

Assessment of Newly Graduated Dentists' Perspectives on Antimicrobial Utilization in Periodontal Therapy

SUMMARY

Background/Aim: The objective of this study was to assess the knowledge level of recently graduated dentists regarding the utilization of antimicrobial agents in periodontal treatments and to elucidate the factors influencing their preferences. **Material and Methods:** The study encompassed 252 individuals who had recently graduated from dental school. Their attitudes and knowledge levels concerning the use of antimicrobial agents in periodontal treatments were assessed via a web-based survey, taking into consideration their training status regarding antimicrobial usage. **Results:** The majority of newly graduated dentists did not recommend antibiotics as an adjunct to non-surgical periodontal treatment. Among those who did, amoxicillin and clavulanic acid combination was the preferred choice (71.4%). Additionally, 65.5% preferred antibiotics for periodontal abscess treatment, and 87.3% favored them for necrotizing periodontal diseases. In surgical periodontal treatment, 68.7% preferred systemic antibiotics, with implant surgery being the most common indication. 94% of participants advocated for antiseptic mouthwash during periodontal treatment, with essential oils (51.2%) and chlorhexidine gluconate (47.6%) being the top choices. The incidence of antibiotic prescription in non-surgical periodontal treatment was found to be statistically significantly higher among individuals who received training in antibiotic utilization ($p < 0.005$). **Conclusions:** The results of this study indicate that newly graduated dentists commonly favor antibiotics and antimicrobial agents in the treatment of necrotizing diseases, periodontal abscesses, and after implant surgeries. It is evident that dentists' preferences for antimicrobial agents are positively influenced by their level of education.

Keywords: Periodontal Disease, Antibiotics, Mouth

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Introduction

Periodontal diseases encompass various conditions affecting the tissues supporting the teeth, ranging from reversible gingivitis to irreversible periodontitis¹. Periodontitis defined as a complex interplay between microbial dysbiosis and an excessive host inflammatory response, leading to the breakdown of the tooth-supporting apparatus². Following the 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions, the European Federation of

Periodontology categorized periodontitis into necrotizing periodontal diseases, periodontitis as a manifestation of systemic disease, and periodontitis¹. Periodontal pockets harbor a diverse microbial community, comprising over 500 identified species, predominantly characterized by gram-negative and anaerobic organisms³. Previous studies have demonstrated that clinical improvement is achieved by reducing periodontal pathogens through periodontal interventions, and that improvement can then be sustained by providing root surfaces with a novel established microbial consortium enriched with host-

compatible species^{4,5}. Scaling and root planning (SRP) may not consistently induce the ecological alterations essential for achieving and sustaining long-term clinical improvement across all individuals, particularly in severe cases characterized by numerous deep periodontal pockets⁶. To address this limitation, the adjunctive administration of antimicrobials has been suggested. This approach has the potential to concurrently target the elimination of multiple microbial species, thereby fostering enhanced stability within the microbiota and facilitating an improved host response⁷.

Systemically administered antibiotics penetrate all oral surfaces and fluids. Within these sites, they have the capacity to access microorganisms that are beyond the reach of scaling instruments and local antibiotic therapies⁸. The range of systemic antimicrobials employed in the management of periodontitis is extensive, and empirical evidence from clinical investigations thus far indicates substantial variability in their efficacy, contingent upon the specific agent (alone or in combination) and treatment protocol employed. Studies have suggested that the adoption of multiple-drug therapy may exhibit greater efficacy compared to single-drug therapy, attributable to an extended spectrum of activity and the synergistic effects of these pharmaceutical agents against a diverse range of pathogens⁹.

