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Original article

Knowledge of Dentists regarding Antibiotic Prescription in Endodontics in Tripoli

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ABSTRACT

The aim of this study was to assess how well dentists understand and follow guidelines for prescribing antibiotic in endodontics in Tripoli. A questionnaire link was sent to all participants via various social media platforms. All answers from the online form were automatically imported in an Excel file and were then appropriately analyzed. Descriptive statistics (such as frequencies and percentages) were calculated, and Chi-square test were used to compare between the groups. The majority (67.6%) of the respondents were general dental practitioners and most of them were females (80.4%). A smaller group (10.8%) were endodontic specialists while 21.6% belong to other specialties. Diffuse swelling was the most common condition for which antibiotics were prescribed (81.4%) and in patient with swelling & difficulty in swallowing (73.5%). Antibiotics were always prescribed by 65,7% of respondents for patient exhibiting systemic symptoms such as fever and malaise and 6.9% of respondents always prescribed antibiotics in prolonged root canal treatment. The Majority of respondents selected Amoxicillin with Clavulanate as the first choice for patients without medication allergies (72.7%) and Amoxicillin ranked as the second most preferred antibiotic (39.4%) (Table 3). On the other hand, the majority of respondents preferred clindamycin as the first choice for patients with penicillin allergy (43.6%). The majority of the participants believe that the typical duration of antibiotics course is five to seven days (98%). The majority (95.1%) of respondents were aware of drug resistance, while a very small percentage (4.9%) were not aware. The data reveal that critical importance of selecting antibiotics based on patient-specific factors, such as allergies, to ensure effective and safe management of endodontic infections. The knowledge and attitude of dentists regarding antibiotic prescription for endodontic treatments require further improvement.

Key words: Endodontic Treatment, Antibiotics, Knowledge of Dentist.

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كان الغرض من هذه الدراسة هو التحقق من معرفة أطباء الأسنان فيما يتعلق بوصف المضادات الحيوية في علاج جذور الأسنان في طرابلس. تم إرسال رابط استبيان الى جميع المشاركين عبر منصات التواصل الإجتماعي المختلفة. تم جمع البيانات و تحليلها احصائيا. كانت الغالبية من المشاركين (67.6%) أطباء أسنان عام و كان معظمهم من الإناث (80.4%). كان التورم المنتشر هو الحالة الأكثر شيوعا لوصف المضادات الحيوية (81.4%), كما كانت المضادات توصف للمرضى الذين يعانون من تورم و صعوبة في البلع (73.5%). حيث وصف 65.7% من الآطباء المضادات الحيوية للمرضى الذين يعانون من أعراض مثل الحمى و التوعك. اختار أغلبية المستجيبين الأموكسيسيلين مع كلافونات كخيار أول للمرضى الذين لا يعانون من حساسية اتجاه البنسلين (72.7%), بينما فضلت الغالبية الكليندااميسين كخيار أول للمرضى الذين يعانون من حساسية للبنسلين (43.6%). أظهر غالبية المشاركين أن المدة النموذجية للمضادات الحيوية تتراوح بين خمسة الى سبعة أيام (98%). كشفت البيانات الأهمية الحيوية لإختيار المضادات الحيوية بناء على العوامل الخاصة بالمرضى, مثل الحساسية, لضمان علاج فعال و امن للعدوى في علاج جذور الأسنان مما يتطلب تحسين المعرفة لدى أطباء الأسنان فيا يخص وصف المضادات الحيوية

INTRODUCTION

Most oral diseases presented to the dentist are primarily inflammatory conditions that are associated with pain. A significant percentage of dental pain originates from acute and chronic infections of the pulp or surrounding area, which often requiring operative intervention, rather than antibiotics [1]. Although endodontic infections, similar to other odontogenic infections, have a polymicrobial origin involving gram-positive, gram-negative and strict or facultative anaerobic bacteria [2], most endodontic infections can be effectively treated with root canal therapy, drainage or tooth extraction, without requiring the use of local or systemic antibiotics [3]. Antibiotics should be used as an adjunct in treating apical periodontitis and only in cases of acute apical abscess with systemic involvement, when an infection is fast progressing or in immunocompromised patients [4,5].

