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Antibiotic Prescribing Practices for Periodontitis among Dentists in Cameroon: Strengthening Antibiotic Resistance Stewardship in Dentistry

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Abstract **Original Research Article**

Periodontitis is a disease resulting from the formation of a bacterial biofilm, which subsequently destroys the tissues supporting the teeth. Antibiotic therapy may be necessary for its management. The over-prescription of antibiotics in dentistry represents a significant concern, in relation to the emergence resistance. The objective of this study was to evaluate the prescribing practices of antibiotics among dentists for periodontitis in Cameroon. This was a cross-sectional descriptive study. Sampling was consecutive and convenience-based. A structured and tested questionnaire was administered to dentists, collecting information on their socio-demographic and professional profile and their prescribing practices of antibiotics. The study was approved by an ethical committee. Statistical Package for Social Science (SPSS) version 20 was used to analyze the data. A total of 203 dentists were surveyed. 113 dentists (55.7%) indicated working in private offices and have been practicing for at least five years. Most dentists (91%) prescribe antibiotics without antibiogram test. Only 9% of respondents indicated prescribing laboratory tests in the event of complications. Most of them (98.5%) were aware of the program to halt antibiotic resistance; however, a subset did not perceive this issue as pertinent to their practice. The most commonly prescribed antibiotics were amoxicillin, amoxicillin combined with clavulanic acid, and metronidazole. A review of standard periodontal practice revealed that dentists frequently fail to adhere to the guidelines regarding antibiotic prescription. It is imperative that dentists receive continuous training in this area. Furthermore, it is essential to ensure the availability of laboratory techniques for bacterial identification and antibiogram testing.

Keywords: Antibiotic prescription, dentists, periodontitis, Cameroon.

INTRODUCTION

Periodontitis is an inflammatory disease of infectious etiology. The bacteria involved form a biofilm under the marginal gingiva. Biofilm has a complex structure. It is made up of bacterial communities anchored in a polysaccharide matrix. A study has shown that bacteria within a biofilm have increased antibiotic resistance compared with planktonic bacteria (Sukumar S, 2020). This unique three-dimensional structure of bacteria contributes greatly to the development of a periodonto-pathogenic microflora and justifies the importance of mechanical therapy in periodontal treatments to disorganize this structure. Biofilm plays several important roles for bacteria, including its contribution to the phenomenon of microbial resistance.

In fact, some periodonto-pathogenic bacteria are more resistant to periodontal treatment than others. For this reason, the use of an antibiotic represents an interesting therapeutic adjunct to periodontal therapy (Julie Dormoy, 2021). The increasing prevalence of antibiotic resistance is a major public health problem and a serious threat to global health. It is caused by the often

excessive and inappropriate use of antimicrobial agents. The warning came from the WHO and several international and national organizations calling for immediate action to limit the further development and spread of resistant bacterial strains (Julie Dormoy, 2021). Several studies have shown that 60% of dentists' prescriptions worldwide are either unnecessary or inappropriate (Abdullah A., 2020) (Luca Sbricoli, 2024) (Rehmatullah Kandrhro, 2024). In France, the number of antibiotics prescribed by dentists is rising steadily: from 8-10% in 2016 to over 12% in 2021 (Anass Elbouti, 2016). Studies done on the prescribing practices in the emergency unit of antibiotics have shown that 5.7% of antibiotics prescriptions were unjustified (Fortes Deguenonvo, 2009).

Repeated or prolonged exposure of bacteria to antibiotics allows them to develop defense mechanisms and thereby become resistant to antibiotics. Antibiotic resistance is, therefore, accelerated by repeated administration of antibiotics and their misuse (Oana Sandulescu, 2024). Responsibilities of antibiotic resistance development are shared between the patient, the prescriber and the health system. The purpose of this study was to explore antibiotic prescription practices for periodontitis by dentists, their perceptions of antibiotic resistance, and identify the most commonly prescribed antibiotics.

MATERIALS AND METHODS

A cross-sectional descriptive research study was conducted between June and December 2023. Data were gathered from dentists practicing in Yaoundé, Cameroon, using a questionnaire that had been previously tested and included both multiple-choice and open-ended questions. Convenience sampling targeted 257 registered dentists practicing in Yaoundé. Questionnaires were distributed in person and online.

A structured, pretested questionnaire collected data on:

- Socio-demographics: age, sex
- Professional profile: years of service, practice type (public/private)
- Antibiotic prescribing habits for periodontitis: indications, laboratory testing, antibiotic choice
- Awareness and perceptions of AMR

The figure 1 below illustrates participants' enrolment process.