The adjunctive administration of systemic antibiotics alongside SRP has been associated with decreased infection, reductions in both periodontal pocket depth and the proportion of sites with probing pocket depths (PPD) ≥ 5 mm, increased attachment gain, and improved clinical outcomes, particularly notable in instances of severe periodontitis¹⁰. There is evidence indicating that adjunctive systemic antibiotic therapy should be administered concurrently with mechanical removal of supra- and particularly subgingival bacterial biofilms^{10,11}. Moreover, antibiotics are employed in the management of acute periodontal infections, to reduce the risk of post-operative infections subsequent to periodontal surgeries, and for prophylaxis in individuals with medical comorbidities¹².

While empiric antibiotic use may offer short-term benefits in certain periodontal scenarios, concerns regarding antimicrobial resistance and microbiome disruption, with potential systemic ramifications, necessitate a critical reevaluation of this approach. Moreover, a comprehensive risk-benefit analysis specific to each patient, accounting for potential benefits and adverse drug reactions, is crucial. To date, there exists no definitive guideline that systematically translates the indication and implementation of adjunctive systemic antibiotic therapy into evidence-based directives tailored to clinical needs, drawing upon the available dataset¹¹.

To ensure and maintain periodontal health, various antimicrobial agents are incorporated into chemical plaque control agents, such as mouthwashes, to inhibit the growth

of plaque biofilm, especially in areas of the mouth that are less accessible to toothbrushing. The guidelines established by the European Federation of Periodontology (EFP) specify that mouthwashes containing chlorhexidine, essential oils, and cetylpyridinium chloride represent the most efficacious adjunctive agents for plaque and gingivitis control^{13,14}. Multiple studies have demonstrated that incorporating antiseptic mouthwashes adjunctively with SRP yields an additional benefit in reducing probing pocket depths, bleeding on probing and bacterial plaque biofilms^{15,16,17}.

Survey studies in dentistry are frequently conducted to ascertain physicians' treatment preferences. Upon reviewing the literature, it becomes evident that various protocols exist regarding the use of antimicrobials in periodontal diseases and conditions. Worldwide, there are numerous issues stemming from incorrect, unnecessary, ineffective, and costly medication utilization. Therefore, it is paramount to administer medication only when necessary, in the appropriate quality, quantity, and manner. Consequently, the aim of this study was to assess the knowledge level of recently graduated dentists regarding the utilization of antimicrobial agents in periodontal treatments and to elucidate the factors influencing their preferences.

Material and Methods

The study protocol was approved by the Istanbul Biruni University Non-Interventional Clinical Research Ethics Committee during a meeting held on July 19, 2023, under ethical decision number 2023/82-11. Participants provided consent for the processing of personal data in accordance with the "Turkey Data Protection Rules." The survey was conducted anonymously, without recording any participant's identity information.

The research constitutes a survey study involving a questionnaire distributed via email to 5th-grade students enrolled in the Faculty of Dentistry at 23 different universities in Turkey during the period of May to June 2023. A total of 252 participants completed the survey in its entirety. The survey comprises 26 questions in total, encompassing inquiries related to demographic data (3 questions), the utilization of antibiotics in periodontal treatments (15 questions), and the use of antiseptic mouthwash in periodontal treatments (8 questions). Before collecting the data, the survey questions underwent a review process by 10 periodontists who were not involved in the study. This review ensured the clarity, relevance, and appropriateness of the questions for the study's objectives. Their expertise and impartial perspective contributed to refining the survey instrument, enhancing its validity and reliability.

(<https://docs.google.com/forms/d/112fURjHKckBB77IcY8fqNBxQR1YSIc98QQaaaWbHhwo/edit>)

Statistical analysis

Descriptive statistics of the data obtained in the study were calculated and presented as frequency (n) and percentage (%) for each question. Descriptive statistics analysis involved calculating frequencies, which represent the number of occurrences of each response, and percentages, which indicate the proportion of responses relative to the total sample size. Mann-Whitney U and Spearman's analysis methods are used to explore the relationship between participants' receipt of education on antimicrobial agent utilization in periodontal treatments and their prescribing patterns for various periodontal conditions. Statistical significance was defined as having a p-value less than 0.05. Data analysis was conducted using the SPSS 21 software package.

