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Original Article

The scientometric indicators of Kerman Dental Faculty students in prescribing different drug categories

Gholamreza Sepehri[1,2,3], Seyed Amir Hossein Gandjalikhan Nassab[4*], Maryam Alsadat Hashemipour[5,6], Fatemeh Fadakar Davarani[6], Ava Abedzadeh[5]

[1]Neuroscience Research Center, Kerman University of Medical Sciences, Kerman, Iran
[2]Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
[3]Department of Physiology and Pharmacology, Afzalipour Medical Faculty, Kerman University of Medical Sciences, Kerman, Iran
[4]Department of General Surgery, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
[5]Kerman Social Determinants on Oral Health Research Center, Kerman University of Medical Sciences, Kerman, Iran
[6]Department of Oral Medicine, School of Dentistry, Kerman University of Medical Sciences, Kerman, Iran

*Corresponding Author: Seyed Amir Hossein Gandjalikhan Nassab, Email: aamirganj351@gmail.com

Abstract

Background: Analgesics, antibiotics, mouthwashes, and anesthetics are among the drugs most commonly prescribed by dental students. The present research aimed to investigate the scientometric indicators of Kerman, Zahedan, and Rafsanjan dental faculty students› prescription of different drug categories in 2023.

Methods: This cross-sectional and descriptive study used a questionnaire to gather data on demographic characteristics and knowledge. This questionnaire was prepared based on reliable sources, and after determining its validity, its reliability was also confirmed using the test-retest method. The questionnaire was administered to 203 dental students in Kerman, Zahedan, and Rafsanjan.

Results: Among the participants, 47% were male and 53% were female. The mean age of the participants was 22.8±0.9 years. The results showed that the mean knowledge score of the students was 23.91 out of a possible 32 points. There was a significant relationship between the entry year and the knowledge score, with the 6th-year students demonstrating a higher knowledge score than 5th-year students ($P=0.001$ and 0.01, respectively).

Conclusion: This research showed that students' knowledge regarding the prescription of common drugs in dentistry was acceptable; however, students should receive more information on the selection of analgesic and antibiotic prescriptions.

Keywords: Drug, Dental students, Knowledge, Analgesics, Antibiotics

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Introduction

A drug is a substance that could change biological function through its chemical action.[1] A drug is a strategic commodity, and as it has a strong relationship with people's health, it is essential to pay attention to how it is prescribed and consumed in all contexts.[2] Drug therapy is the primary tool physicians use for their patients' health due to the numerous advantages of drugs in treating patients. However, irrational or excessive drug prescriptions can also affect patient health.[3] Drug prescription patterns are influenced by social, cultural, economic, or advertising factors[4]; improving the quality of drug prescription reduces medication errors. The rational use of drug therapy promotes patient safety.[4-7]

Studies have shown that most dentists and even physicians are unaware that drug prescription errors can lead to a significant increase in malpractice, side effects, and even legal consequences.

Local anesthetics, non-steroidal anti-inflammatory drugs (NSAIDs), and antibiotics are the most prescribed drugs in dentistry. Having sufficient knowledge regarding drug prescription, side effects, accurate dosage calculation, interactions, and toxic effects is vital,[4] as the lack of such knowledge might lead to complications such as treatment failure, disease chronicity, complication of the treatment process, unnecessary imposition of drug side effects on the patient, the resistance of microorganisms to antibiotics, re-treatment costs, and even severe complications such as patient mortality.[8]

Dentists and dental students must know the drugs used

to treat dental and mucosal conditions, essential drugs used by patients with related systemic problems, and drug interactions. Furthermore, they should have sufficient knowledge and skills to prescribe drugs to prevent bacterial endocarditis.[9]

Drug side effects are the fourth cause of death after heart disease, cancer, and stroke in the United States. Inappropriate and irrational drug prescriptions are prevalent in most societies, including developed countries.[10,11]

Several studies have been conducted on dentist drug prescriptions and drug interactions in dentistry.[12-16] A study by Ciancio et al on the drug prescription patterns of 375 general and specialist dentists in Western New York found that dentists prescribed a wide range of drugs (157 types of drugs) representing over 13 drug categories. These researchers pointed out that due to the wide range of drugs dentists prescribe, pharmacology training in dentistry should be comprehensive, and dentists should have the necessary knowledge to prescribe all types of drugs.[12]

