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Knowledge and Attitude of Antibiotic Prescription Among Dental Students in Najaf City, Iraq

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Abstract

Dental practitioners regularly prescribe antibiotics for therapeutic or prophylactic purposes to manage oral and dental infections. However, inappropriate prescribing and excessive use of antibiotics are major factors in the emergence of antibiotic resistance. Materials and methods: Dental students at the college of dentistry at the University of Kufa were provided with a questionnaire consisting of ten questions regarding the daily practice of antibiotic prescription in dental practice. Result: 73.3% of the students couldn't identify the most effective antibiotic for dental infection, 53.4% of them had good answer about antibiotic to avoid during pregnancy , more of half of the student had good answer for the antibiotic regarding renal diseases and 37.7% of them chose the write answer about antibiotic to avoid in liver failure, only 39.7 % of the student knew the true indication for antibiotic prescription and less of half of them (43.8) knew the antibiotic effective for beta lactamase enzyme bacteria, a high percentage of the students (72.3) could answer the question about indication for antibiotic prophylaxis and about half of them (49.7) could identify macrolides antibiotics, and about 58.9 of the students knew the most serious side effect of penicillin. Conclusion: The knowledge of dental students was varied regarding different questions, and more educational effort is needed to obtain better medical knowledge for Iraqi dental students.

Keywords: antibiotics, dentistry, dental students, drug prescription

Introduction

Antibiotics are essential medications in modern medicine because they significantly lower the death rate from infectious diseases and increase survival rates. They are also essential for preventing or treating infections that may develop in chemotherapy patients, patients with chronic illnesses, or patients who have undergone major operations like organ transplants, joint replacements, or heart surgeries [1].

Antibiotics are used in dentistry to treat several cases that are either tooth-related or for other causes. 6-10% of prescribed antibiotics have been made by dentists, with either a preventative or therapeutic intent. Additionally, the prescription of antibiotics is necessary in cases of acute infection of the alveolar bone and as a preventative measure to ward off endocarditis [2].

Resistance to antibiotics has resulted from improper, random, and illogical use of antibiotics and dentist over prescription without any need. It was found that 1/3 of antibiotic prescriptions in outpatients were dispensable. So, to avert this random use of antibiotics, there was a definitive way to use antibiotics in managing tooth infections [3].

The prophylactic and therapeutic use of antibiotics has become widespread. It has been found that cellulitis and lip angle inflammation are effectively treated with penicillin. In dentistry, infections that are commonly managed with antibiotics are related to root canal infections "endodontic infections." Alternately, it has been found that local measures such as "incision and drainage, root canal treatment, and tooth extractions" for removing or improving endodontic infection can be very useful, excluding antibiotic use [4].

Dentists in contact with multiple infections in the orofacial region [1,2]. Bacterial infections are ahead of those infections that begin in the pulp and are less common in periodontal diseases and tissues of the salivary gland. Operative procedures "in the form of dental fillings, root canal treatment, scaling, root planning, extraction, or abscess drainage are considered the gold standard for treatment "[3]. In some conditions, these procedures cannot be applied, so prescribing antibiotics is very necessary.

Therapeutically, facial cellulitis, bacterial sialadenitis, necrotizing ulcerative gingivitis, pericoronitis, and certain forms of periodontitis are the most typical examples that indicate antibiotic prescription in dentistry, so there is some limitation to its prescribing [5].

This study aims to evaluate the knowledge of Iraqi dental students about antibiotic use in the dental field.

Materials and methods

This includes all of the dental students in fourth and fifth grades at the College of Dentistry at the University of Kufa in 2022. All the participants (290 students) were given ethical consideration before the conduct of the survey, and the objectives were clearly explained to ensure confidentiality. All the students have passed the pharmacology course, an annual course in the 3rd stage at the college that consists of 60 credit hours.

The dental students were provided with a questionnaire consisting of ten multiple-choice questions regarding the daily practice of antibiotic prescription in dental practice, and the filled-out forms were collected for statistical analysis.

The answers to the questionnaire were collected for analysis and assessment after the exclusion of unclear and empty results. The demographic distribution of the participants is shown in Table 1.The questions were conducted to assess the overall knowledge of the dental students towards the pharmacological treatment of common oral infections and the general precautions for some specific conditions like pregnancy, as well as some side effects and contraindications, as shown in Table 2.