Results

Among the 252 participants in this study, 124 (49%) were identified as female, while 128 (51%) were identified as male newly graduated dentists. A total of 156 (62%) reported graduating from a foundation university, while 96 (38%) indicated graduating from a state university. During their training period; 38 (14.7%) newly graduated dentists reported seeing fewer than 5 patients per week, 184 (73.4%) reported seeing between 5 and 15 patients, and 30 (11.9%) reported seeing more than 15 patients per week.

The distribution of 236 (94%) individuals who reported receiving training on the use of antibiotics as an adjunct to periodontal treatment, categorized by the duration of training, is as follows: 152 (64.6%) received 0-2 hours of training, 39 (16.5%) received 2-5 hours, 37 (16%) received 5-10 hours, and 8 (3%) received more than 10 hours of training.

Table 1 presents the attitudes of newly graduated dentists toward the utilization of antibiotics in non-surgical periodontal treatment. Upon evaluating the reasons cited by participants for prescribing systemic antibiotics in non-surgical periodontal treatment, the highest incidence was observed in immunosuppressed individuals during routine treatment (95.4%) and in patients with periodontal abscesses (62.1%). The incidence of antibiotic prescription in non-surgical periodontal treatment was found to be statistically significantly higher among individuals who received training in antibiotic utilization ($p < 0.005$).

When assessing the timing of antibiotic prescription during non-surgical periodontal treatment, 94 participants (37.3%) indicated recommending it after completing supragingival instrumentation and continuing throughout subgingival instrumentation, while 67 participants (26.2%) stated recommending it after scaling SRP. (Table 1)

Table 1. Use of antibiotics in non-surgical periodontal treatments.

Would you recommend systemic antibiotics for non-surgical periodontal treatment?	n	(%)
Yes	108	42.9
No	144	57.1
If your answer is yes, in which situations would you prefer to prescribe them? (You may select more than one option.)		
Molar-incisor involvement	11	10.2
Stage III/IV periodontitis patients	18	16.7
Routinely in patients with immunosuppressive diseases	103	95.4
Routinely in patients with poorly controlled diabetes	17	15.7
Routinely in the presence of periodontal abscess	66	61.1
In the presence of severe periodontitis	75	69.4
If you recommend systemic antibiotics in conjunction with scaling and root planing treatment, how would you schedule the timing of antibiotic administration?		
I recommend antibiotics to the patient before scaling and root planing, and once the antibiotic treatment is completed, I commence periodontal treatment.	51	20.2
I recommend it before scaling and root planing procedures and continue its use for one week until the completion of the treatment.	41	16.3
I recommend it after supragingival instrumentation and continue its use during subgingival instrumentation.	94	37.3
I recommend it after completing the scaling and root planing procedures.	66	26.2
If you were to choose antibiotics in non-surgical periodontal treatment, which antibiotic would be your first choice?		
Amoxicillin	17	6.7
Amoxicillin + Clavulanic acid	180	71.4
Amoxicillin + Metronidazole .	31	12.3
Metronidazole.	12	4.8
Tetracycline	10	4

$P < 0.005$ and statistical test was done with Mann-Whitney U.

The combination of amoxicillin and clavulanic acid emerged as the primary preference among newly graduated dentists for non-surgical periodontal treatment, exhibiting the highest frequency of selection (71.4%).

Antimicrobial treatment approaches of newly graduated physicians in the presence of periodontal abscess are shown in Table 2. Of the participants, 165 (65.5%) indicated a propensity to prescribe antibiotics in cases of periodontal abscess. The predominant rationale for antibiotic prescription in such instances was the presence of fever and lymphadenopathy, cited by 153

participants (92.7%). Once more, among the participants, the combination of amoxicillin and clavulanic acid (79.4%) stood out as the primary antibiotic preference for cases of periodontal abscess. When comparing the rate of antibiotic prescribing in the treatment of periodontal abscess according to participants' education on antibiotic use, no statistically significant difference was observed ($p=0.510$).

