CAHIERS MAGELLANES-NS
Volume 07 Issue 1
2025

ISSN:1624-1940
http://magellanes.com/

KNOWLEDGE AND AWARENESS LEVEL OF ANTIBIOTIC PRESCRIPTION FOR ENDODONTICS THERAPY AMONG DENTAL STUDENTS, INTERNS, AND DENTISTS IN SAUDI ARABIA

Khames T. Alzahrani*[1], Essam Almenea[2], Mashahid Alqteeb[3], Abdulaziz Alqarni[4], Osama Alghamdi[4], Abdulrhman Algarni[5], Saud Alsefri[5], Khalid Alharbi[5], Bader Muaddi[5], Razan Alamoudi[5].

[1]BDS, PGD Endo from Standford University, Saudi Board of Endodontic SR, King Fisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia.
[2]Consultant of Endodontic, King Faisal Specialist Hospital and Research center, Riyadh, Saudi Arabia.
[3]Dental student, Imam Abdulrahman bin Faisal University, Dammam, Saudi Arabia.
[4]Dental intern, King Abdulaziz University, Jeddah, Saudi Arabia.
[5]General dentist, King Abdulaziz University, Jeddah, Saudi Arabia.

***Corresponding author**: Khames T. Alzahrani; **Email**: Dr.khames.Alzahrani@gmail.com

Abstract

Background: The overuse of antibiotics in agriculture, veterinary medicine, human medicine, and dentistry has contributed to the rise of antibiotic-resistant bacteria. In Endodontics, antibiotic prescriptions are not routinely written down; antibiotic resistance may also arise as a result of their improper use. 12.5% of general dentist practitioners (GDPs) recommended antibiotics for acute pulpitis when a definitive diagnosis was difficult. 47.3% of GDPs provided antibiotics, and 30.3% did so because of time restrictions. To assess knowledge and awareness of antibiotic prescriptions for endodontics therapy among dental students, interns, and dentists in Saudi Arabia.
Method: This cross-sectional study was conducted in Saudi Arabia from July 2024 to December 2024. Include Dental students, interns, and Saudi Arabian dentists. Dental students from countries other than Saudi Arabia and non-dental professionals were excluded. Data concerning awareness and knowledge about antibiotic prescription for Endodontic treatment were collected through a questionnaire. The data was analyzed using a computer statistical software program, SPSS.
Results: This study assessed knowledge and awareness regarding antibiotic prescriptions for endodontic therapy among 392 dental students, interns, and practitioners in Saudi Arabia. Findings revealed that 45.2% of participants demonstrated a high level of knowledge, while 14.0% had low understanding, potentially jeopardizing patient safety. Awareness levels paralleled these results, with 46.7% exhibiting high awareness but 27.8% showing low awareness, highlighting gaps that may affect clinical practice. Notably, antibiotic prescribing practices had a significant relationship with demographic factors, including gender and age, prompting a need for targeted educational interventions to improve understanding and adherence to guidelines in antibiotic use.
Conclusion: In conclusion, this study highlights critical gaps in knowledge and awareness about antibiotic prescriptions in endodontic therapy among dental students, interns, and practitioners in Saudi Arabia.

Keywords: Knowledge, Awareness, Endodontics treatment, Antibiotics, Saudi Arabia.

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Introduction:

The overuse of antibiotics in agriculture, veterinary medicine, human medicine, and dentistry has contributed to the rise of antibiotic-resistant bacteria [1]. Dentists prescribe 7-11% of all common antibiotics, mainly for oral infections [2]. The main purpose of antibiotics is to treat bacterial infections by either eliminating the bacteria or inhibiting their growth [3]. The first antibiotic discovered in history was penicillin, introduced in the mid-20th century by Alexander Fleming [4]. Antibiotics are chemical compounds that are produced by certain microorganisms through a fermentation process [5].
Antibiotics have been used extensively in medicine since 1928. Alexander Fleming discovered penicillin [6]. 7-10% of the antibiotics used in primary healthcare are prescribed by general dentists, of which about 80% percent are unsuitable or abused [7]. In endodontics, antibiotic prescriptions are not routinely written down, and antibiotic resistance may also arise due to improper use [8]. 12.5% of general dentist practitioners (GDPs) recommended antibiotics for acute pulpitis. In cases when a definitive diagnosis was difficult to make, 47.3% of GDPs provided antibiotics, and 30.3% did so because of time restrictions [9].