Previous studies have shown that antibiotics do not alleviate pain or swelling in non-vital symptomatic teeth when there is no systemic involvement [6,7]. On the other hand, the patients with life-threatening conditions such as swelling of the floor of the mouth or breathing difficulties should be hospitalized and treated by administering intravenous antibiotics [8].

AAE advises that antibiotic therapy is only in patients suffering from a localized symptomatic apical abscess with systemic manifestations (fever, lymphadenopathy, malaise), progressive infections like cellulitis, soft tissue trauma requiring intervention and extraction and as a prophylaxis for asymptomatic apical abscess in immunocompromised patients and in underlying medical conditions such as endocarditis, otherwise it will be ineffective [9]. Unfortunately, the overuse of antibiotics by dentists, particularly in treatment of endodontic infections, continues to be prevalent despite the recommendations from AAE [10, 11].

Because microbial samples are not routinely taken from infected root canals, antibiotics are often prescribed empirically, leading to their overuse [12]. Antibiotic overuse and prescription of inappropriate antibiotics (misuse) have been the leading cause of increased microbial resistance [13]. Dentists are responsible for about 3% to 11% of all antibiotic prescriptions [3] and their influence on the development of resistant bacterial species is not negligible. As clinicians, we are responsible for understanding the impact of our therapeutic decisions beyond the chairside [4].

The appropriate use of antibiotics should be emphasized, and dental professional should be educated about the indications and potential consequences of improper antibiotic prescription [5].

The aim of this study was to explore dentists' understanding of antibiotic prescription in endodontics in Tripoli.

METHODS

This online cross-sectional study was carried out from May to July 2024 among dentists working in Tripoli. a specifically designed free-access Google Forms questionnaire was developed in English language. The questionnaire consisted of 10 closed-ended questions. The first part to collect dentists' socio-demographic data including gender, years of experience and their specialization.

The second part of the questionnaire consists of multiple-choice questions concerning different situations to prescribe antibiotics, the antibiotic prescribed in patient with and without penicillin allergy, as well as duration of treatment. The third part of the questionnaire was included questions about awareness about drug resistance and prescribing a loading dosage of antibiotic.

The questionnaire link was then sent to all participants via various social media platforms. All answers from the online form were automatically imported in an Excel file and were then appropriately analyzed. Descriptive statistics (such as frequencies and percentages) were calculated, and Chi-square test tests were used to compare between the groups.

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RESULTS

The demographics of respondents are described in Table 1. The majority (67.6%) of the participants who replied were general dental practitioners and most of them were females (80.4%). A smaller group (10.8%) were endodontic specialists while 21.6% belong to other specialties. A substantial portion (47.1%) were more than 10 years of practice and 40.2% had been in the field for less than 5 years of practice, indicating a diverse range of experience levels. A smaller group (12.7%) has between 5 and 10 years of practice. The highest number of antibiotic prescriptions was issued for patient with diffused swelling (81.4%) and in patient with swelling & difficulty in swallowing (73.5%). Overall, 65.7% of respondents consistently prescribed antibiotics for patients exhibiting systemic symptoms such as fever and malaise and 6,9% of respondents always prescribed antibiotics for prolonged root canal treatment (Table 2). The majority of respondents selected Amoxicillin with Clavulanate as the first choice for patients without medication allergies (72.7%) and Amoxicillin was the second most freqently selected antibiotic (39.4%) (Table 3). On the other hand, the majority of respondents selected clindamycin as the primary choice for patients with a penicillin allergy (43.6%) (Table 4). In terms of specific patient populations, dentists commonly prescribe prophylactic antibiotics to immunocompromised patients (67.3%), systemic disease patients (34.7%), uncontrolled diabetes patients (57.4%), patients undergoing endodontics surgery (8.9%), and patients with a history of cancer and radiology (29%) as shown in figure 1. Most participants believed that the appropriate duration for an antibiotic course is 5 to7 days (98%). Tables 5and 6 illustrate the antibiotic preferences of dentists with varying years of practice when treating endodontic infections in adult patients, both with and without penicillin allergies. Amoxicillin is most preferred by those with less than 5 years of practice (53.7%) but less so by those with 5-10 years (23.1%). Amoxicillin with Clavulanate was highly preferred by those with more than 10 years of practice. The Chi-square test shows a significant difference in antibiotic choice based on years of practice (p = .030). This indicates that experience level influences prescribing habits for patients without medical allergies. For patients who are allergic to penicillin, the Chi-square test indicates no significant difference in antibiotic choice based on years of practice (p = 0.361). This suggests that the prescribing habits for patients with penicillin allergies are relatively consistent regardless of the dentist's experience level. The majority (95.1%) of respondents were aware of drug resistance, while a very small percentage (4.9%) were not aware (Figure2). Figure 3 revealed that most respondents (71.6%) do not prescribe a loading dosage, and a smaller proportion (28.4%) are prescribing a loading dosage.