Table 2. Use of antibiotics in the presence of periodontal abscess.

Do you recommend antibiotics for the treatment of periodontal abscesses?	n	(%)
Yes	165	65.5
No	87	34.5
If so, in which situations would you prefer to prescribe them? (You may select more than one option.)		
Routinely in the treatment of periodontal abscess	8	4.8
Periodontal abscess in the presence of deep inaccessible pockets	21	12.7
Fever and lymphadenopathy accompany periodontal abscess	153	92.7
Periodontal abscess drainage cannot be achieved	93	56.4
If treating a periodontal abscess, which antibiotic would be your first choice?		
Amoxicillin	2	1.2
Amoxicillin + Clavulanic acid	131	79.4
Amoxicillin + Metronidazole	25	15.2
Metronidazole	4	2.4
Tetracycline	3	1.8

$P<0.005$ and statistical test was done with Mann-Whitney U.

The antimicrobial treatment approaches employed by recently graduated dentists for necrotizing periodontal diseases are depicted in Table 3. The most prevalent rationales among participants for selecting antibiotics in cases of necrotic diseases were the presence of fever and lymphadenopathy, as well as systemic diseases or immunosuppression. The primary preference among newly graduated dentists for the treatment of necrotizing periodontal diseases is the combination of amoxicillin and metronidazole (45%), closely followed by the preferred combination of amoxicillin and clavulanic acid (43.6%). It was observed that 92.5% of the participants endorsed the use of mouthwash for the management of necrotizing diseases, with 92.3% specifically recommending chlorhexidine gluconate. The incidence of antibiotic and antiseptic mouthwashes prescription in necrotizing diseases treatment was found to be statistically significantly higher among individuals who received training in antibiotic utilization ($p<0.05$).

Table 3. Antimicrobial approach in necrotizing periodontal diseases.

Do you prefer antibiotics in the treatment of necrotizing periodontal diseases?	n	(%)
Yes	220	87.3
No	32	12.7
If your answer is yes, in which situations would you prefer to prescribe antibiotics? (You may select more than one option.)		
Routinely used in the treatment of necrotizing diseases	43	19.5
When accompanied by fever and lymphadenopathy	195	88.6
In immunosuppressed individuals or individuals with systemic diseases	186	84.5
If more than one area in the mouth is affected	29	13.2
In patients with severe complaints	19	8.6
Which antibiotic would be your first choice for the treatment of necrotizing periodontal disease?		
Amoxicillin	0	0
Amoxicillin + Clavulanic acid	96	43.6
Amoxicillin + Metronidazole	99	45
Metronidazole	20	9.1
Tetracycline	5	2.3
Would you prefer antiseptic mouthwash in the treatment of necrotizing periodontal diseases?		
Yes	233	92.5
No	19	7.5
If your answer is yes, which one/which do you prefer?		
Povidone iodide	15	6.4
Hydrogen peroxide	26	11.2
Chlorhexidine gluconate	215	92.3
Mouthwashes containing essential oils (e.g. Listerine)	30	12.9
Herbal mouthwashes	8	3.4

$P<0.005$ and statistical test was done with Mann-Whitney U.

It was ascertained that 69.4% of recently graduated dentists refrained from prescribing antibiotics in cases of peri-implant mucositis and peri-implantitis. Among the 77 participants who opted to prescribe antibiotics, the predominant rationale for their selection was the presence of periodontal pockets exceeding 6 mm in depth. (Table 4).

