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Cross Sectional Study

Knowledge and Awareness of the Side Effects and Drug Interactions of Antibiotics and Analgesics among the Dental Students in Iraq

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ABSTRACT

Students in colleges of dentistry in Iraq can prescribe some medications during the fourth and fifth year of their undergraduate study of dentistry under the supervision of their seniors in the dental clinics. Numerous researches in many countries all over the world has identified the gaps in pharmacotherapeutic knowledge among dental students, but no such researche was made in Iraq. This study aimed to measure knowledge and awareness of the side effects and drug interactions of the drugs that are mostly prescribed the dental clinics by Iraqi dental students. A cross-sectional study was directed among 890 undergraduate Iraqi dental students using a structured closed-ended online questionnaire regarding their perception, attitude, knowledge, and awareness toward drug prescription. The online survey was done from March to April 2022. The online questionnaires were completed by 890 Iraqi dental students. This study revealed that dental students had made many mistakes during drug prescriptions due to a lack of pharmacological information, especially regarding analgesics and antibiotic prescriptions. Over and irrational prescription of antibiotics was also found.

GRAPHICAL ABSTRACT

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Introduction

Many drugs are prescribed by dentists daily in dental practice. At the same time, many medicinal drugs are used managing diseases, provided they are carefully chosen and used. Drugs have beneficial and harmful effects so they are considered double edged weapons [1].

An increase in the number of prescribed medications used by patients leads to a rise the significance of potential drug interactions between these drugs and those used in dental practice [2].

Each medical and dental student should be concerned with mastering the skill of learning all aspects of medication in order to treat the condition for which it was prescribed effectively. Undergraduates in medicine and dentistry are not legally permitted to prescribe medications, but they receive training in this area from a clinical instructor [3]. When it comes to raising awareness, it is the duty of the institution and the faculty [4].

Dentists frequently prescribe antibiotics and analgesics for the treatment of a variety of dental and oral disorders [5].

Patients seek treatment at dental clinics to treat various painful disorders and diseases [6]. Pathology or dental therapy can produce tissue damage, resulting in patients pain [7].

In order to alleviate patient discomfort, dentists frequently recommend NSAIDs. In terms of prevalence, analgesic use, paracetamol and ibuprofen are clear frontrunners [8].

The pain associated with endodontic procedures may be treated with non-steroidal anti-inflammatory medications and paracetamol, with opioids being used only as a last resort because of their side effects and potential for abuse [9]. In the elderly, it is important to monitor hepatic and renal function and adjust analgesic doses accordingly to avoid toxicity [10].

Different factors during their employment have caused them to alter the antibiotics they prescribe and how they were initially taught to prescribe them [11].

The advantages of these medications and when to prescribe them should be thoroughly assessesed by dentists. It is not appropriate to use antibiotics as an alternative for more direct measures, such as drainage of pus or eliminating infection sources. The number of situations where these medications can be used as preventative measures is dwindling.

The indications for these medications as supplementary therapies have received more attention as researchers learn more about the biology of dental infections and particulary, the function of bacteria in the etiology of periodontal disease. As the number of situations in which antibiotics are warranted grows, it is imperative that everyone working in the medical field be aware of the serious risks associated with their overuse and the potentially fatal infections that can result from even a single misuse [12].

Antibiotics are a popular treatment option recommended by dentists for managing and curing tooth infections. Antibiotics are widely misused in the dental and medical communities. Inappropriate antibiotic use leads to higher medical bills, a higher risk of antibiotic-related side effects, and, most significantly, the emergence and spread of antibiotic resistance. antibiotics in dentistry are reserved for very particular cases [13]. Antibiotic-resistant bacteria pose a major threat to global health because they compromise our ability to treat bacterial diseases [14].

