing of inflammation within the periodontal pocket. Furthermore, they may be recommended for patients who do not respond adequately to standard mechanical treatment, those experiencing acute periodontal infections with systemic symptoms, medically compromised individuals requiring prophylaxis, and as a supplement to both surgical and non-surgical periodontal procedures.

The use of antibiotics in periodontal therapy is guided by considerations of the pathogenic microbiota, the patient's overall condition, and the appropriate selection of the antimicrobial agent [5]. Currently, however, an ideal antibiotic for the treatment of periodontal disease does not exist [6]. While many antibiotics can affect oral bacteria, no single antibiotic at the concentration achieved in body fluids inhibits all putative periodontal pathogens [7]. Indeed, a combination of antibiotics may be necessary to eliminate all putative pathogens from some periodontal pockets [8].

Inappropriate prescribing of antibiotics by dentists could therefore play a significant part in the emergence of resistant strains. Antimicrobial resistance (AMR) poses a significant global public health threat. It occurs when microorganisms are exposed to antibiotics, causing them to develop resistant strains that antibiotics can no longer kill or control. This leads to the rise of severe infections that are challenging to treat. Consequently, the misuse of antibiotics plays a key role in the growth of AMR [9]. Dentists account for approximately 10% of all antibiotic prescriptions for humans, although this percentage varies by country [10]. Studies have shown that, despite efforts to reduce dental antibiotic use, too many antibiotics are still being prescribed by dentists. A study conducted in the United Kingdom revealed that 80% of antibiotics prescribed for acute dental conditions were not needed [11]; another study in the United States found that 80% of antibiotics prescribed for prophylactic purposes were used inappropriately [12]. The dental profession has a clear responsibility to commit to and contribute to global, national, and local efforts to tackle antibiotic resistance. This study aims to evaluate the knowledge and awareness levels of Libyan dentists about the use of antibiotics in periodontal treatment.

## Methods

### Study design and setting

This study is a descriptive epidemiological survey conducted between March and August 2025. Before distributing the questionnaire, verbal consent was obtained from each participant, and they were assured of the confidentiality of their responses.

### Questionnaire development and distribution

A total of 200 dentists were invited to voluntarily participate in this study, of whom 170 completed the questionnaire. Both female and male dentists who were fully informed about the study and gave their verbal consent were included. The study employed a self-administered questionnaire consisting of 14 closed-ended questions. The questions in the questionnaire were derived from previously published research following a thorough review of the relevant literature, ensuring both content validity and alignment with the study's objective. It included demographic information as well as questions related to the use of systemic antibiotics in both surgical and nonsurgical periodontal therapy, covering aspects such as the type, duration, and timing of antibiotic use. Additionally, the questionnaire explored the use of locally delivered antibiotics, indications for antibiotic prescriptions, complications associated with inappropriate antibiotic use, and participants' awareness of antimicrobial resistance. The questionnaire was prepared in English.

## Results

Descriptive statistics, including the total number and percentage of responses for each question, were calculated. Data analysis was performed using SPSS version 23.0. The findings are presented as follows:

### Participant Demographics

As illustrated in (Table 1), a total of 170 dental practitioners were enrolled in the study. The majority of respondents were female (58.2%), while male participants were 41.8% of the sample. In terms of specialty, general dental practitioners represented (57.6%), followed by periodontists (22.9%) and other dental specialists (19.4%). About clinical experience, 27.6% of participants reported having less than five years of professional practice, 40.6% had five to ten years of experience, and 31.8% had been practicing for more than ten years.

**Table 1. Demographic characteristics of participants (N = 170)**

Variable	Category	Frequency (N)	Percentage (%)
Gender	Female	99	58.2%
	Male	71	41.8%
Specialty	General Dentist	98	57.6%
	Periodontist	39	22.9%
	Others	33	19.4%
Years of Experience	< 5 years	47	27.6%
	5–10 years	69	40.6%
	> 10 years	54	31.8%