The antimicrobial treatment approaches employed by recently graduated dentists for surgical periodontal treatment are depicted in Table 5. 68.7% of recently graduated dentists indicated that they do not prefer to prescribe antibiotics in conjunction with surgical periodontal treatments. The highest rate of antibiotic prescription was observed following implant surgeries (86.1%), followed by mucogingival surgeries (62.4%). It was observed that a significant majority of participants advocated for the utilization of antibiotics post periodontal surgery. Furthermore, those who underwent training in antibiotic administration for periodontal treatments exhibited a notably higher antibiotic prescription rate, which was found to be statistically significant ($p = 0.02$).

Table 4. Use of antibiotics in the presence of peri-implant mucositis/peri-implantitis.

Should systemic antibiotic therapy be recommended for non-surgical peri-implant mucositis / peri-implantitis treatment?	n	(%)
Yes	77	30.6
No	175	69.4
If your answer is yes, in which situations would you prefer it? (You may select more than one option.)		
Mechanical debridement around the implant, routine	14	18.2
Pus discharge is observed in clinical findings of peri- implantitis	28	36.4
In cases where the probable pocket depth is 6 mm and above	42	54.5
In cases where clinical improvement is not observed despite non-surgical periodontal treatment	29	37.7
I do not recommend systemic antibiotics for the treatment of peri-implant mucositis	20	26
I do not recommend systemic antibiotics for the treatment of peri-implantitis	0	0

P<0.005 and statistical test was done with Mann-Whitney U.

Table 5. Use of antibiotics in surgical periodontal treatment.

Should systemic antibiotics be recommended in surgical periodontal treatment?	n	(%)
Yes	173	68.7
No	79	31.3
If your answer is yes, in which situations would you prefer it? (You may select more than one option.)		
Flap operation	88	50.9
Free gingival graft/Connective tissue graft	108	62.4
Implant surgery	149	86.1
Gingivectomy / Gingivoplasty operations	19	11
Periodontal regenerative operations	78	45.1
When should systemic antibiotic use be recommended in periodontal surgery?		
I recommend using antibiotics before periodontal surgery	37	14.7
It should be recommended before periodontal surgery and should continue to be used after the operation	95	37.7
It should be recommended after the completion of the periodontal surgery.	120	47.6

P<0.005 and statistical test was done with Mann-Whitney U.

Table 6. Use of antiseptic mouthwash in periodontal treatment.

Are you recommend antiseptic mouthwash to your patients in periodontal treatment?	n	%
Yes	237	94
No	15	6
If your answer is yes, in which situations would you prefer it? (You may select more than one option.)		
I routinely recommend it to patients for daily use.	134	56.5
To reduce or prevent plaque buildup.	178	75.1
I recommend it to patients with bleeding gums	113	47.7
I recommend it to patients with inadequate oral hygiene	212	89.5
To reduce bad breath	146	61.6
Dentin sensitivity.	15	6.3
I recommend it to patients who cannot achieve clinical improvement after non-surgical periodontal treatment.	70	29.5
Non-surgical periodontal treatment of peri-implant mucositis	54	22.8
Non-surgical periodontal treatment of peri-implantitis	55	23.2
When would you recommend antiseptic mouthwash to your patients? (You may select more than one option.)		
I recommend gargling before starting tooth surface cleaning and root planing procedures	67	26.6
After tooth surface cleaning	151	59.9
After completing tooth surface cleaning and root planing treatments	153	60.7
Routinely when giving oral hygiene education to the patient	152	60.3
After periodontal surgery operations	114	45.2
In addition to non-surgical periodontal therapy in the treatment of peri-implant mucositis	66	26.2
In addition to non-surgical periodontal treatment in the treatment of peri-implantitis	65	25.8
If you were recommending antiseptic mouthwash in Phase I periodontal treatment, what would be your first choice?		
Mouthwashes containing triclosan	2	0.8
Mouthwashes containing sanguinarin	0	0
Mouthwashes containing chlorhexidine gluconate	120	47.6
Mouthwashes containing essential oils (Listerine etc)	129	51.2
Herbal mouthwashes	1	0.4

Do you recommend mouthwash containing chlorhexidine gluconate to your patients?	n	%
Yes	231	91.7
No	21	8.3
If your answer is yes, in what situations do you recommend it? (You may select more than one option.)		
Routinely after non-surgical periodontal treatment	37	16
Routinely after surgical periodontal treatment	99	42.9
During periodontal treatment in patients with systemic diseases	100	43.3
During periodontal treatment in patients with poor oral motivation	163	70.6
In cases where complications occur after surgical periodontal treatment	109	47.2

$P < 0.005$ and statistical test was done with Mann-Whitney U.