previous study examined pediatric and general dentists' awareness and adherence to antibiotic prescription and prophylaxis guidelines and their knowledge of antibiotic resistance. Nearly all the pediatric and general dentists surveyed were aware of antibiotic resistance and familiar with the relevant prescription and prophylaxis guidelines [10]. In study done among Egyptian dentists were evaluated for their knowledge, attitudes, and antibiotic prescription patterns. The dentists showed adequate knowledge of antibiotic resistance, but their prescribing practices needed to adhere to AAPD guidelines entirely [11]. The level of knowledge and practice concerning antibiotic usage in Croatian Dentists' endodontics was assessed using the European Society of Endodontology position statement as a reference. Croatian dentists need more knowledge on proper antibiotic use in endodontics, indicating a need for continuing education in this area [12].
Previous studies have demonstrated a need for more relevant articles addressing this topic. A notable knowledge gap exists between dental students and general dental practitioners regarding the appropriate prescription of antibiotics for endodontic infections. This gap underscores the importance of enhancing the curriculum for dental students and continuing education for practitioners. Focusing on updated guidelines and evidence-based practices for antibiotic use in endodontic infections could bridge this knowledge gap. This approach would lead to more effective management of endodontic infections and help mitigate the issue of antibiotic resistance, thereby improving overall dental care standards in Saudi Arabia. The study aimed to evaluate the level of knowledge and adherence among general dentists in Saudi Arabia regarding the guidelines provided by the American Association of Endodontists (AAE) for prescribing antibiotics to patients undergoing endodontic treatment.

Methodology:

Study Design and Setting:

This study was a cross-sectional questionnaire based on a structured questionnaire developed by the authors. It was conducted in Saudi Arabia between July 2024 and December 2024. The study's population consisted of undergraduate students, dental interns, general dentists, board certification and fellows.

Sample size:

Sample size calculations were made to determine the minimum responses required to create a

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representative sample for the entire population. A Rao soft sample size calculator was used to calculate the sample size. The determined sample size was 384, with an indicator percentage of 0.50, a margin of error of 5%, and a confidence interval (CI) of 95%.

Inclusion and Exclusion Criteria:
Dental students, dental interns, and Saudi Arabian dentists met the study's inclusion requirements. Dental professionals, interns, students from countries other than Saudi Arabia, and non-dental professionals have been excluded from this study.

Method for data collection, instrument and score system:
The survey instrument was a self-administered anonymous questionnaire in English. It consisted of 21 questions in three main sections. Section one contained Demographic features. The second section asked Knowledge questions regarding antibiotic prescription for endodontic therapy. At the same time, the third section included Awareness questions. Dental students collect information using Google Forms; with the author's permission, some survey questions were relied upon from their questionnaire form [13,14].

Scoring system:
In total, 30 statements were used to assess the participants' awareness and degree of knowledge. 6 statements were for demographics, 16 for knowledge, and 8 for awareness. Correct answers were awarded one point, while incorrect answers or 'I don't know' responses received zero points. The scoring was done using Likert scales (Dichotomous, Three-Point, and Quality Scales), ensuring an objective assessment. The maximum score was 15, divided as per the original Bloom's cut-off points: 80.0%-100.0%, 60.0%-79%, and 59.0%. Participants were then categorized into three groups based on their scores.
Knowledge score varied from 0 to 29 points. It was classified into three levels as follows: those with a score of 9 or below ($\leq$9) were classified as having a **low level of knowledge**, those with a score between 10 and 15 as having a **moderate level of knowledge**, and those with scores ($\geq$ 16) as a **high level of knowledge.**
Awareness scores varied from 0 to 8 points. They were classified into three levels as follows: those with a score of 5 or below ($\leq$ 5) were classified as having a **low level of awareness**, those with a score of 6 as having a **moderate level of awareness**, and those with scores seven or above ($\geq$ 7) as having a **high level of awareness**.

Pilot test:
Twenty people were given the questionnaire and asked to complete it. This was done to assess the study's viability and the ease of use of the questionnaire. The pilot study's results were not included in the study's final analysis.

Analyzes and entry method:
The computer entered data using the "Microsoft Office Excel Software" (2016) Windows software. Then, the data was loaded into the IBM SPSS Statistics for Windows, Version 20.0 (Armonk, NY: IBM Corp.) statistical analysis application, version 20 of the Statistical Package of Social Science Software (SPSS).