Table 1: Demographic Information of studied group.

Items		Frequency	Percentage
Gender	Male	20	19.6%
	Female	82	80.4%
Professional role	A general dentist	69	67.6%
	An endodontic specialist	11	10.8%
	Other specialty	22	21.6%
Years of practice	Less than 5 years	41	40.2%
	5 - 10 years	13	12.7%
	More than 10 years	48	47.1%

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Table 2 Indications for antibiotic use in endodontic infections.

Condition	Frequency	Percentage
In patient with diffused swelling	83	81.4%
In patient with swelling & difficulty in swallowing	75	73.5%
In patient with fever & malaise	67	65.7%
Acute apical abscess	31	30.4%
Acute pulpitis	19	18.6%
Chronic apical abscess with sinus tract	16	15.7%
Chronic apical periodontitis	14	13.7%
In prolonged root canal treatment	7	6.90%
If the patient insists	8	7.80%

Table 3: Antibiotic preferences of dentists for treating endodontic infections in patients who have no allergy

Antibiotic	Number of Responses	Percentage
Amoxicillin /Clavulanate	72	72.7%
Amoxicillin	39	39.4%
Metronidazole	15	15.2%
Azithromycin	6	6.1%
Clindamycin	2	2.0%

Table 4: Antibiotic preferences of dentists for treating endodontic infections in patients with penicillin allergies.

Antibiotic	Number of Responses	Percentage
Azithromycin	24	23.8%
Metronidazole	23	22.8%
Clindamycin	44	43.6%
Erythromycin	31	30.7%

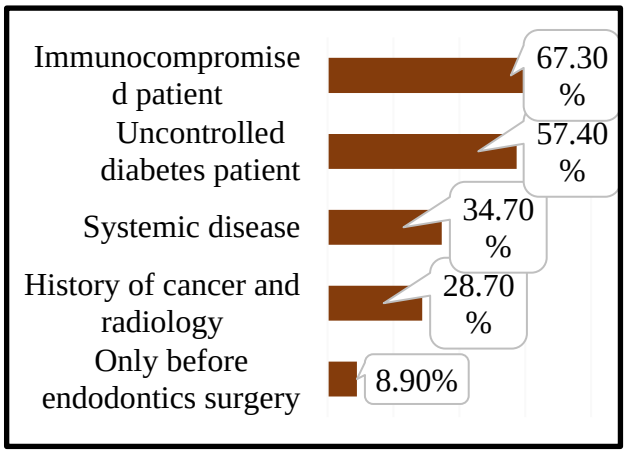

Figure 1: Indications for Prophylactic Antibiotics in Dentistry

Table 5: Comparison of years of experience of dentists and antibiotic preferences in patients with no medical allergy