### Systemic Antibiotic Prescription Practices

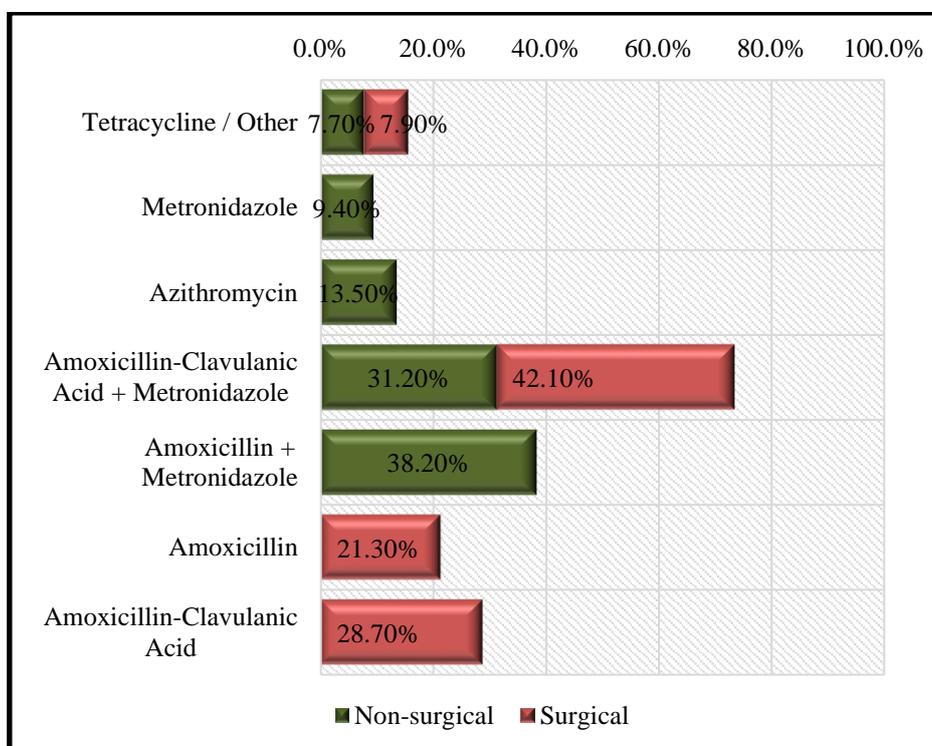
As clarified in (Table 2), the majority of participants reported prescribing systemic antibiotics in both non-surgical and surgical periodontal treatments. Specifically, 75.9% prescribed antibiotics for non-surgical cases, while 81.2% did so for surgical procedures.

**Table 2. Antibiotic prescription patterns in periodontal therapy (N = 170)**

Treatment Context	Yes - N (%)	No - N (%)
Non-surgical therapy	129 (75.9%)	41 (24.1%)
Surgical therapy	138 (81.2%)	32 (18.8%)

**Preferred Antibiotic Regimens**

The bar chart illustrates the percentage of different antibiotic regimens prescribed for non-surgical and surgical treatment cases. Among non-surgical cases, the most frequently prescribed regimen was Amoxicillin combined with Metronidazole, accounting for 38.2% of prescriptions. This was followed by Amoxicillin-Clavulanic Acid combined with Metronidazole at 31.2%. Other antibiotics, such as Azithromycin, Metronidazole alone, and Tetracycline/other antibiotics, were less commonly prescribed, comprising 13.5%, 9.4%, and 7.7% respectively. In contrast, the surgical group predominantly received Amoxicillin-Clavulanic Acid combined with Metronidazole, representing 42.1% of prescriptions, followed by Amoxicillin-Clavulanic Acid alone at 28.7%, and Amoxicillin alone at 21.3%. A small proportion (7.9%) were prescribed Tetracycline or other antibiotics. Notably, antibiotics such as Azithromycin and Metronidazole were not prescribed in the surgical group.



**Figure 1. Percentage of antibiotic regimens in surgical and non-surgical cases**

**Timing and Duration of Antibiotic Use**

As shown in (Table 3), 55.9% of respondents reported prescribing systemic antibiotics both before and after surgery. Others preferred to administer antibiotics only after (26.5%) or only before surgery (12.9%). Regarding duration, 61.2% prescribed antibiotics for one week, while 24.1% preferred a shorter course of five days or less.

**Table 3. Timing and Duration of Systemic Antibiotic Use (N = 170)**

Timing of Use in Surgical Therapy	N (%)
Before and after surgery	95 (55.9%)
After surgery only	45 (26.5%)
Before surgery only	22 (12.9%)
No need	8 (4.7%)
Duration of Use	N (%)
1 week	104 (61.2%)
5 days	41 (24.1%)
2-3 weeks	18 (10.6%)
1 month	7 (4.1%)

### Use of Local Antibiotic Delivery Systems

Approximately two-thirds of participants (66.5%) reported utilizing local antibiotic delivery systems in periodontal care, while 33.5% did not incorporate local antimicrobials into their practice (Figure 2).