The use of systemic antibiotics in dentistry has no specific indications. However, local therapies to eradicate the source of infection are beneficial in almost all cases of oro-facial infections. Antibiotics should not be used for non-infectious reasons in otherwise healthy people before, during, or after conservative or surgical procedures such as endodontic treatments or simple tooth extractions. For this reason, the use of systemic antibiotics should be limited. Patients at high risk for postoperative infections (antibiotic prophylaxis; for example, risk of infective endocarditis or compromised immunity) and patients with certain dental diagnoses showing symptoms and signs of dissemination of local infection (e.g., fever and lymphadenitis; for example, cellulitis, apical periodontitis); when direct local intervention is impossible; are the only two situations where

systemic antibiotic use may be indicated. The primary issue in deciding whether or not to give systemic antibiotics is not which antibiotic to use but whether or not to prescribe any. When prescribing systemic antibiotics, it is important to take into account a wide range of factors, such as the drugs pharmacological properties, the dosage, the length of treatment, the hosts characteristics, the patients compliance (with the dentists recommendations for antibiotic use and oral hygiene), the etiology of the infection, and the potential for side effects (side effects of antibiotics, antibacterial resistance, and risk for postoperative infection). Better dental care and lower rates of antibiotic resistance can result from encouraging the prudent use of these drugs in the dental setting [15].

Very little is known about the effectiveness of antibiotics for preventing infective endocarditis when used prophylactically [16].

Amoxicillin was the most prescribed antibiotic, followed by penicillin V, metronidazole, and amoxicillin/clavulanic acid.

Clindamycin is a bacteriostatic drug against gram-positive and anaerobic bacteria and may be useful for penicillin-allergic patients; nevertheless, it is associated with a number of undesirable side effects, including pseudomembranous colitis, metallic taste, and elevated liver enzyme levels [17]. The shortest antibiotic treatment cycle that effectively prevents clinical and microbiological relapse is the ideal one. In most cases, the symptoms of acute infection will disappear after 3-7 days. An increased dose of an oral antibiotic may be necessary to reach therapeutic levels quickly [18].

Materials and Methods

In March and April 2022, 890 dental students from Iraqi dental colleges participated in a cross-sectional survey utilizing a structured questionnaire with sixteen closed-ended items to provide descriptive data.

The questionnaire was sent online to 890 students in the fourth and fifth stages. Informed consent is obtained by informing the students about participation in this study in the title of the questionnaire.

The following factors were assessed: gender of the respondent, study stage, the most frequent mistakes in drug prescription, sources of information intended for prescribing drugs, whether the students consider past medical history in drug prescription, the most common cause for drug prescription, the utmost common prescribed drug categories and which analgesic and antibiotics are most commonly prescribed, which antibiotic is prescribed in case of allergy to penicillin, knowledge about the rout, frequency and duration of treatment, cases in which they prescribe antibiotics, if they prescribe antibiotics in case of viral infections and awareness about antibiotic resistance when prescribing antibiotics.

Results and Discussion

The number of respondents who participated in the survey was 890 students. The most common answer was given as the most important one for each question.

The majority of respondents were females (62.4%) (Figure 1) and from the fifth level of study (50.6%) (Figure 2).

The most communal mistake in drug suggesting was not asking the patient about the medical history (43.8%), followed by not asking the patient if he had a drug allergy (23%), while not knowing what to prescribe forms about (19.7%), and finally wrong dosage (13.5%) (Figure 3).

It was found that the most common source for the pharmacological information of the dental students involved in this study was a pharmacology study as part of their undergraduate curriculum (57.9%), followed by information obtained from their senior teachers in the dental clinics (28.7%), followed by books as a source for their information in (28.7%) while (1.7%) obtained their information from their classmates (Figure 4).

About (94.4%; 168/178) of the respondents considered the medical history before prescribing drugs to the patient, while (5.6%; 10/178) did not consider the medical history of the patient (Figure 5).