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Results:

Table (1) displays various demographic parameters of the participants with a total number of (392). The mean age of participants is 25.3 years, with 76.5% of participants 24 and 26 years old, reflecting which represent 38.5% of the sample. This demographic is ever male (57.1%) and Saudi (86.7%) with some homogenous national representation. The Western area (63.3%) dominates geographically by far, possibly indicating regional (geographical) as well as participant (availability, availability for, recruitment, etc.) differences. Qualifications of respondents were academically varied, with 38.8% of respondents holding a Bachelor of Dental Surgery (BDS). Moreover, the data is slightly skewed to employment in educational institutions and government hospitals, which may be the result of the participants career path, or given chances of employment within the healthcare sector.

Table (1): Sociodemographic characteristics of participants (n=392)

Parameter		***No.***	***Percent (%)***
Age (Mean:25.3, STD:4.1)	23 or less	145	37.0
	24 to 26	151	38.5
	27 or more	96	24.5
Gender	Female	168	42.9
	Male	224	57.1
Nationality	Saudi	340	86.7
	Non-Saudi	52	13.3
Location	Northern area	23	5.9
	Southern area	42	10.7
	Central area	29	7.4
	Eastern area	50	12.8
	Western area	248	63.3
Academic qualification	BDS	152	38.8
	Intern	90	23.0
	Student	150	38.3
Working place	College	120	30.6
	Governmental hospital	118	30.1
	Private hospital	112	28.6
	Other	42	10.7

As shown in figure 1, Using a total sample size of 392 respondents, the data presented provide insight into the clinical decision making that occurs when prescribing antibiotics for dental conditions. It is among the situations considered, and a significant proportion of respondents, 50.5% (197 people), would have prescribed antibiotics in case of diffuse swelling, reflecting a common clinical practice of presumed systemic implications. Furthermore, the results indicate that 31 respondents (7.9 %) would prescribe antibiotics for acute apical abscess and 19 respondents (4.8 %) would prescribe antibiotics for chronic pulpitis. Of those with a sinus tract related to chronic apical abscess, 42 (10.7%) supported antibiotic use. Interestingly, over a quarter (23.9%, 94 respondents) chose "all of the above" as a comprehensive treatment approach. In our cohort, only 9 (2.3%) would prescribe antibiotics on necrosis, revealing discretion in this condition.

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Figure (1): Illustrates situations where antibiotics are prescribed among participants.