Moore and colleagues' study on drug interactions concluded that despite the mention of thousands of drug interactions in books and articles, most of these interactions are not significant in dental practice.[15]

Dental education lasts six years in Iran, and in the second year, students learn pharmacology with a focus on general pharmacology, chemotherapy, and specialized dental pharmacology. In the fourth year, students start their clinical courses and regularly prescribe medicine under the supervision of professors in their oral diseases, endodontics, and maxillofacial surgery courses. Therefore, pharmacological knowledge should be an essential part of dental education. As there have been limited studies on the knowledge and attitudes of dental students regarding drug prescription in Iran, the present study is designed to investigate the scientometric indicators of dental students in Kerman, Zahedan, and Rafsanjan concerning drug prescription.

Method

This research was an analytical and cross-sectional study. The target population included fifth- and sixth-year students of the dental faculties of Kerman, Zahedan, and Rafsanjan. A last-year medical student provided a researcher-made questionnaire with personal questions, including age, gender, year of entry, general questions, and questions related to students' scientometric indicators regarding drug prescription in dentistry students. The students were asked to complete and submit the questionnaire, which was distributed at the end of classes. The students were given approximately 15 minutes to complete the questionnaire.

The students who entered the study were allowed to withdraw from the study at any time after the interview began.

The questions of this questionnaire were designed by one person who specialized in pharmacology, three who specialized in dentistry, and one who specialized in statistics. To evaluate the validity and reliability of the questionnaire, seven specialists from the dental school confirmed the scientific validity of the questionnaire. The level and comprehensibility of the questions were discussed, and based on expert opinions and the text assessment, the questionnaire's content validity was deemed satisfactory. Then, this initial questionnaire was distributed among ten general dentistry students for feedback on the writing style (face validity) and necessary revisions. After making changes to the text and question order, the final questionnaire, comprising 24 questions plus the demographic information questions, was prepared and completed. The reliability of the questionnaire using Cronbach's alpha coefficient was optimal (0.79). A score of 2 was given for a correct answer and a score of 1 for an incorrect answer in the scientometric questions.

The results were analyzed using the *t* test, Mann-Whitney *U* test, and chi-square test in SPSS Version 18. The significance level in the data analysis was set at $P < 0.05$.

Results

A total of 225 questionnaires were distributed in this study, of which 203 were evaluated (response rate = 90.2%). Ninety-five (46.8%) were male, and 108 (53.2%) were female. The mean age of the participants was 22.8 ± 0.9 years (Table 1).

A total of 159 students (78.3%) stated that they had passed the theoretical and practical courses related to drug administration in dentistry, and there was no significant difference between genders and academic years in this regard ($P = 0.08$ and $p = 0.12$, respectively). Furthermore, 91.1% (185 students) agreed that there was a need to take theoretical and practical courses related to drug administration during education. In this regard, female students ($P = 0.01$) and fifth-year students had significantly higher agreement ($P = 0.01$). The students' sources for drug prescription included clinic professors, books, information related to the pharmacology course, and assistants. The students' answers to general questions regarding drug prescription are presented in Table 2.

The main reasons for drug prescription were infections, pain, pericoronitis, and dental abscesses. The most used analgesics included NSAIDs, such as ibuprofen, mefenamic acid, and indomethacin. The most commonly prescribed antibiotics were amoxicillin, ampicillin, metronidazole, and penicillin V. The most common analgesic for pregnant women was acetaminophen (Table 3).

Table 4 shows the students' answers on drug prescription knowledge in dentistry. The results showed

Table 1. Demographic characteristics of the participants

Variable		Male (n = 95)		Female (n = 108)		Total (N = 203)	
Age	Average age	23.1 ± 0.8		22.5 ± 0.9		22.8 ± 0.9	
	Age range	22–40		22–29		22–40	
Academic year	Fifth	52	54.7	49	54.4	101	49.7
	Sixth & higher	43	45.3	59	45.6	102	50.3
Dental school	Kerman	40	42	52	25.6	92	45.3
	Zahedan	31	32.6	36	17.7	67	27
	Rafsanjan	24	25.4	20	10	44	27.7

Table 2. Students' answers to the general questions regarding medicine

Question		No.	%
Have you had prescription training?	Yes	159	78.3
	No	44	21.7
In your opinion, how much do you know about prescribing drugs?	Enough	25	12.3
	Average	45	22.2
	Insufficient	133	65.5
What is your source of information for a prescription?	Professor	143	70.4
	Classmate	35	17.2
	Iranian Generic Drugs Information Book	27	13.3
	Pharmacology textbooks	31	15.6
	Dental assistants	72	35.5

that 62 participants were prescribed lorazepam to reduce anxiety and restlessness during dental operations, and 37 people were also prescribed phenobarbitals to reduce the patient's anxiety before dental surgery.