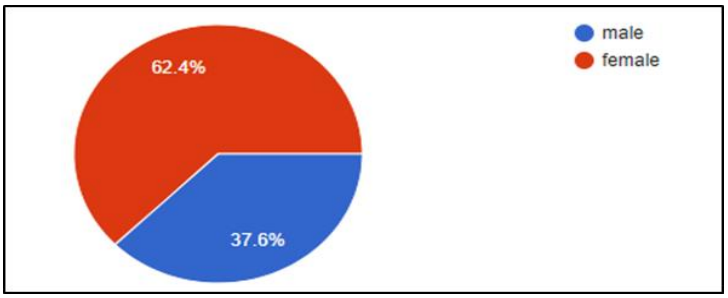

Figure 1: Differences in respondent gender

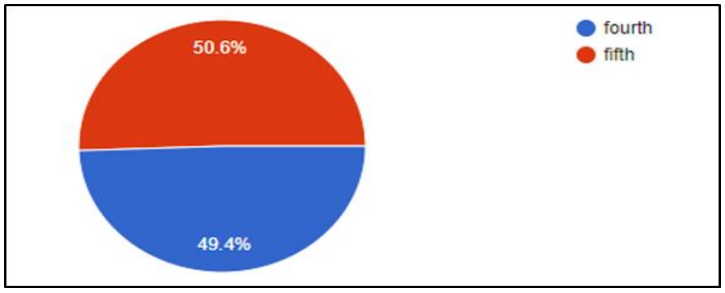

Figure 2: Stage of studying of the respondents

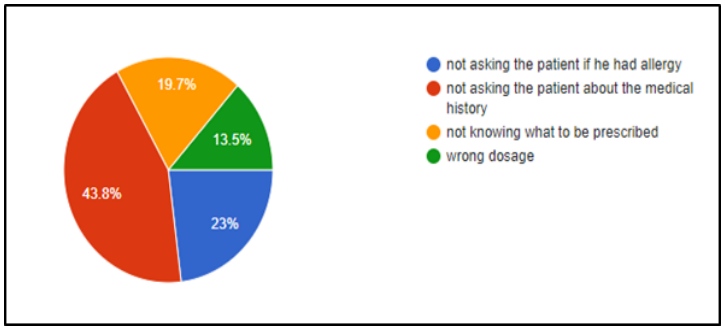

Figure 3: Mistakes in drug prescription

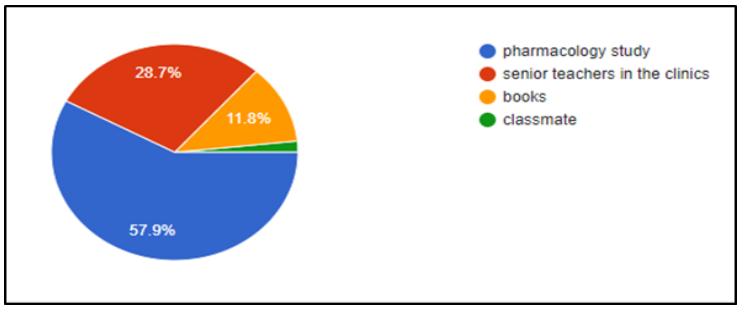

Figure 4: Source of students pharmacological information

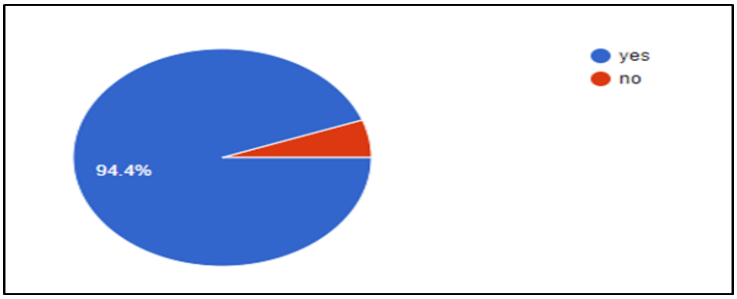

Figure 5: Considering the medical history for the patient

Most prescriptions for painkillers were given for pain (61.8%), followed by infections (31.1%) and others (7.1%) (Figure 6).