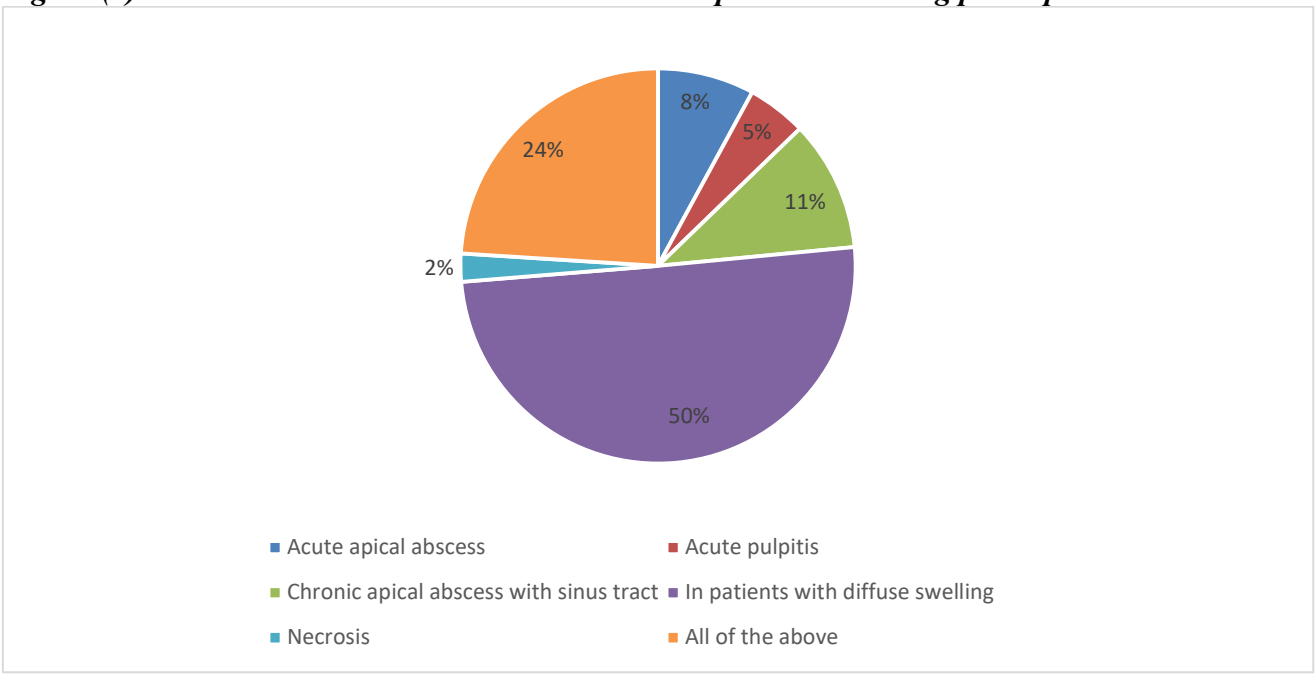

Table 2 presents an overview summarizing the knowledge levels about antibiotic prescription practice in endodontic therapy among a sample of 392 respondents. The results indicate reliance on antibiotic use in many clinical scenarios with 50.3 per cent of practitioners indicating they would prescribe antibiotics for a patient with diffuse swelling a common presentation in endodontic emergencies. The data also suggests a troubling trend regarding prophylactic antibiotic prescribing, with 39.8 percent saying yes for all listed scenarios in both immunocompromised patients and those with a history of heart ailments. For adult patients without allergies, this reinforced tendency towards established first line therapies is demonstrated by the preference of amoxicillin (68.1%). Although the decision-making process is mostly guideline driven (78.8%) it is favourable regarding adherence to evidence-based practices. Notably, the substantial percentage of respondents (31.4 per cent) who are uncertain of the need for prophylactic antibiotics for all dental procedures indicates a potential area of further education and clarification within the dental community.

Table (2): Parameters related to knowledge level of antibiotic prescription for endodontics therapy (n=392).

Parameter		***No.***	***Percent (%)***
In which of the situations would you prescribe antibiotics:	Acute apical abscess	31	7.9
	Acute pulpitis	19	4.8
	Chronic apical abscess with sinus tract	42	10.7
	In patients with diffuse swelling	197	50.3
	Necrosis	9	2.3
	All of the above	94	24.0

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In which of the following situations would you prescribe antibiotics prophylactically	History of cancer and radiotherapy	6	1.5
	Immunocompromised patients	149	38.0
	Only before endodontic surgery	21	5.4
	Systemic disease	19	4.8
	Uncontrolled diabetic patients	41	10.5
	All of the above	156	39.8
Antibiotic preference for adult patients with no medical allergies	Amoxicillin 250mg QID/ 500mgBD	267	68.1
	Azithromycin 500mg stat, 250mgBD	47	12.0
	Ciprofloxacin mg" D	23	5.9
	Metronidazole 250mg /500mgQID	14	3.6
	Other	41	10.5
Antibiotic preference for adult patients with penicillin allergy	Azithromycin 500mg stat, 250mgBD	111	28.3
	Ciprofloxacin mg" D	35	8.9
	Clindamycin 150mg/300mgQID	177	45.2
	Metronidazole 250mg /500mgQID	42	10.7
	Other	27	6.9
Would you routinely prescribe antibiotics in the following situations? *	Acute facial swelling	268	68.4
	Dental trauma	162	41.3
	Extraction by open method	168	42.9
	Dry socket	103	26.3
	Periapical abscess	111	28.3
	Apical periodontitis	87	22.2
	Pediatric periodontal diseases	88	22.4
	Pericoronitis	136	34.7
	Irreversible pulpitis	76	19.4
	Extraoral draining sinus tract	198	50.5
	Simple extraction	61	15.6
	Reversible pulpitis	101	25.8
Would you prescribe antibiotics for the following systemic conditions? *	Blood dyscrasias	219	55.9
	Respiratory disorders	106	27.0
	Juvenile diabetes	147	37.5
	Viral infections	151	38.5