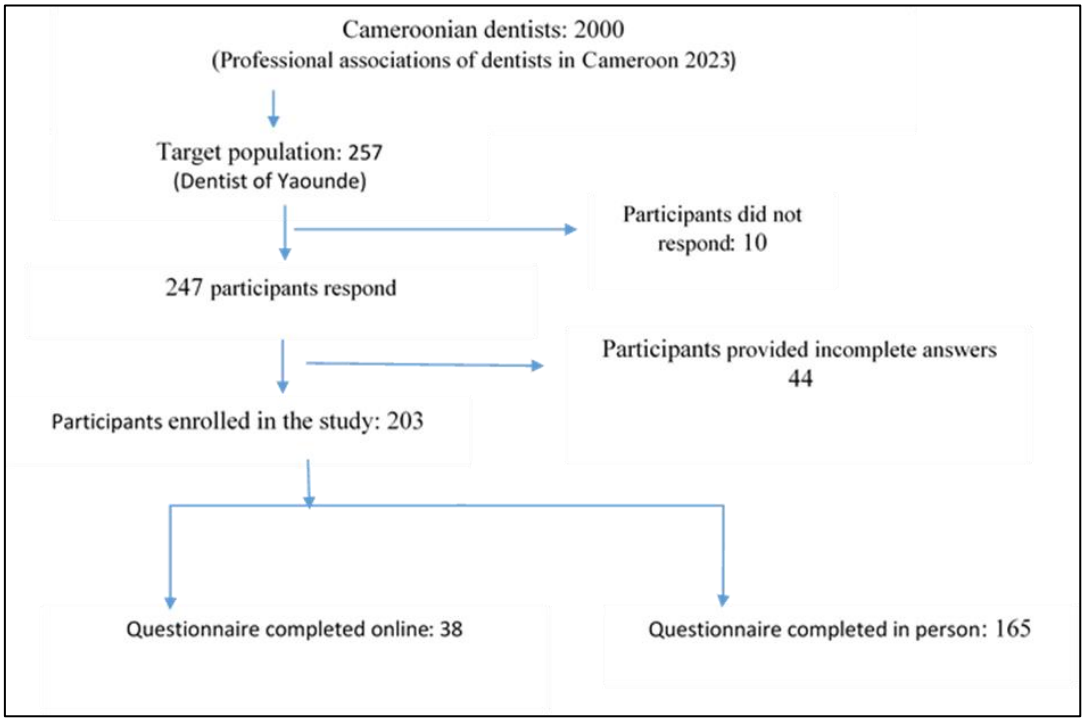

Figure 1: Flowchart illustrating participant enrollment.

Ethical approval was obtained from the University of Douala Ethics Committee (No. 7017 CEI-UDo/10/2023/T) and from the Regional ethics committee for Human Health research. Consent was obtained. Confidentiality was ensured by anonymizing data.

The authors declare no conflicts of interest.

Data were cleaned and analyzed using SPSS v20. Descriptive statistics summarized demographics and prescribing patterns. Chi-square and ANOVA tests compared adherence by demographics. Logistic

regression identified factors influencing guideline adherence. Significance was set at $p<0.05$.

RESULTS

Participant Characteristics

1. Characteristics of study participants

Of the 203 dentists interviewed, we had a sex ratio of 1.07 in favor of the female sex. Dentists aged between 30 and 40 (47%) were the most represented. Over half of the dentists (60.6%) worked in private dental health offices. In terms of years of service, 101 (49.8%) had between 5 and 10 years of experience. (See table 1 below).

Table 1: Socio-demographic and professional characteristics of participants

Characteristic	Number	Percentage (%)
Female	105	52.5
Male	95	47.5
Age 30-40	96	47.3
Age 41-50	62	30.5
Age >50	45	22.2
Years of service <5	85	41.9
Years of service 5-10	101	49.8
Years of service >10	17	8.3
Private practice	123	64.4
Public practice	68	35.6

The data indicated that younger dentists, aged between 30 and 40 years, were more likely to adhere to the guidelines or best practices in prescribing antibiotics than those aged over 60. The data collected permitted us to establishment of an association between the number of years in service and the implementation of best practices.

2- Antibiogram test before antibiotic therapy in dentistry as a whole

The data collected revealed that 185 (91%) of the dentists surveyed do not request a bacteriologic test prior to initiating antibiotic therapy. The following reasons were provided for this practice:

Bacteriological testing takes at least 3 days, but what if the patient's condition worsens in the meantime?