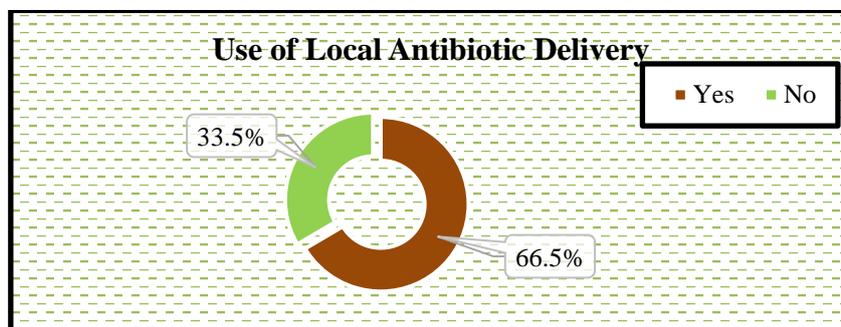


Figure 2. Use of local antibiotic delivery

### Clinical Indications for Antibiotic Use

The clinical indications for antibiotic prescription among the study population show notable variation. The least common causes for antibiotic use were chronic gingivitis (2.9%), chronic periodontitis (4.1%), gingival enlargement (5.3%), and gingival bleeding (8.2%). In contrast, 45.9% of participants recommended antibiotic use for aggressive periodontitis and slightly less (41.2%) for acute necrotizing ulcerative gingivitis (ANUG)/necrotizing ulcerative periodontitis (NUP). On the other hand, the majority of participants (77.1%) prescribe antibiotics as prophylaxis for infective endocarditis. The clinical indications for antibiotic use are summarized in (Figure 3).

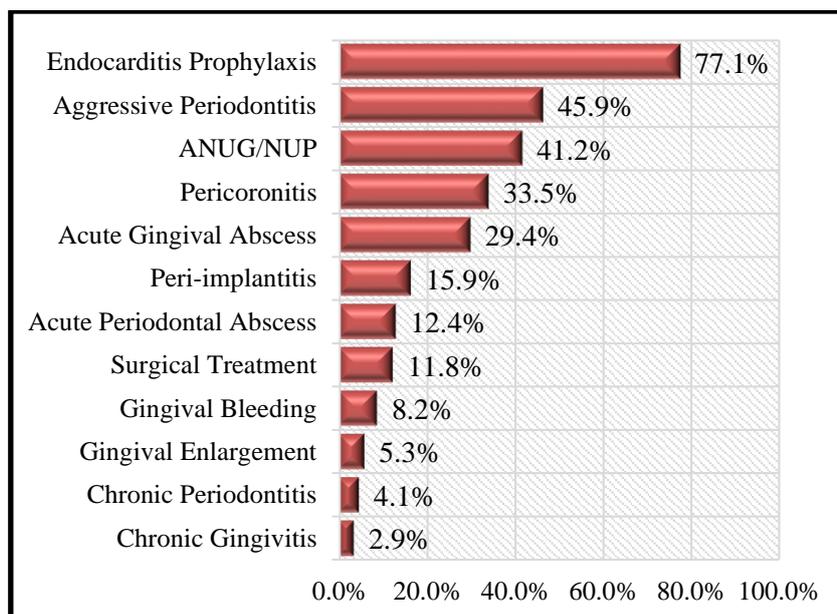


Figure 3. Association between various periodontal diseases and antibiotic use in periodontal practice.

### Attitudes Toward Mechanical Therapy Alone

As reflected in (Table 4), when asked whether mechanical periodontal treatment alone is sufficient without adjunctive systemic antibiotics, 57.6% of practitioners agreed, whereas 42.4% believed that antibiotics were often necessary to manage periodontal diseases effectively.

Table 4. Participant beliefs regarding the sufficiency of mechanical periodontal therapy without adjunctive antibiotics.