Table 1: the demographic discerption of the participants

	Gender		total
	Male	female	
fifth stage	50	82	158
Fourth stage	62	96	132

Table 2: the multiple choices questions included in the survey and the responses of the participants.

Question	Answers			
the most effective antibiotic for dental infection	amoxicillin	amoxiclav	tetracycline	cephalexin
	214(73.3%)	46(15.8%)	14(4.8)	12(6.2%)
antibiotics to avoid during first trimester of pregnancy are:	metronidazole	erythromycin	cephalosporin	penicillin
	156(53.4%)	66(22.6%)	24(15.8%)	46(8.2%)
antibiotics that don't need dosage adjustment in patients with renal failure	metronidazole	cephalosporin	tetracycline	penicillin
	90(30.8%)	72(24.7%)	66(23.6%)	42(21.9%)
antibiotics that need dosage adjustment in patients with liver disease	erythromycin	tetracycline	cephalosporin	penicillin
	110(37.7%)	86(29.5%)	52(17.8%)	30(15.1%)
the prescription of antibiotic is indicated in :	All choices	Acute pericoronitis	Acute pulpitis	Chronic pulpitis
	122(41%)	116(39.7%)	30(10.3%)	24(8.2%)
the antibiotic that effective against beta lactamase bacteria	amoxiclav	amoxicillin	metronidazole	erythromycin
	128(43.8%)	76(26%)	62(21.2%)	23(8.9%)
which of these operation indicated for antibiotic prophylaxis to prevent infective endocarditis	Dental implant	Restoration procedure	All of the other choices	orthodontic
	182(62.3%)	26(8.9%)	56(19.2%)	10(9.6%)
antistaphyllococus penicillin include	Cloxacillin	ampicillin	amoxicillin	amoxiclav
	118(40.4%)	74(25.3%)	52(17.8%)	48(16.4%)
macrolides antibiotics include	azithromycin	All of the other choices	lincomycin	clindamycin
	144(49.3%)	106(36.3%)	18(6.2%)	24(8.2%)
penicillin most serious adverse effect is	allergy	Nausea& vomiting	Skin rash	Diarrhea
	172(58.9%)	46(15.8%)	(%15.8)46	28(9.6%)

Table 3: comparison between the correct answers of the fourth stage and the fifth stage students

	Mean ±SD	T -test	P-value
5th stage students	**5.89± 1.8**	**2.18**	**0.03**
4th stage students	**5.38±2.15**		

NOTE: * p<0.05
**analysis using two samples t-test

Result and Discussion

A wide variety of answers were obtained from dental students. For the question of the most effective antibiotic for dental infection, most of the answers (73.3) pointed out that amoxicillin is the most effective antibiotic, and this concurs with other previous studies that found that amoxicillin was the first choice for the treatment of odontogenic infection excluding allergic patients due to a suitable cost and few side-effects and good anti-microbial action[6,7]. On the other hand, Amoxiclav, which is a combination of amoxicillin and clavulanic acid, has a wider range of action but is more expensive than amoxicillin.

While there were few answers that considered tetracycline as a drug of choice since this drug is not usually prescribed for the management of tooth infections due to the emergence of bacterial resistance and several side effects, mostly discoloration of teeth, the prescription of it should be with restrictions and should not be given as a first choice for the management of tooth infection[8].

Additionally, several responses included "cephalexin," which is a good response., although there were few side-effects and more activity against microbes than amoxicillin, amoxicillin is still the most effective medication for the management of tooth-infection[6].

The addition of a beta-lactamase inhibitor such as clavulanic acid to amoxicillin (Augmentin) extends the antibiotic spectrum to anaerobes such as Prevotella spp., Bacteroides spp. anaerobes, and Staphylococcus bacteria[9].

When asked about antibiotics to avoid during the first trimester of pregnancy, most of the students considered metronidazole. The use of metronidazole is not recommended during the first trimester as a result of maternal infection with Trichomonas Vaginalis or a high concentration of fetal fibronectin with the elevation of preterm birth10. Also, it was found that high rates of answers went with erythromycin, despite being in category B, but it is associated with heart disease, as had been reported in a previous study[11].