Table 5 shows the students' answers to the questions on drug prescription knowledge. 89.2% of students chose penicillin as the appropriate antibiotic. Nearly one-third of the students gave the correct answer to the most suitable local anesthetic for pregnant women, patients with asthma, patients with hyperthyroidism, and patients with hypertension.

This study showed that the mean score of students' knowledge of drug prescription was 23.91 ± 5.78 (range: 13–32). No significant relationship was observed between knowledge score and gender, age, and school of education ($P = 0.31$, 0.42, and $P = 0.09$, respectively). There was a significant relationship between the entry year and the knowledge score ($P = 0.001$). Sixth-year students had a higher knowledge score than fifth-year students ($P = 0.01$).

Discussion

Drug prescription is a complex process that requires scientific, clinical, and practical skills. According to the World Health Organization (WHO) recommendations, drug prescription should include determining the purpose of the treatment, followed by choosing the treatment after confirming its effectiveness and safety according to the various options. In addition to the unique characteristics of drugs, prescription patterns may also be influenced by social, cultural, economic, or promotional factors.[17,18]

Local anesthetics are the most prescribed drugs in dentistry, followed by antibiotics and NSAIDs. Given the characteristics of these drugs, it is mandatory to determine accurate doses and be aware of any adverse or toxic effects.[17,19,20]

In Iran, dental students pass the pharmacology course in the second year during the introductory sciences courses, focusing on general pharmacology, medicinal chemistry, and specialized pharmacology. Additionally, in the tenth semester, students learn about the pharmacology of common drugs used in dentistry. In the fifth and sixth years, students begin clinical practice, meet patients from different departments (oral diseases, endodontics, and dental surgery), and learn to prescribe medicine under the supervision of professors.

This study investigates the scientometric indicators of dental students concerning drug prescription in Kerman, Zahedan, and Rafsanjan. Ciancio et al conducted a study on the drug prescribing patterns by 375 general and specialist dentists in Western New York, discovering that dentists prescribe a wide range of drugs (157 types of drugs) representing over 13 drug categories. These researchers pointed out that due to the wide range of drugs dentists prescribe, pharmacology training in dentistry should be comprehensive, and dentists should have the necessary knowledge to prescribe all types of medications.[17]

The differences in students' familiarity with this assessment method in different studies may be due to differences in dental program training in different countries and the resulting unfamiliarity of some students with this assessment method.

This study showed that pain is the most common reason for prescribing medicine. In a study by Jain et al,[21] the most common reason for drug prescription was pain, which is inconsistent with the study by Guzmán Alvarez et al,[22] where infection was the most common cause. It should be noted that untreated dental infections can lead to pain. Therefore, to know the type and cause of pain, it is necessary to use appropriate diagnostic methods and perform appropriate treatments.[18,23]

This research showed that NSAIDs and acetaminophen are the most commonly used analgesics, which is consistent with the research by Guzmán Alvarez et al[22]

Table 3. Students' answers to the knowledge of drug prescription and common mistakes

Question		No.	%
What is the most common problem you treat in dentistry?	Dental infection	84	53.5
	Toothache	52	33.1
	Gum diseases	21	13.4
What are the most common NSAID) you prescribe?	Ibuprofen	54	34.4
	Gelofen	42	26.8
	Mefenamic acid	28	17.8
	Indomethacin	22	14
	Naproxen	4	2.5
	Diclofenac	5	3.1
	Aspirin	2	1.3
What is the most common antibiotic you prescribe?	Amoxicillin	32	20.8
	Ampicillin	38	24.2
	Penicillin V	41	26.1
	Clindamycin	5	3.1
	Clarithromycin	5	3.1
	Cephalexin	6	3.9
	Metronidazole	28	17.8
	Cefixime	2	1.3
Which of the following is the most suitable analgesic for a pregnant woman?	Ibuprofen	19	12.4
	Gelofen	17	10.8
	Acetaminophen	65	41.4
	Mefenamic acid	15	10
	Indomethacin	10	6.5
	Naproxen	12	8
	Diclofenac	14	9.1
	Aspirin	5	3.1

NSAIDs, non-steroidal anti-inflammatory drugs.