Antibiotic	< 5 Years (N, %)	5 - 10 Years (N, %)	> 10 Years (N, %)	P-value
Amoxicillin	22 (53.7%)	3 (23.1%)	14 (31.1%)	0.030
Azithromycin	2 (4.90%)	2 (15.4%)	2 (4.4%)	
Amoxicillin /Clavulanate	24 (58.5%)	10 (76.9%)	38 (84.4%)	
Metronidazole	5 (12.2%)	3 (23.1%)	7 (15.6%)	
Clindamycin	1 (2.4%)	1 (7.7%)	0 (0.0%)	

Table 6: Comparisonn of years of experience of dentists and antibiotic preferences in patients with penicillin allergy

Antibiotic	< 5 Years (N, %)	5 - 10 Years (N, %)	> 10 Years (N, %)	P-value
Azithromycin	10 (25.0%)	4 (30.8%)	10 (20.8%)	0.361
Amoxicillin /Clavulanate	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Metronidazole	9 (22.5%)	2 (15.4%)	12 (25.0%)	
Clindamycin	23 (57.5%)	4 (30.8%)	17 (35.4%)	
Erythromycin	9 (22.5%)	4 (30.8%)	18 (37.5%)	

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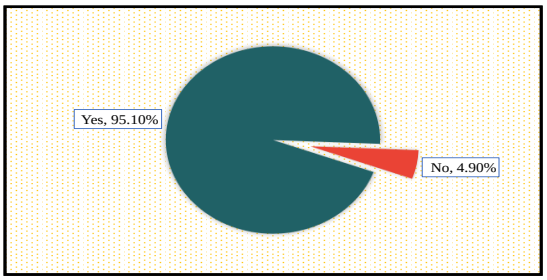

Figure 2: Awareness of drug resistance among dentist.

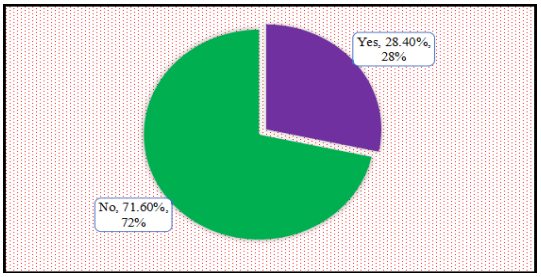

Figure 3: Use of loading dosages among dentists

DISCUSSION

One of the major causes of antibiotic resistance which may be lethal is the abuse of antibiotics with unnecessary prescription [14]. The emphasis on this point isn't to decrease and control the improper use of antibiotics and its resulted resistance, but also to minimize exposing patients to unneeded side effects, to prevent potential fatal allergic reactions, to lessen unnecessary outcomes such as gastrointestinal disturbance or yeast infections in oral mucosa due to taking of certain types of antibiotics prescribed by dentists and to preserve the economic status of health care systems [14,15]. This questionnaire-based, cross-sectional study enhanced dentists' understanding of antibiotic prescriptions in Endodontics in Tripoli.

Multiple surveys conducted in Saudi Arabia revealed that systemic antibiotics were unnecessarily prescribed in dental practice [16,17]. Other studies with comparatively large sample size also reported antibiotic abuse among dental patients [28,29]. In the present study, (72.7%) of respondents selected amoxicillin combined with clavulanic acid (CA) as their first choice which is comparable to other study done in Saudi Arabia [18]. like our study, the preferred medication among respondents in the study conducted in Turkey was Amoxicillin with CA 61.8% while the second drug of choice was Amoxicillin alone 46.5% [19]. According to a recent antibiotic update in endodontics, amoxicillin and penicillin VK are recommended as the first line therapeutic antibiotics that dentists must prescribe to non-allergic penicillin patients [9,12]. Being bactericidal, Penicillin VK has great effectiveness, low toxicity, as well as low cost [20]. The difference between amoxicillin and penicillin VK is that penicillin has relatively narrow spectrum, while amoxicillin has a broader spectrum of antibiotic activity [12,20] of note, the development of β -lactamase producing bacteria can result in a significant decrease in the antimicrobial effectiveness of amoxicillin against endodontic pathogens; [12,21] as such, a combination of amoxicillin with clavulanic acid (a β -lactamase inhibitor) is highly recommended [9,12,20]. our results showed that Amoxicillin with Clavulanate is highly preferred, especially by those with more than 10 years of practice (84.4%). Amoxicillin is most preferred by those with less than 5 years of practice (53.7%) but less so by those with 5-10 years (23.1%). The Chi-square test shows a significant difference in antibiotic choice based on years of practice ($p = .030$). This indicates that experience level influences prescribing habits for patients without medical allergies. Only about (30%) of members of American Association of Endodontics (AAE) preferred prescribing clindamycin for patients with allergies in 2000 [22]. However, in 2016, the percentage increased significantly to be over (95%) [23]. Our results showed that the first drug of choice for patients with penicillin allergy was clindamycin (43.6%).