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Would you prescribe prophylactic antibiotics in cases of cardiovascular diseases such as *	Congenital cardiac abnormalities	280	71.4
	Subacute bacterial endocarditis	304	77.6
How do you most of the time decide which antibiotic to use?	Based on guidelines	307	78.3
	Based on symptoms	69	17.6
	Based on the cost of the drug	16	4.1
In any of the following cases, a prophylactic antibiotic should be given before starting a dental procedure *	Cardiac transplant	189	48.2
	Congenital heart conditions	203	51.8
	Patient with history of infective endocarditis	292	74.5
	Patient with prosthetic heart valves	274	69.9
Procedures Requiring Prophylaxis: All dental procedures that involves manipulation of the gingival tissue, periapical region of teeth, or perforation of the oral mucosa	No	123	31.4
	Yes	196	50.0
	I don't know	73	18.6
If you have any adult patient , have you been advised to take Amoxicillin 2 grams orally 30 to 60 minutes before the procedure?	No	155	39.5
	Yes	171	43.6
	I don't know	66	16.8
If the patient is a child who needs a prophylactic antibiotic before treatment and is allergic to penicillin, what will you prescribe for him/her among these options?	Azithromycin or Clarithromycin 500 mg orally	67	17.1
	Cephalexin 2 grams orally	53	13.5
	Clindamycin 600 mg orally	192	49.0
	None of the above	80	20.4
If the patient was a child and had to take a prophylactic antibiotic, would you advise him/her to take Amoxicillin 50 mg/kg orally 30 to 60 minutes before the procedure?	No	70	17.9
	Yes	239	61.0
	I don't know	83	21.2
If the child is allergic to penicillin, have they been advised to take one of the following?	Azithromycin or Clarithromycin 15 mg/kg orally	83	21.2
	Cephalexin 50 mg/kg orally	67	17.1
	Clindamycin 20 mg/kg orally	217	55.4
	None of the above	25	6.4

****Results may overlap***

As shown in figure (2), The collected data of the 392 total respondents shed light on some of the reasons that antibiotics do not work for these patients, not only because of the physiologic processes that may undermine the antibiotics, but because of the patient backgrounds and comorbidities. 68 individuals (approximately 17.4%) indicated that further efforts to alleviate clinical symptoms may require a more effective anti-inflammatory agent. In addition, 17 respondents or about 4.3% of respondents have

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attributed the response to insufficient to systemic factors necessitating an increased dosage. In the case of 81 individuals (20.7%), representing a notityable potential development of tolerance towards the antibiotic, there is an urgent need of how to mitigate tolerance in antibiotic treatment. On the other hand, 31— roughly 7.9 percent— said the antibiotic was just not sensitive enough to the infection. Finally, 195 respondents (49.7%), or a majority, indicated a clear 'No' to the antibiotic and hence constituted a serious public health problem.

Figure (2): Illustrates reason for not responding to antibiotics among participants.