Table 4. Students' answers regarding the knowledge of drug prescription in dentistry

Question		No.	%
What is the most common drug you prescribe to reduce patient anxiety before dental surgery?	Diazepam 2 mg	104	51.2
	Lorazepam 1 mg	62	30.5
	Buspirone 5 mg	0	0
	Phenobarbital 5 mg	37	18.2
What is the most common drug you prescribe to reduce tremors and restlessness during dental surgery?	Diazepam 2 mg	132	65
	Lorazepam 1 mg	61	30.3
	Buspirone 5 mg	2	0.98
	Phenobarbital 5 mg	8	3.9
Which of the following side effects occurs due to the administration of local anesthetic drugs such as lidocaine?	High blood pressure	161	80.9
	Increased liver enzymes	21	9.8
	Hypoglycemia	15	7.35
	Increased risk of bleeding	6	3

and Doshi et al.[24]

In the research by Jain et al,[21] most students prescribed diclofenac and paracetamol (36.47% and 32.35%, respectively) as analgesics. The prescription of naproxen and aspirin as analgesics was not consistent with other studies.[22,24]

In a study by Chamani et al,[25] dentists chose mefenamic acid, acetaminophen or acetaminophen codeine, and ibuprofen as analgesics. None of the dentists mentioned aspirin as an analgesic drug of choice. These researchers concluded that there should be a fundamental review of the pattern of analgesic prescription by dentists. Although mefenamic acid prevents prostaglandin production and effects, severe blood dyscrasias and digestive disorders such as pyrosis and diarrhea are important side effects of this drug.[26] Therefore, it seems that prescribing other analgesics is preferable.

Acetaminophen (paracetamol) is a valuable analgesic for patients in whom aspirin is contraindicated. Although its effect on inflammation is limited, its analgesic and antipyretic effects are similar to those of aspirin. Therefore, aspirin or other NSAIDs (such as ibuprofen) are preferable to acetaminophen in cases where inflammation needs to be reduced.[27]

Given that dental pain or pain caused by dental treatments is often accompanied by inflammation, NSAIDs are preferred. One of the most critical factors in the use of NSAIDs is being aware of their pharmacokinetics and pharmacodynamics, as well as the slight differences between their general properties and their effects.[18,28]

Several students in the present study chose aspirin, which is not a common choice in dentistry.[29-31] Regarding antibiotics, most students chose penicillin and amoxicillin, which is consistent with other research.[32,33] In a study by Jain et al,[21] amoxicillin was chosen as the first antibiotic, which aligns with other studies.[23,25-28]

Antibiotics are generally prescribed in dentistry for treatment or prophylaxis. Antibiotic use may be associated with side effects, ranging from gastrointestinal disturbances to fatal anaphylactic shock and even antimicrobial resistance. Therefore, these drugs should be prescribed cautiously.[34-40]

Studies have shown that dentists prescribe antibiotics in more than 10% of cases. Antibiotics treat oral problems, including endodontic, periodontal, and surgical problems.[41]

Penicillin is recommended as the first choice for endodontic infections. It is a cheap drug with low toxicity and an excellent effect on the main microbes that are effective in endodontic infections. For patients allergic to penicillin, clindamycin will be the drug of choice. Metronidazole is another antibiotic used in endodontic infections. This antibiotic has a good effect on obligate anaerobic bacteria. In cases where no improvement is observed two days after treatment with penicillin, its prescription can be beneficial.[41]

Several studies have investigated antibiotic prescription habits in different countries. In 1996, Whitten et al[42] surveyed 291 root canal treatment specialists regarding