The perspectives of recently graduated dentists concerning the utilization of antiseptic mouthwashes in periodontal treatment are delineated in Table 6. 94% of participants indicated recommending the utilization of antiseptic mouthwash during periodontal treatment. Among the participants, 89.5% reported recommending antiseptic mouthwash for patients exhibiting inadequate oral hygiene, while 75.1% indicated recommending its use to and prevent plaque accumulation. When assessing the timing of antiseptic mouthwash recommendations, it was discerned that participants commonly prescribed it following SRP (60.7%) and subsequent to delivering oral hygiene education to patients (60.3%). The most commonly preferred mouthwash ingredients were those containing essential oils (51.2%) and chlorhexidine gluconate (47.6%). Among the factors influencing participants' recommendations for mouthwashes containing chlorhexidine gluconate, the highest prevalence was observed in cases of inadequate oral hygiene among individuals undergoing periodontal treatment (70.6%). It was observed that participants who underwent training in antimicrobial use demonstrated a statistically significant increase in the prescription of antiseptic mouthwash and chlorhexidine for periodontal treatments.

Discussion

The microbial dental biofilm is widely recognized as the primary etiological factor in the development of periodontal diseases. Therefore, non-surgical and surgical periodontal treatments with effective biofilm control are usually sufficient for successful control of periodontal tissue destruction. Nevertheless, despite meticulous treatment, instances arise where optimal outcomes remain elusive, and the progression of periodontal destruction persists. In such circumstances, adjunctive therapy with antimicrobial agents may be warranted¹⁸. Presently, a universally accepted protocol for the application of antimicrobial agents in periodontal treatments is lacking. In light of this gap, our study endeavors to assess the attitudes and knowledge levels of recently graduated dentists regarding this matter.

In non-surgical periodontal treatment, SRP procedures are employed to eradicate biofilm. When mechanical debridement of the microbial dental biofilm layer proves inadequate, adjunctive antibiotic therapy can be considered to enhance the efficacy of non-surgical periodontal treatment¹⁹. Factors that negatively affect the success of treatment include patient-related characteristics such as microbial recolonization, deep periodontal pockets, and difficulty in accessing furcation areas. Despite SRP being widely regarded as the gold standard for biofilm removal, its effectiveness appears to be constrained in patients with pocket depths exceeding 5 mm²⁰. Our study revealed a higher proportion of newly graduated dentists who opted against systemic antibiotic use in non-surgical periodontal treatment compared to those who endorsed it. Research suggests that the optimal timing for prescribing antibiotics alongside non-surgical periodontal treatment is concurrent with the mechanical elimination of supra and subgingival bacterial biofilms, particularly the latter^{10,11}. This alignment between the participants' responses and existing literature underscores their adherence to established guidelines. It was also observed that the amoxicillin - clavulanic acid combination was the most frequently preferred option among the participants. However, recent studies indicate that the adjunctive use of metronidazole and amoxicillin alongside SRP yields more favorable outcomes in the management of periodontal diseases¹⁸. This underscores the limitations identified within the practices of the clinicians involved in our study. The one study involved participants from diverse dental backgrounds, including general dentists, periodontologists, and dental trainees. Remarkably, 66% of the participants expressed the belief that mechanical periodontal therapy alone could effectively address the clinical presentation in the majority of periodontal disease cases, thus obviating the need for antimicrobial intervention²¹. Correspondingly, Goutam et al.²² found that 63% of practitioners did not favor systemic antibiotics in this context. Similarly, Yiğit et al.²³ advocate for a case-based approach to systemic antibiotic use in support of non-surgical periodontal therapy, based on findings from a study involving 206 participants across various dental disciplines. The majority of participants in their study reserved systemic antibiotics for cases presenting with systemic