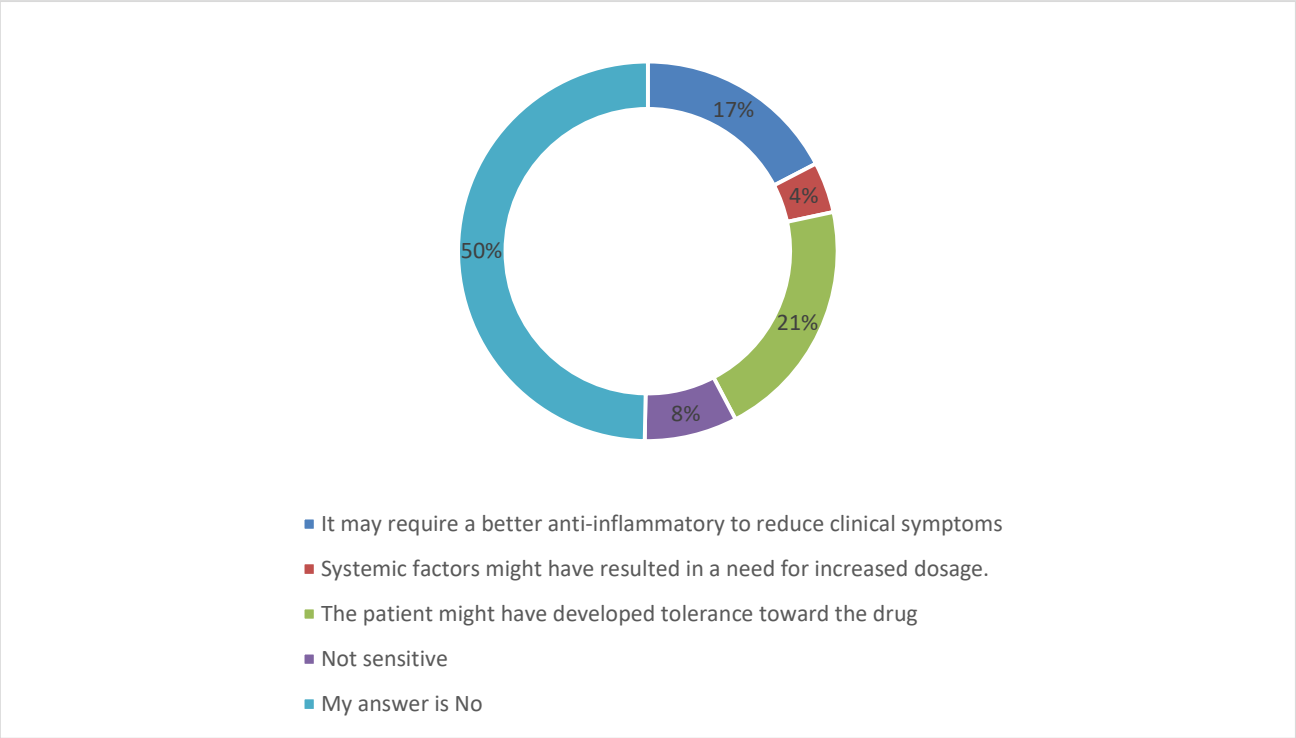

Table 3 describes insightful reflections on the awareness and practices of dental practitioners regarding antibiotic prescriptions in endodontic therapy are provided based on a huge sample of 392 participants. The patients had experienced not one patient failure to prescribed antibiotics among a significant part of which, 49.7%, reported. Nevertheless, the remaining 36.2% of respondents identified reasons of antibiotic ineffectiveness, pointing to the necessity to keep in mind the patient specific reasons such as tolerance and bring better anti-inflammatory agents. However, despite a majority (90.3%) knowledge of antimicrobial resistance, about 14% still do not consider it to be a serious public health problem, raising an alarmingly big disconnect that could slow intervention efforts. In addition, the data shows that some 79.1 percent of pharmacists do adjust prescriptions in accordance with established pharmacologic principles; yet some 18.4 percent do not keep themselves educated on antibiotic guidelines.

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Table (3): participants' awareness level of antibiotic prescription for endodontics therapy (n=392).

Parameter		***No.***	***Percent (%)***
Do any of your patients haven't responded to the antibiotics that you've prescribed?	No	195	49.7
	Yes	197	50.3
If yes, what is the reason for not responding to antibiotics?	It may require a better anti-inflammatory to reduce clinical symptoms	68	17.3
	Systemic factors might have resulted in a need for increased dosage.	17	4.3
	The patient might have developed tolerance toward the drug	81	20.7
	Not sensitive	31	7.9
	My answer is No	195	49.7
What would be your choice in cases where improvement is not seen after 2-3 days with Your First Choice of Antibiotic	Amoxicillin 250mg QID/ 500mgBD	95	24.2
	Azithromycin 500mg stat, 250mgBD	84	21.4
	Ciprofloxacin mg" D	25	6.4
	Clindamycin 150mg/300mgQID	34	8.7
	Metronidazole 250mg /500mgQID	97	24.7
	Other	57	14.5
Are you aware of antimicrobial resistance?	No	38	9.7
	Yes	354	90.3
Is antimicrobial resistance considered a public health problem?	No	58	14.8
	Yes	334	85.2
Can overprescription of antibiotics lead to antimicrobial resistance?	No	66	16.8
	Yes	326	83.2
Do you prescribe the drugs based on the drug dosage formula, half-life, and patient weight?	No	82	20.9
	Yes	310	79.1
Do you upgrade yourselves with the new guidelines or updates regarding antibiotic usage?	No	72	18.4
	Yes	320	81.6

Table 4 demonstrates the knowledge levels of the surveyed population in respect of antibiotic prescriptions for endodontic therapy. A sizeable proportion, 45.2%, scored high level of knowledge with a total number of 392 respondents, suggesting a good understanding by a considerable portion amongst them of antibiotic protocols applied to tooth endodontic practice. On the other hand, 40.8% fell in the band of individuals with moderate knowledge, revealing a clear portion that might profit from

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targeted instructional intercessions. What is noteworthy is that, alarmingly, 14.0 percent of respondents had a low level of knowledge, a level of understanding that may have serious consequences on patient safety and treatment efficacy.