Response	N (%)
Yes	98 (57.6%)
No	72 (42.4%)

### Perceptions of Antibiotic-Associated Complications and Awareness of Antimicrobial Resistance

Participants expressed varying levels of concern regarding the potential complications associated with antibiotic use in periodontal therapy. As shown in (Table 5), the most commonly perceived complication was antimicrobial resistance, reported by 82.9% of respondents. In contrast, only 8.8% of participants expressed concern about toxicity or antibiotic-associated diarrhea, while 14.1% identified the risk of fungal infections. Additionally, 85.9% of participants affirmed that they were aware of the issue of antimicrobial drug resistance, reflecting a high level of general awareness regarding this global health concern.

**Table 5. Participant perceptions of antibiotic-associated complications and awareness of antimicrobial resistance (n = 170)**

Complication / Awareness Item	Yes - N (%)	No - N (%)
Concern about antibiotic toxicity	15 (8.8%)	155 (91.2%)
Concern about antimicrobial resistance	141 (82.9%)	29 (17.1%)
Concern about antibiotic-associated diarrhea	15 (8.8%)	155 (91.2%)
Concern about fungal infections	24 (14.1%)	146 (85.9%)
Awareness of drug resistance	146 (85.9%)	24 (14.1%)

**Associations Between years of experience and Antibiotic Prescription Practices**

(Table 6). shows that dentists with more clinical experience prescribed antibiotics more frequently, with rates increasing from 25.5% (<5 years) to 75.9% (>10 years).

**Table 6. Association between years of experience and antibiotic prescribing practices**

Variable		Prescribed Antibiotics N (%)	Did Not Prescribe N (%)	p-value
Years of Experience	< 5years	12 (25.5%)	35 (74.5%)	< 0.001
	5-10 years	44 (63.8%)	25 (36.2%)	
	>10 years	41 (75.9%)	13 (24.1%)	

**A Comparative Assessment of Prescription Patterns and Clinical Indications Among Different Dental Specialties**

There was a statistically significant difference in prescribing practices among dental specialties across most variables. General dentists prescribed non-surgical therapy in 89.8% of cases, surgical therapy in 91.8%, and local antibiotic delivery in 75.5%. Significantly more often than periodontists (15.4%, 76.9%, 61.5%, respectively) and other specialists (24.2%, 54.5%, 45.5%, respectively) (p = 0.001). Similarly, clinical management of aggressive periodontitis (general dentists 51.0%, periodontists 59.0%, other specialists 15.2%), peri-implantitis (25.5%, 38.5%, 9.1%), and periodontal abscess (12.2%, 15.4%, 9.1%) varied significantly by specialty (p = 0.001). However, no significant difference was observed in the prescription of endocarditis prophylaxis, with rates of 77.6%, 79.5%, and 72.7% for general dentists, periodontists, and other specialists, respectively (p = 0.765).

**Discussion**

Systemic antibiotic therapy can be used as an adjunct to mechanical periodontal treatment, particularly in patients with aggressive or acute periodontal conditions, those unresponsive to mechanical therapy alone, individuals with severe or acute periodontal infections, and those who are systemically compromised. The responses of 170 participants in our study showed that antibiotic use was commonly associated with both non-surgical (75.9%) and surgical periodontal therapy (81.2%). These results are consistent with current clinical practices, which frequently prescribe antibiotics to control microbial biofilms and avoid systemic side effects after therapy [5]. Several antibiotic types in this study were found to be appropriate for periodontal therapy and share many similarities with those reported previously. The most recommended combination was amoxicillin and metronidazole (38.2%). This combination is thought to be the first-choice antibiotic regimen for severe periodontitis and is commonly used, consistent with its documented synergistic efficacy against anaerobic pathogens associated with periodontitis [13]. For surgical therapy, the combination of amoxicillin-clavulanic acid and metronidazole (42.1%) emerged as the most favored, indicating a preference for broader-spectrum coverage in invasive procedures.

There is no universal agreement regarding the timing of antibiotics during surgical procedures, and most trials lack a clear and consistent antimicrobial regimen (28, 29). However, most dentists in our survey preferred to use antibiotics for seven days (61.2%) and five days (24.1%) in order to treat periodontal disease

before and after periodontal surgical procedures. As suggested by others, these short-term regimens are not only proven to have successful outcomes, but they also limit the risk of resistance [14].

Approximately two-thirds of clinicians in this study preferred using a local antibiotic delivery system in the treatment of periodontal disease. In the reported series, one key benefit of locally delivered antibiotics is reducing systemic side effects while exposing microbes to higher concentrations of drugs that eventually lead to increased treatment effectiveness [15].