Analgesics were the most prescribed drugs (52.8%; 94/178) followed by antibiotics (43.8%; 78/178) and other drugs (3.4%; 6/178) (Figure 7).

The most generally prescribed analgesic was paracetamol (51.1%), followed by ponstan (37.1%), while only (7.9%) of the respondents prescribed ibuprofen as an analgesic and (3.9%) prescribed other analgesics (Figure 8).

When asked about antibiotics, 76.4% of doctors recommended amoxicillin, followed by flagyl (metronidazole) (9.6%) followed by augmentin (7.9%), and clindamycin (2.8%), and other drugs (3.4%) (Figure 9).

In the case of penicillin allergy, about (56.7%) of the respondents chose clindamycin, (23.6%) chose erythromycin, while amoxicillin was selected by (19.7%) of respondents (Figure 10).

Most respondents (79.2%) are unaware of how each antibiotic is administered (Figure 11).

Only (77.5%) of the respondents know the frequency of administration of each antibiotic (Figure 12).

About (79.2%) of the respondents know the duration of administration of each antibiotic (Figure 13).

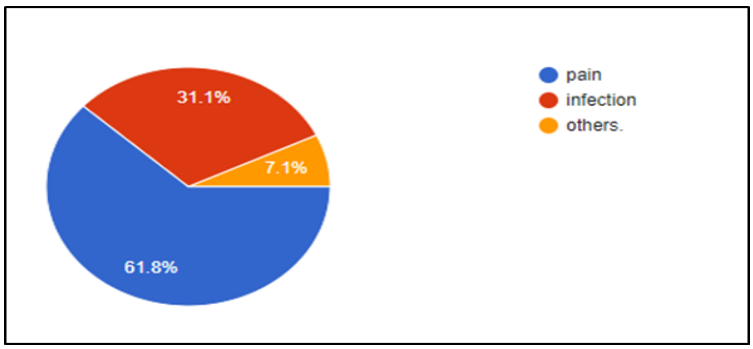

Figure 6: Cause for drug prescription

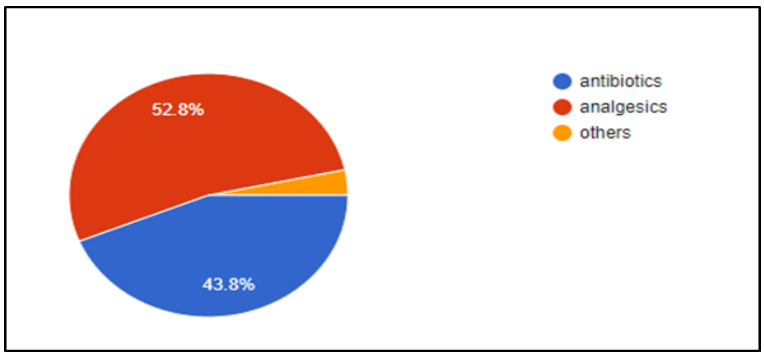