symptoms, prophylactically for patients at risk of infective endocarditis, and in acute periodontal scenarios where debridement was impractical. In another survey conducted by Yıldız et al.²⁴ involving 450 periodontologists, over half of the respondents expressed a preference for adjunctive antibiotics alongside non-surgical periodontal treatment. Notably, the combination of amoxicillin-clavulanic acid and metronidazole garnered the highest preference rate. This inclination towards antibiotic usage among periodontologists is posited to stem from their frequent encounter with complex forms of gingival diseases.

It was observed that a notable proportion of newly graduated dentists participating in our study exhibited a preference for antibiotics in the management of necrotizing periodontal diseases, with a particularly high inclination towards the amoxicillin - metronidazole combination and the amoxicillin - clavulanic acid combination. In the literature, systemic antibiotic use is recommended in addition to periodontal treatment in the treatment of necrotizing periodontal diseases accompanied by systemic findings such as fever, malaise and lymphadenopathy²⁵. In the online survey study involving 513 participants, 42.7% reported receiving training on antibiotic use in periodontal treatment. Among them, a significant proportion indicated a preference for antibiotics as the primary treatment modality for necrotizing periodontitis. Same study, it has been noted that antibiotics are frequently utilized as second-line therapy in the treatment of periodontal abscesses²⁶. This study conducted in France, akin to our own research, identified a high rate of antibiotic prescriptions for periodontal abscesses, which was found to be inconsistent with international protocols^{26,27}. In an online survey conducted by Al-Ak'hali et al.²¹ in Saudi Arabia, participants indicated that the conditions for which they most frequently prescribed antimicrobials were periodontal abscess and necrotizing periodontal diseases (84.3% each). Additionally, it was observed that the most frequently prescribed antibiotic for necrotizing periodontal diseases was metronidazole, followed by the amoxicillin - clavulanic acid combination.

In our present study, 68.7% of the participants expressed a preference for systemic antibiotics in surgical periodontal treatments. Consistent with our findings, a study by Yıldız et al.²⁴ reported that 78% of periodontologists in Turkey favored systemic antibiotics in surgical periodontal treatment. A systematic review indicated that the adjunctive use of systemic antibiotics alongside surgical periodontal treatment led to an increased level of clinical attachment⁷. Powell et al.¹² conducted an evaluation of antibiotic usage in periodontal surgical procedures, focusing on postoperative infection risk. Their findings suggested a range of influence on infection risk between 0% and 5.88%, with systemic antibiotics not significantly preventing infections. In a

study investigating the use of systemic antibiotics in the perioperative period during periodontal flap operations, considering the low incidence of postoperative infection and the drawbacks of systemic antibiotic use, it was recommended to refrain from using systemic antibiotics in the perioperative period to prevent infection²⁸. Another study assessing the use of systemic antibiotics in regenerative periodontal surgeries reported that systemic antibiotics did not yield additional benefits in terms of regenerative outcomes²⁹. The divergent opinions in the literature regarding the necessity of supplemental antibiotic use in surgical periodontal treatment may contribute to the variations in physicians' preferences.