In terms of clinical indications, this survey emphasized the insufficient awareness among dentists of the importance of antibiotic prescriptions in the treatment of aggressive periodontitis (45.9%) and ANUG/NUP (41.2%). These conditions are well identified as the most frequent causes for antibiotic prescription because they usually exhibit systemic symptoms and rapid development [16].

According to the data we obtained, the participant group stated that they were worried about antimicrobial resistance and complications while prescribing systemic antibiotics. A similar result was revealed in the survey study conducted by Yıldız et al (2023) and another study by Ong et al (2019) with Australian periodontists. In our study, diarrhea, abdominal pain, vomiting, and urticaria were the most common drug complications encountered by dentists [17,18]

A significant percentage of clinicians preferred treating chronic periodontitis only by scaling and root planning (SRP). These findings are consistent with previously reported studies. Herrera et al. (2002) and Smiley et al. (2015) have demonstrated the efficacy of scaling and root planning (SRP) as a primary treatment for chronic periodontitis, especially in mild to moderate cases. Antibiotics such as amoxicillin and metronidazole can be used as supplementary therapy to improve outcomes, even though SRP monotherapy may be adequate in more severe cases of the illness [19,20].

The results of this study show notable variations in clinical decision-making and prescription patterns of antibiotics among different dental specialties. General dentists demonstrated a markedly higher tendency to prescribe antibiotic with non-surgical therapy (89.8%), surgical therapy (91.8%), and local antibiotic delivery (75.5%) compared to periodontists (15.4%, 76.9%, 61.5%, respectively) and other specialists (24.2%, 54.5%, 45.5%, respectively), with these differences being statistically significant ( $p = 0.001$ ). This trend may reflect a broader treatment scope typically undertaken by general dentists, who often manage a variety of periodontal conditions in primary care settings, unlike specialists who may focus on more complex or advanced cases. Previous research also indicates that the treatment protocols of periodontists and general dentists differ significantly. For example, research by Javali et al. (2021) reported that general practitioners are performing most of the non-surgical periodontal procedures at their clinics, while surgical periodontal procedures are often referred to a periodontist. Variations in clinical experience, training, and facilities were the major reasons for the referral to periodontists [21].

The therapeutic approach also differed significantly by specialty in the treatment of complicated periodontal conditions. This study revealed that Periodontists managed aggressive periodontitis and peri-implantitis by using antibiotics at higher rates (59.0% and 38.5%, respectively) than general dentists (51.0% and 25.5%) and other specialists (15.2% and 9.1%). These findings align with those of Heitz-Mayfield and Lang (2010), who emphasized the significant role of periodontists in managing complex periodontal and peri-implant conditions [22]. Conversely, the high degree of consistency in prescribing antibiotics as prophylaxis for infective endocarditis across all groups, general dentists (77.6%), periodontists (79.5%), and other specialists (72.7%), suggests adherence to the previous version of guidelines from the American Heart Association (AHA) [23]. The lack of significant variation ( $p = 0.765$ ) in this area highlights a shared awareness of systemic implications and medico-legal responsibilities across specialties. However, the new version of the AHA guideline only recommended prescribing antibiotics in an extremely small number of patients where their underlying cardiac conditions are associated with the highest risk of adverse outcome from IE [24].

### Limitations

This study was limited by its reliance on self-reported data, which may be subject to response bias. Additionally, the sample size was relatively small and may not fully represent the broader population of dentists.

### Conclusion

This study reveals that although many dentists possess a general understanding of antibiotic use in the treatment of periodontal diseases, there are still notable deficiencies in their knowledge and adherence to current prescribing guidelines. Misunderstandings about the appropriate indications for both prophylactic and therapeutic antibiotics, as well as confusion regarding treatment durations, potentially contribute to the growing issue of antimicrobial resistance (AMR). To address these issues, it is vital to promote continuous professional development and ensure the use of evidence-based prescribing practices. Regular training sessions, curriculum updates, and the integration of antimicrobial stewardship principles into

dental care are essential strategies to reduce inappropriate antibiotic use. Enhancing these measures will not only improve patient outcomes but also support the global fight against antibiotic resistance.

### Acknowledgments

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### Conflicts of Interest

There are no financial, personal, or professional conflicts of interest to declare

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