Table (4): Shows knowledge level of antibiotic prescription for endodontics therapy score results.

	Frequency	**Percent**
High level of knowledge	177	45.2
Moderate knowledge level	160	40.8
Low knowledge level	55	14.0
Total	392	100.0

Table 5 shows the results of the presentation of the data concerning the awareness of antibiotic prescriptions for endodontic therapy among a sample of 392 respondents. Amongst the significant results, it is noteworthy that 46.7% of the respondents demonstrate a high level of awareness (a good understanding on antibiotic protocols in endodontics). The reverse is true, 25.5% of them represent the moderate awareness group that syas they were somewhat familiar with the issue, and 27.8% falls under the low awareness one, which unfortunately might indicate holes in their knowledge that could have actual or potential impact on the clinical practice.

Table (5): Shows awareness level of antibiotic prescription for endodontics therapy score results.

	Frequency	**Percent**
High awareness level	183	46.7
Moderate awareness	100	25.5
Low awareness level	109	27.8
Total	392	100.0

Table (6) shows that knowledge level of antibiotic prescription for endodontics therapy has statistically significant relation to gender (P value=0.0001), age (P value=0.021), nationality (P value=0.004), location (P value=0.003), working place (P value=0.002). It also shows statistically insignificant to academic qualifications.

Table (6): Relation between knowledge level of antibiotic prescription for endodontics therapy and sociodemographic characteristics.

Parameters		***Knowledge level***		***Total (N=392)***	***P value****
		High level of knowledge	**Moderate or low**		
Gender	Female	96	72	168	0.0001
		54.2%	33.5%	42.9%	
	Male	81	143	224	
		45.8%	66.5%	57.1%	
Age	23 or less	75	70	145	0.021
		42.4%	32.6%	37.0%	

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	24 to 26	55	96	151	
		31.1%	44.7%	38.5%	
	27 or more	47	49	96	
		26.6%	22.8%	24.5%	
Nationality	Non-Saudi	33	19	52	0.004
		18.6%	8.8%	13.3%	
	Saudi	144	196	340	
		81.4%	91.2%	86.7%	
Location	Northern area	13	10	23	0.003
		7.3%	4.7%	5.9%	
	Southern area	17	25	42	
		9.6%	11.6%	10.7%	
	Central area	6	23	29	
		3.4%	10.7%	7.4%	
	Eastern area	15	35	50	
		8.5%	16.3%	12.8%	
	Western area	126	122	248	
		71.2%	56.7%	63.3%	
Academic Qualification	BDS	71	81	152	0.463
		40.1%	37.7%	38.8%	
	Intern	44	46	90	
		24.9%	21.4%	23.0%	
	Student	62	88	150	
		35.0%	40.9%	38.3%	
Working place	College	38	82	120	0.002
		21.5%	38.1%	30.6%	
	Governmental hospital	58	60	118	
		32.8%	27.9%	30.1%	
	Private hospital	63	49	112	
		35.6%	22.8%	28.6%	
	Other	18	24	42	
		10.2%	11.2%	10.7%	

P value was considered significant if ≤ 0.05.

Table (7) shows awareness level of antibiotic prescription for endodontics therapy has statistically significant relation to gender (P value=0.0001), age (P value=0.0001), academic qualifications (P value=0.001), working place (P value=0.026). It also shows statistically insignificant relation to nationality and location.

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Table (7): Awareness level of antibiotic prescription for endodontics therapy in association with sociodemographic characteristics.

Parameters		***Awareness level***		***Total (N=392)***	***P value****
		High awareness level	**Moderate or low**		
Gender	Female	53	115	168	0.0001
		29.0%	55.0%	42.9%	
	Male	130	94	224	
		71.0%	45.0%	57.1%	
Age	23 or less	44	101	145	0.0001
		24.0%	48.3%	37.0%	
	24 to 26	89	62	151	
		48.6%	29.7%	38.5%	
	27 or more	50	46	96	
		27.3%	22.0%	24.5%	
Nationality	Non-Saudi	25	27	52	0.829
		13.7%	12.9%	13.3%	
	Saudi	158	182	340	
		86.3%	87.1%	86.7%	
Location	Northern area	12	11	23	0.187
		6.6%	5.3%	5.9%	
	Southern area	15	27	42	
		8.2%	12.9%	10.7%	
	Central area	9	20	29	
		4.9%	9.6%	7.4%	
	Eastern area	26	24	50	
		14.2%	11.5%	12.8%	
	Western area	121	127	248	
		66.1%	60.8%	63.3%	
Academic Qualification	BDS	88	64	152	0.001
		48.1%	30.6%	38.8%	
	Intern	40	50	90	
		21.9%	23.9%	23.0%	
	Student	55	95	150	
		30.1%	45.5%	38.3%	
Working place	College	64	56	120	0.026
		35.0%	26.8%	30.6%	
	Governmental hospital	45	73	118	
		24.6%	34.9%	30.1%	
	Private hospital	59	53	112	
		32.2%	25.4%	28.6%	
	Other	15	27	42	
		8.2%	12.9%	10.7%	