The bacteria involved are difficult to grow.

Why prescribe a bacteriological test when the literature gives me the range of bacteria and the antibiotics to which they are sensitive?

It will take time.

Some dentists said that they often prescribe a bacteriologic testing only in cases of treatment failure or cellulitis.

3- Dentists' perception of antimicrobial resistance

The majority (96%) of respondents indicated awareness of the growing issue of antimicrobial resistance. However, over half (54%) of respondents attributed some responsibility for this phenomenon to their own negligence.

It's true that we contribute to this phenomenon through inappropriate prescription of antibiotics

It is also evident that the patients themselves bear some responsibility for the observed outcomes, as they do not appear to be adhering to the recommended dosage regimens.

4-Treatment of periodontitis

The treatment of periodontitis is dependent upon the stage of the disease. The data obtained from the questionnaire indicated that 70% of dentists combine antibiotic therapy with periodontitis treatment from stage I onwards, in addition to mechanical debridement to destabilize the bacterial biofilm. Some dentists have justified this practice by suggesting that debridement may induce adhesion and facilitate the penetration of biofilm bacteria.

…its by precaution that I prescribe antibiotics.

Whereas recommendations preconizes antibiotic therapy as from stage 3 and 4 of periodontitis.

5-Antibiotic choices

The most commonly prescribed antibiotics were amoxicillin + clavulanic acid (33%), amoxicillin (28%), and metronidazole (17%). In 99% of cases, antibiotics were selected based on their theoretical susceptibility to bacteria, and in 70% of cases, they were prescribed based on routine. In only 30% of cases was the patient's financial situation taken into account.

DISCUSSION

Dentists have an important role to play in the fight against antimicrobial resistance, not only because of the number of prescriptions that they write, but also because of their relevance (Maria Contaldo, 2023) (Sameen R, 2020). An antibiotic prescription must be justified by the existence of an infection, as evidenced by specific clinical signs, or for prophylaxis during certain high-risk procedures, particularly in patients who are in poor health (Izabela Struzycka, 2019) (Smitha S, 2023).

Periodontal prescriptions include anti-inflammatories, antiseptics, antifungals, analgesics, desensitizers and antibiotics. Paul Keyes advocates non-surgical treatment based on motivating the patient to practice good hygiene, mechanical debridement of pockets by root detraction-surfacing and subgingival irrigation with hydrogen peroxide. Antibiotic therapy should only be used in conjunction with surgical debridement. Systemic prescription of broad-spectrum antibiotics should be kept to a strict minimum, in order to contain the growing emergence of acquired genetic bacterial resistance (e.g beta-lactamase-producing *Prevotella intermidia*) (Aly Mariam, 2021).

In addition to mechanical debridement, systematic antibiotic therapy should be reserved for acute periodontal disease with signs of infection, early periodontitis, refractory periodontitis, and surgical procedures involving bone grafting or tissue regeneration techniques (Ndjidda B William, 2021).

Of course, the fight against the emergence of acquired bacterial resistance not only involves the elimination of unnecessary prescriptions, but also compliance with other general rules governing antibiotic prescribing (optimal dosage, efficacy, toxicity, narrowest possible spectrum) (Dahlen, 2017). The aim of this study was to assess dental surgeons' knowledge of the scourge of antibiotic resistance, and whether they acknowledge their share of responsibility. Their antibiotics prescribing practices were also evaluated.

Antimicrobial resistance (AMR) is a concept that is challenging to grasp for dentists and other healthcare professionals, who often believe that they do not encounter it in their daily practice. This is likely the underlying cause of the difficulties encountered in implementing effective measures to combat antimicrobial resistance in dental practice. The inappropriate use of antibiotics contributes to the evolution of resistant strains and poses a significant risk to the health and well-being of individuals and communities. The misuse of antibiotics is considered not only a significant contributor to the increased incidence of antimicrobial resistance (AMR), but also a public health issue. Consequently, the further escalation of AMR due to the misuse of antibiotics will have a negative and widespread impact on the health and well-being of individuals and other healthcare professionals (Federation, 2019).

The prescription practices of the medical professionals in question did not adhere to the recommendations set forth by the relevant authorities (Philippe Casamajor, 1997). The physicians prescribed antibiotics according to the suspected bacterial sensitivity and departmental routine, rarely according to the patient's clinical condition, and even less according to the patient's financial situation. This latest parameter is of particular significance in the context of limited resources, as is the case in Cameroon. If the prescriber fails to consider the financial resources of their patient, or if they are unaware of the availability of generic drugs at a lower cost, the patient may be unable to purchase the full dosage, which could result in the development of resistance.