Figure 7: The most commonly prescribed drugs

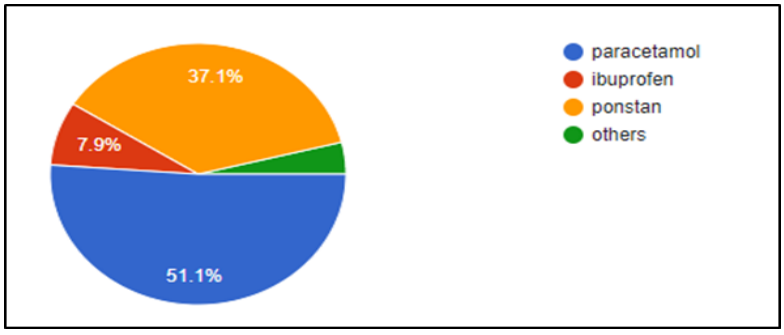

Figure 8: Most common analgesics prescribed

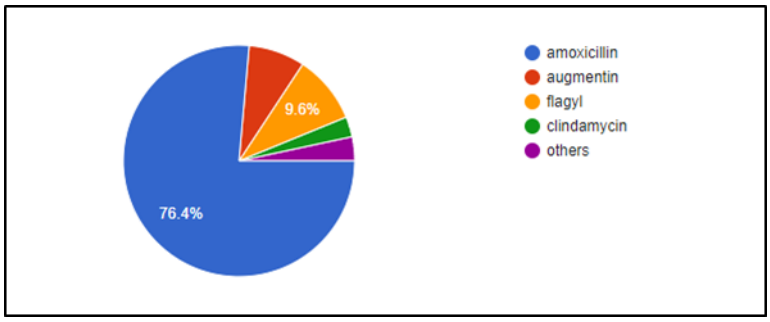

Figure 9: Most common antibiotics prescribed

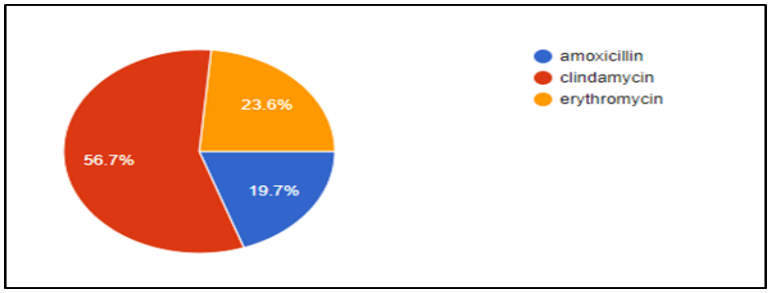

Figure 10: In the event of a penicillin allergy, an alternative antibiotic

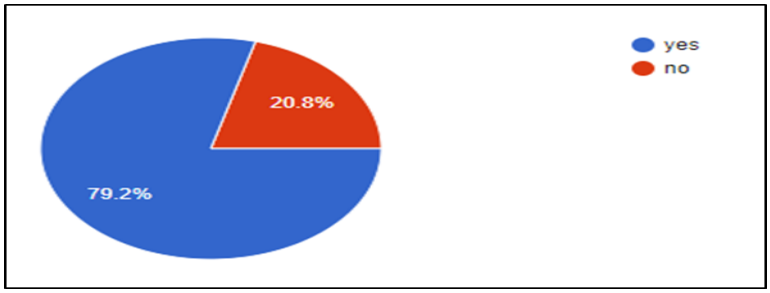

Figure 11: Knowledge of the route of administration of the antibiotics

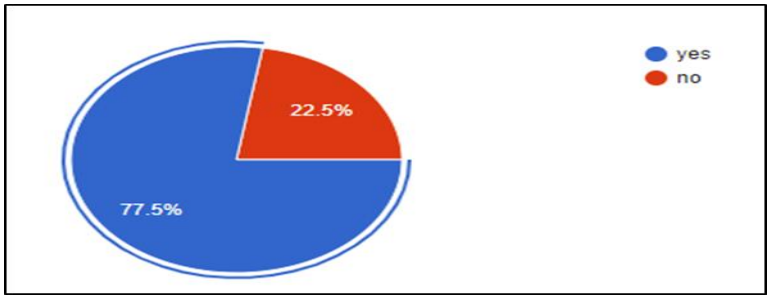

Figure 12: Knowledge of the frequency of administration of each antibiotic

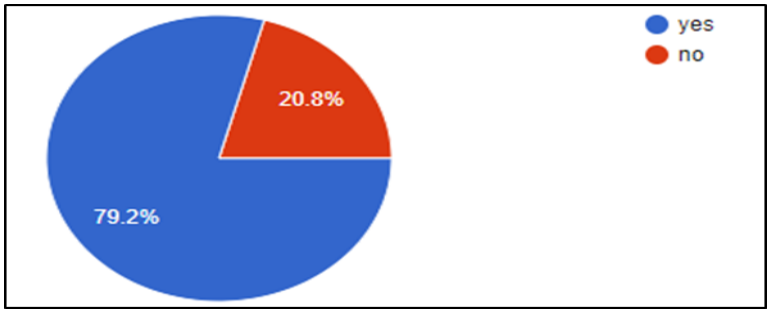

Figure 13: knowledge of the duration of administration of each antibiotic

In answering the question about the cases in which they prescribed antibiotics: 70.2% of the respondents prescribed antibiotics after surgical tooth extraction, 60.1% of the respondents prescribed antibiotics for facial swelling, antibiotics were given to 36% of respondents for dry sockets, and 27% for postoperative complication prophylaxis, 24.7% of the respondents prescribed antibiotics in case of presence of periapical pathology in the radiograph, 9.6% of the respondents prescribed antibiotic when the diagnosis was uncertain, 7.9% of the respondents prescribed antibiotics for periapical abscess and 9.6% prescribed antibiotics for other reasons (Table 1).

Upon asking the students if they prescribe antibiotics in cases of viral infections, (63.5%) answered that they prescribed in such infections (Figure 14).

Only (79.8%) of the respondents thought unnecessary antibiotic prescription could cause bacterial resistance (Figure 15).

All mistakes in drug prescribing in this survey (not asking the patient about the medical history, not asking the patient if he had a drug allergy, not knowing what to prescribe, and finally, the wrong dosage) are considered dangerous prescribing errors that threaten the safety of the patients in the dental and clinical practice [19].

Most students use what they learned in pharmacology classes to guide their prescription decisions (57.9%).

Table 1: Causes for Prescription of Antibiotics

Surgical tooth extraction	70.2%
facial swelling	60.1%
dry socket	36%
prevention of post-operative complications	27%
periapical pathology in the radiograph	24.7%
Uncertain diagnosis	9.6%
periapical abscess	7.9%
other reasons	9.6%