In a web-based survey conducted by Kissa et al.³⁰ in 2023, it was noted that 88.2% of dentists favored the use of systemic antibiotics in implant surgery. Similarly, in a separate survey study conducted among periodontology specialists in Turkey, a notable proportion of dentists regarded implants as foreign materials, anticipating a decrease in the primary response to these materials with antibiotic usage, thereby potentially reducing associated pain³¹. George et al.³² conducted a web - based survey where 73% of 93 participants reported routinely opting for systemic antibiotics in implant surgery. The predominant rationale for antibiotic administration was cited as the reduction or elimination of local or systemic infections. Furthermore, a 2018 study by Arteagoitia et al. involving 210 participants revealed that 88% routinely prescribed antibiotics in implant surgery, with only 4 dentists abstaining from antibiotic prescription entirely³³. Echoing these findings, participants in our study similarly exhibited a high propensity for antibiotic usage in implant surgery.

The EFP guidance recommends that adjunctive antiseptics, particularly chlorhexidine mouthwashes, may be contemplated for a finite duration in periodontitis therapy, serving as supplements to mechanical debridement, under specific circumstances³⁴. In our investigation, it was noted that among newly graduated dentists, mouthwashes containing chlorhexidine ranked second in their preferences. Notably, this preference was particularly directed towards individuals exhibiting inadequate motivation towards oral hygiene maintenance. Mouthwashes may lack effectiveness in the absence of tooth brushing, interdental cleaning, and professional plaque removal. Indeed, the majority of guidelines worldwide advocate for the utilization of mouthwashes as an adjunct to good oral hygiene practices, resulting in modest yet noteworthy clinical advantages such as reductions in periodontal pocket depth, plaque accumulation, and bleeding scores²⁷. Hence, in line with the perspectives expressed by the participating physicians, rather than advocating for chlorhexidine mouthwashes as a remedy for suboptimal oral hygiene, it would be more advisable for physicians to incorporate them as adjuncts to their mechanical treatments and encourage

patient compliance with oral hygiene practices. Upon reviewing the literature, it was noted that in survey studies assessing physicians' preferences regarding chlorhexidine-containing mouthwash, the predominant recommendation was for its utilization in post-operative infection control following periodontal and implant surgeries^{32,33,34,35}.

In present study, it was noted that newly graduated dentists predominantly favored mouthwashes with essential oil content to support periodontal treatment. Studies have concluded that while chlorhexidine-containing mouthwashes are more effective in preventing biofilm accumulation than those containing essential oils, both types of mouthwashes exhibit similar antibacterial activity³⁶. Nonetheless, chlorhexidine mouthwashes are associated with potential adverse effects, including alterations in taste perception, xerostomia, discoloration or coating of the tongue, and desquamation of the oral mucosa³⁷. When reviewing the literature, it was observed that mouthwashes containing essential oils not only improve both plaque index and gingival index but also exhibited potential for prolonged usage as an antimicrobial agent^{36,38,39,40}. It can be inferred that newly graduated dentists align their choices with these studies indicating that essential oil-containing mouthwashes can serve as alternatives to chlorhexidine.

An additional outcome of our investigation revealed a positive correlation between the extent of education received by recently graduated dentists regarding the utilization of antimicrobial agents in periodontal therapies and their prescription patterns of antibiotics and antiseptic mouthwashes. Our findings indicate that as the duration of education concerning antimicrobial agent usage in periodontal treatments increased, there was a corresponding rise in the frequency of antimicrobial agent prescriptions among newly graduated dentists. This finding suggests that having knowledge about antimicrobial agents leads to the development of a positive attitude towards the use of antimicrobial agents.

Conclusions

The study highlights notable trends among newly graduated dentists, particularly their preference for amoxicillin - clavulanic acid over the recommended amoxicillin-metronidazole combination in non-surgical periodontal treatment. Additionally, the frequent prescription of antibiotics for periodontal abscesses indicates potential gaps in antibiotic knowledge. Similarly, the inclination towards antiplaque mouthwash for patients with poor oral hygiene suggests further educational needs. While increased training correlates with higher antimicrobial prescription rates, caution is warranted due to potential side effects and the risk of bacterial resistance. Therefore, targeted training programs and

public awareness campaigns are recommended to promote judicious antimicrobial use and enhance the knowledge base of newly graduated dentists.

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