While other answers went with cephalosporin and penicillin, this disagrees with another review as these drugs were the safest drugs to be used in dentistry for pregnant women (category B)[12]. So, the student's medical information should be updated and refined.

According to the question "drugs that do not need dose adjustment in patients with renal failure", a great number of answers went with metronidazole. It was found that patients with kidney disease do not need to change the "single-dose pharmacokinetics of metronidazole". It is not removed to a great level by the kidney, so the usual dose can be prescribed.

Also, considerable answers went with cephalosporin, but these answers need to be refreshed as the excretion of most generations of cephalosporin depends on GFR[13.] The third answer went with tetracycline, but this is a wrong answer since an adjustment is needed as it is excreted by the kidney[14]. Also, some students answered penicillin; this answer was also wrong as it is eliminated by the kidney[14.]

Concerning question 4, antibiotics need dose adjustment in liver disease patients. It was found in this survey that a high percentage of students answered erythromycin, which is primarily metabolized by the liver. This is in agreement with the studies of Munar et al. and Cruz-Pamplona et al. that found contraindications to using erythromycin in severe liver disease, the same as tetracycline. Also, considerable answers went with cephalosporin, but this is a wrong answer as the main excretion is by urine and there is no need for dose

adjustment in patients with liver disease17. Samely, some answers went with penicillin; also, it was a wrong answer as penicillin is excreted by renal tubules and there is no need for dose adjustments in patients with hepatic dysfunction17. Indication of an antibiotic prescription, It was found in this survey that most answers went with all choices (acute pulpitis, chronic pulpitis, acute pericoronitis), which agreed with the study of Poveda et al. that explains the need for prescribing antibiotics was adjusted to RCT, periapical lesion, pulp infection, and severe inflammation of the periodontium. The indication is restricted for cases with systemic symptoms such as fever, malaise and loss of appetite9.

Regarding antibiotics that are effective against B-lactamase bacteria, most answers went with the first choice of amoxiclav and amoxicillin, which agrees with the study of Pandey and Cascella. While some students answered erythromycin and metronidazole, these answers were wrong, which indicates a defect in their information and needs to be refreshed. According to the question of dental procedures that need antibiotic prophylaxis, a high number of answers went with dental implants. This is the correct answer because more bleeding occurs with dental implants. It is in agreement with previous studies and guidelines19,20. These guidelines recommend that any dental procedure with excessive bleeding or obvious dental tissue trauma should include prophylaxes. While some students answered restoration procedures and orthodontic treatment. These answers should be evaluated, and the student's information should be reupdated as there is no need for prophylaxes in those procedures that exclude considerable bleeding 21.

Antistaphylococcus penicillin: it was found in this survey that most answers went with the correct choice, which is cloxacillin, which is one of the b-lactam antibiotics but is resistant to attack by staphylococcal-penicillinase22. On the other hand, other answers went with other choices, such as ampicillin and amoxicillin, which are semisynthetic penicillins. Also, a few students went with amoxiclav, which is a b-lactam inhibitor. So those students need to be more knowledgeable about the types of penicillin. Regarding macrolide antibiotics, a high percentage of answers went with the correct one (azithromycin), which is an antibiotic with the property of being bacteriostatic. While other answers went with other choices such as clindamycin and lincomycin, which are licosamide antibiotics not related chemically to macrolides but only similar in their activity (bacteria-static)23, As a result of these answers, pharmacological information needs to be reoriented and should be corrected. Regarding the most serious side effects of penicillin, a high percentage of answers went with the correct one (allergy). On the other hand, for other answers, the students went with other choices, which are popular adverse effects but not serious24,25. So concerning these answers, the students must be able to differentiate between common, serious, and usual side effects of penicillin.

Table 3 shows the comparison between the 4th-stage students and the 5th-stage students regarding the percentage of correct answers. The 5th-stage students showed a higher ratio of correct answers Mean±SD (5.89± 1.8) compared to 4th-stage students Mean±SD (5.38±2.15) with a significant difference (P-value <0.05), and this is probably due to the additional course of pharmacology applied for the 5th-stage students during the final year that was associated with refreshments of medical information before the students' graduation.

Conclusion

The knowledge of dental students toward antibiotic prescription was varied regarding different questions, and more educational effort is needed to obtain better medical knowledge for Iraqi dental students.

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