Majority of respondents in this study preferred to prescribe antibiotic for patients with diffused swelling (81.4%) and difficulty in swallowing (73.5%). Systemic symptoms such as fever and malaise (65.7%) are strong indicators for antibiotic use. Acute apical abscess (30.4%) is significant but less frequently associated with antibiotic use. The antibiotic therapy in the both above mentioned

conditions is justifiable and in line with AAE guidelines [9].

Chronic apical abscess with a sinus tract (15.7%) involves chronic conditions with drainage, making antibiotics less likely. Chronic apical periodontitis is only associated with antibiotic use in 13.7% of cases. In prolonged root canal treatment (6.9%), antibiotics are rarely prescribed. However, in a study done to assess antibiotic prescription for infections of endodontic origins by Brazilian endodontists, the study showed that 38.3% of endodontists preferred systemic antibiotic prescription for treatment of necrotic pulp with chronic apical periodontitis; when fistul is present and patient has no pain [24].

Nevertheless, antibiotics should be administered in immuno-compromised patients to avoid complications associated with endodontic-associated bacteremia. In present study, 67.3% of respondents were prescribe prophylactic antibiotics to immunocompromised patients, 57.4% to uncontrolled diabetes patients and 34.7% for those with systemic disease. This study has shown a high percentage of dentists having sufficient knowledge regarding antibiotic prophylaxis administration.

Data on the use of antibiotic prophylaxis from other studies are heterogeneous but they show that clinicians are not always sure whether antibiotic prophylaxis is needed; therefore, they use it defensively. On the other hand, certain diagnoses that are clear indications of the need for prophylaxis remain unrecognized, thus putting the patient an increased risk of developing bacteremia [25,26].

The onset of endodontic infections is rapid with brief duration and resolves in 3–7 days or less if the cause is treated or removed [11]. However, there is limited evidence to support the optimal duration of the antibiotic course. The literature implies that shorter course duration for 2–3 days is effective and significantly improves patients' condition, confirming that a prolonged course of antibiotics may not bestow any additional benefits [9,11]. Disappointingly, only 2.9% of the participants in the present study would prescribe antibiotics for a duration of 3 days, while the majority (95.1%) would prescribe them for a period of 5–7 days.

Bearing on mind the fact that an inappropriate use of antibiotics and lack of knowledge on their rational use can lead to antibiotic resistance, dental health professionals need to reduce antibiotic prescriptions by following the available up-to-date guidelines [27]. In this study the majority(95.1%) of respondents were aware of drug resistance, while a very small percentage (4.9%) were not.

CONCLUSION

The data reveal that critical importance of selecting antibiotics based on patient-specific factors, such as allergies, to ensure effective and safe management of endodontic infections. The strong preference for Amoxicillin/Clavulanate in non-allergic patients and Clindamycin in penicillin-allergic patients highlights the reliance on these antibiotics in dental practice. Our study indicates that dentists with less than five years of experience tend to prefer Amoxicillin, whereas those with more than ten years of experience chose Amoxicillin/Clavulanate. In summary, the results show that most participants use antibiotic inappropriately during endodontic therapy, indicating their lack of knowledge regarding sensible use and the scientific rationale for antibiotics prescriptions. The knowledge and attitudes of dentist regarding antibiotic prescriptions for endodontic treatments require further improvement.

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