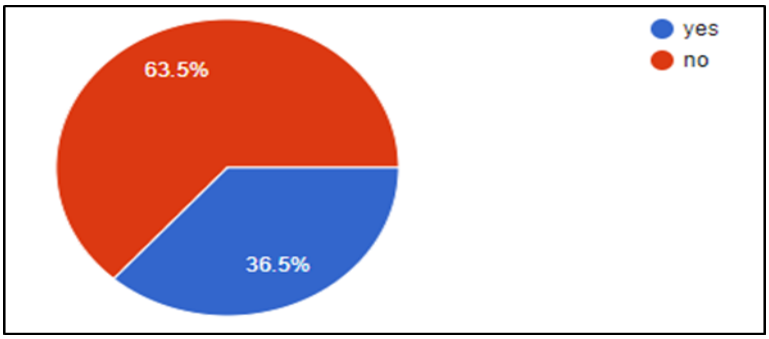

Figure 14: Prescription of antibiotics for viral infections

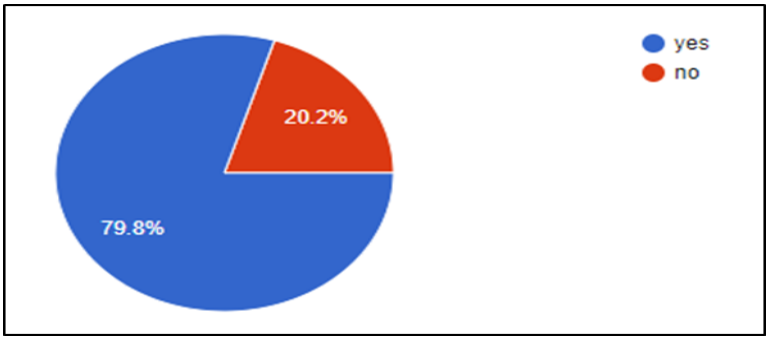

Figure 15: Students concern about bacterial resistance

Although it is ideal for students at this point of their development to learn about dentistry through the undergraduate curriculum, it is very worrisome that a small percentage of students (about 1.7%) still turn to their peers for guidance. In this analysis, the pain was found to be the leading reason for requesting treatment. This finding agrees with an Indian study [20]; however, this contradicts the findings of a study by Guzmán lvarez *et al*., in which infection was found to be the most common reason for medication prescription. There is discomfort when there is an infection, so it must be treated immediately [21]. It is crucial to utilize a proper diagnostic process to identify the nature and cause of the discomfort [22].

In this research, analgesics made up over half of all prescriptions. The analgesic plan should be individualized for each patient and discussed with the patients primary care physician when necessary [23]. Overall, antibiotics were prescribed by 43.8% of respondents. Antibiotics should only be prescribed to patients with systemic symptoms and to control infection. Antibiotic overuse and misuse must be avoided since they might have a negative effect on the general population by causing unwanted drug reactions, the appearance and resistance of species, a rise in drug-resistant microbial diseases, and a financial burden. Before educational programs targeted at logical ways of prescribing analgesics and antibiotics can be established, it is believed that knowledge regarding prescription practices should be available [24].

In contrast to previous studies, which found that most students prescribed ibuprofen, the current study found that 51.1% of students regularly prescribe paracetamol [21]. Dentists should know that patients with persistent severe dental pain may accidentally overdose on paracetamol. Individuals with a body mass index lower than 50 and patients with established liver disease are at greater risk. Some OTC analgesics contain paracetamol, but patients might not realize it, leading them to take far more than they need [25].

The majority of antibiotic prescriptions (76.4%) were for amoxicillin. In many countries, including Australia, it is the go-to antibiotic for treating tooth infections [26], the United States of America [27], England and Scotland [28], Kuwait [29], Yemen [30], Belgium [31], Spain [32], and India [4].

Clindamycin is the alternative antibiotic to ampicillin in case of amoxicillin allergy (Flynn, 2011). Most respondents (56.7%) chose clindamycin as the antibiotic of choice in case of penicillin allergy.

This study revealed an over-prescribing of antibiotics due to a lack of rationale for antibiotic use. Most respondents were prescribed antibiotics after surgical tooth extraction. Dentoalveolar surgery in otherwise healthy patients does not necessitate or recommend antibiotic prophylaxis [33]. There is no significant benefit from postoperative antibiotic prescription [34]. About 60 percent of dentists give antibiotics for face swelling when the correct treatment is drainage of the swelling through the extraction of the troublesome tooth or incision [35]. However, in this study, 36 percent of those who prescribed antibiotics for dry sockets did so even though systemic antibiotics should not be used to treat a real dry socket since they offer no benefit over local therapy directed at the socket in a patient who is not immune-compromised [36].

Treatment depending on tissue regeneration strategy is recommended to manage dry sockets [37].

Also noteworthy is that 63.5% of the sample recommended antibiotics for viral infections, even though in the case of herpes simplex infection, symptomatic alleviation is the recommended course of action [38].

Conclusion

Dental students in the fourth and fifth stages of dentistry colleges in Iraq have insufficient knowledge about the side effects and drug interactions of the drugs that they prescribe in the dental clinics, which indicates a gap in their knowledge of pharmacology, this gap could affect patient safety, and this will necessitate different educational programs, seminars and

reinforcement sessions to be carried out to increase their pharmacological knowledge with the subsequent achievement of the patients safety.

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Authors contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

Conflict of Interest

The author declared that they have no conflict of interest.

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