P value was considered significant if ≤ 0.05.

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Discussion:

The present cross-sectional study has assessed the knowledge and awareness levels around antibiotic prescriptions for endodontics therapy amongst dental students, interns and practitioners in Saudi Arabia. The findings of this study paint a critical picture of where the vast majority of antibiotic prescription practices currently stand among Saudi Arabia's dental community: a picture of strength and gaps that demand focused intervention.

Results suggest large number of respondents (50.3%) tend to prescribe for common endodontic emergencies such as diffuse swelling [15]. Previous studies done in different regions have also reported high rates of antibiotic prescription of dentists for cases of endodontic conditions without any indication [16, 17] which is consistent with this. Concerning overuse of antibiotics in such situations because it can promote antimicrobial resistance, a global public health crisis [18].

Meanwhile, the study showed a disturbing trend when it comes to antibiotic prophylaxis, with 39.8 percent of the respondents willing to prescribe antibiotics for a variety of scenarios, such as with immunocompromised patients and with those with cardiac histories [19, 20]. Prophylactic antibiotic use may be indicated in certain high-risk situations, however indiscriminate prescription of antibiotics this way can expose patients to unnecessary exposure and risk for adverse effects [21].

Preferred by 68.1% [22] of the respondents, adult patients without allergies were identified as the primary choice for amoxicillin. This finding is consistent with recommendations of several professional guidelines, including the Amoxicillin is recommended as the first line antibiotic for endodontic infections, a very common reason for antibiotic therapy [23]. The study however also pointed out that 20.7% of respondents admitted the chances of developing antibiotic resistance and only 7.9% mentioned the incapability to give an appropriate dosing for specific infections despite not sensitive to antibiotics [24]. This underscores the need for enhanced education and awareness campaigns within the dental community to promote the judicious use of antibiotics and mitigate the risk of antimicrobial resistance.

In addition, 90.3% of participants reported awareness of the problem of antimicrobial resistance, yet 14% of participants felt that antimicrobial resistance was not a serious health issue [25]. This is particularly worrying given that the disconnect between knowledge and perceived importance of the problem may prevent the implementation of effective public health intervention to deal with antibiotic misuse and resistance [26].

Furthermore, the study revealed large knowledge gaps areas where respondents lacked knowledge about antibiotic protocols in endodontics, such as 14% of respondents had low knowledge levels and 27.8% were in low awareness category. These results indicate that interventions targeted to dental professionals in Saudi Arabia are needed urgently to improve their clinical competence such that antibiotic prescription is congruent with evidence-based guidelines and best practice.

Limitations of the study include its cross-sectional design, which captures the present state, and does not allow the assessment of trends over time. Furthermore, the data was self-reported, and so is subject to possible biases, and the geographical concentration of respondents was in the Western region of Saudi Arabia, which could limit generalization of any findings.

Conclusion:

This study concludes with critical gaps in knowledge and awareness of knowledge about antibiotic prescriptions in endodontic therapy among dental students, interns, and endodontic practitioners in Saudi Arabia. The results emphasize the importance of providing comprehensive educational interventions, and implementing antibiotic stewardship programs within the dental community to

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promote judicious antibiotic use, diminish the antibiotic antimicrobial resistance threat and optimize patient results.

Acknowledgement:

We acknowledge all of the volunteers who provided samples for this research.

Ethical approval:

After fully explaining the study and emphasizing that participation is optional, each participant gave their informed consent. The information gathered was safely stored and utilized exclusively for study.

Funding:

This study was not supported by any outside sources.

Conflict of interests:

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability:

All data associated with this study are present in the paper.

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