One of the reasons raised by dentists as challenge was the duration of a bacteriological test. It is true that the growth of the so-called strict anaerobic germs requires a precise bacteriological platform. However, this does not constitute a limit and does not explain why bacteriological tests are not frequently requested in dentistry. Currently, it is possible to perform a bacteriological test in less than three days (Goene R, 1990).

The results of our study indicate that some dentists do not accept responsibility for the growing problem of antimicrobial resistance. This corroborates the findings of Julie Dormoy and her colleagues in France in 2021 (Julie Dormoy, 2021), which are at odds with the findings of Mariam Aly in 2021, who conducted a cross-sectional study among Egyptian pediatric and general dentists who were aware of antibiotic resistance and their contributions in respecting the prescribing recommendations (Izabela Struzycka, 2019). It is similarly evident that dental surgeons would also benefit from continuous education and training. Additionally, they require convenient access to information and new recommendations as they are published. This is consistent with one of the FDI's recommendations, which urges dentists to enhance their understanding of antibiotic resistance and the prudent use of antibiotics, and to adhere to best practices in antibiotic prescribing (Oana Sandulescu, 2024).

In addition, it is crucial to educate patients about antimicrobial resistance and the genuine necessity for antibiotic prescriptions in dentistry. This is essential to raise individual and collective awareness.

A substantial body of research has been conducted to assess the prevalence of antibiotic prescribing in dentistry on a global scale. In the United States, for instance, it was determined that dental practitioners and dentists prescribed more than 2.9 million antibiotics annually (Stein K, 2018). Furthermore, a review conducted by Michael et al. indicated that 14% of antibiotic prescriptions were deemed inappropriate (Michael J. Durkin, 2018). Furthermore, a retrospective study conducted in Croatia revealed that antibiotics were prescribed in nearly half of dental emergency visits (Jelovucic B, 2019). A similar retrospective cohort study conducted in the United Kingdom revealed that dental antibiotics were prescribed in more than half of dental consultations. These findings, in addition to those of our own study, indicate that physicians are contributing to the problem of antimicrobial resistance. They also highlight the lack of

public knowledge about the availability of antibiotics over the counter and the residual use of antibiotics that is characteristic of low- and middle-income countries.

Our findings indicate that amoxicillin + clavulanic acid is the most commonly prescribed antibiotic, followed by amoxicillin and metronidazole. In contrast to other national and international studies conducted in Saudi Arabia, the United States, Turkey, and Croatia, where amoxicillin was identified as the primary antibiotic of choice in dental consultations (Zaid Naji, 2023). The present study found that amoxicillin was not the most commonly prescribed antibiotic in dental consultations, but came in fourth position. As was the case in the review conducted by Luca Guerrini in 2019, one of the most commonly used antibiotics in dentistry was penicillin, which is often prescribed in combination with amoxicillin and clavulanic acid. Other antibiotics that are commonly utilized, in accordance with the most recent guidelines, are metronidazole (in periodontology) (Luca Guerrini, 2019) (Ameli, 2022). In contrast, in France, amoxicillin is the most commonly prescribed antibiotic (56%), but amoxicillin plus enzyme inhibitor is only in third place, followed by metronidazole.

This is the first survey at our knowledge reporting prescribing practices for periodontitis care and management among dentists in Cameroon.

It should be noted that the present study present certain limitations. The respondents were exclusively in major urban centers, and it remains to be seen whether the findings will be applicable to suburban areas. The sample size is insufficient to permit the drawing of conclusions at the national level.

It is therefore recommended that future studies should be conducted on a larger scale, including dentists practicing in suburban areas

CONCLUSION

Dentists in Cameroon are aware of AMR but often prescribe antibiotics for periodontitis without adherence to guidelines. The present findings underscore the necessity for the establishment of more evidence-based and accurate antibiotic prescriptions, with the objective of sensitizing dentists and enhancing their knowledge and awareness of antimicrobial resistance in dentistry. Antibiotics were most often prescribed on a routine basis and on the theoretical basis of susceptibility to strains, with minimal consideration of the clinical status of the patients. Continuous professional education, improved access to diagnostic testing, and stewardship programs are urgently needed to optimize antibiotic use and combat resistance.

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