Table 5. Students' answers on the knowledge of drug prescription in dentistry

Question	Correct answer	No.	%
What is the most appropriate antibiotic to treat common dental infections?	Penicillin V	181	89.2
What is the most appropriate combined antibiotic treatment for treating severe dental infection?	Penicillin V and metronidazole	123	60.5
Which antibiotic has no place in the treatment of dental infections?	Gentamicin	27	13.3
Is it legally necessary to perform a penicillin allergy test before injecting penicillin in adults?	Yes	161	79.3
What is the appropriate analgesic to relieve a toothache in a patient with a stomach ulcer?	Acetaminophen	136	67
What is the most suitable antiseptic mouthwash to disinfect the mouth?	Chlorhexidine	172	84.7
Does Citanest carpool have pressure vessel material?	Yes	20	9.8
What is the most suitable local anesthetic for a pregnant woman?	Lidocaine without adrenaline	51	25.1
What is the most suitable local anesthetic for people with high blood pressure?	Lidocaine without adrenaline	60	29.8
What is the most suitable local anesthetic for people with asthma?	Lidocaine without adrenaline	62	31.2
What is the most suitable local anesthetic for people with hyperthyroidism?	Lidocaine without adrenaline	55	27
What analgesic is selected to relieve normal dental pain in a healthy adult?	Acetaminophen	161	79.3
What analgesic is selected to relieve severe dental pain in a healthy adult?	NSAIDs	121	59.6
What are the appropriate antibiotics for treating dental abscesses in pregnant women?	Penicillin V	126	62

NSAIDs, non-steroidal anti-inflammatory drugs.

their antibiotic prescription habits. According to the results of this study, 58.4% of specialists prescribed penicillin as the drug of choice, and 21.6% chose clindamycin in cases of allergy.

Palmer and Martin[43] examined the prescriptions received at pharmacies and reported that amoxicillin was the most common drug (64.5%). Metronidazole, penicillin, erythromycin, clindamycin, and tetracycline followed in decreasing order. Another study by Palmer et al showed that amoxicillin is the most commonly prescribed drug.[44]

According to the results obtained from the study by Yingling et al,[45] 61.48% of the respondents were prescribed penicillin V, and in cases of allergy to penicillin V, erythromycin and clindamycin were prescribed. This is consistent with the studies done by Seltzer, Morse, Roy, Gatewood, and Kandemir.[46-50]

The study by Tabrizizadeh and Alidjani[51] showed that penicillin is the most commonly prescribed drug, which is consistent with the research by Yingling et al[45] and Whitten et al.[42] However, Yingling and colleagues' study reported clindamycin as the second most common antibiotic, while Tabrizizadeh and Alidjani[51] found amoxicillin as the second most common antibiotic.

Few participants in the present study chose clindamycin, which is consistent with the study by Tabrizizadeh and Alidjani.[51] In a study by Yingling et al,[45] almost half of the participants chose this drug. Considering the low but serious risk of pseudomembranous colitis, the broader spectrum of effects, and the higher price, its prescription at such a high percentage by members of the American Association of Endodontists seems unnecessary.

Most students (70.4%) acquired their drug information from professors. In the research by Jain et al,[21] 36.47% of students acquired their information from their professors, which aligns with the study by Guzmán Álvarez et al.[22] Acquiring information from professors is quite appropriate as a stage of students' knowledge development. In the current research, 17.2% of students acquired information from their classmates, which is very high. However, similar information was obtained in the study by Jain et al.[21]

In a study by Chamani et al,[25] 53% of dentists mentioned participating in scientific conferences as one of the sources of obtaining drug information. Most of the participants in the study by Ahmadi Motamayel et al[52] chose textbooks as their most important source of information. In a study by Mainjot et al,[53] 87% of the participants identified their colleagues as the best source.

In this study, students obtained a relatively good knowledge score (medium to high), which was relatively favorable compared to other studies.[53-55] Similar results were obtained in a study by Murti and Morse.[56]

Strengths and Limitations

No limitations were identified in this study.

Conclusion

This study showed that students' knowledge of drug prescriptions is relatively favorable. Acetaminophen was the most commonly prescribed analgesic, and penicillin was the most commonly prescribed antibiotic.

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Authors' Contribution

Conceptualization: Gholamreza Sepehri.

Investigation: Seyed Amir Hossein Gandjalikhan Nassab, Ava Abedzadeh.

Project administration: Maryam Alsadat Hashemipour.
Writing–original draft: Seyed Amir Hossein Gandjalikhan Nassab, Fatemeh Fadakar Davarani.

Competing Interests
The authors declare that they have no competing interests.

Data Availability Statement
The data supporting the findings of this study are available upon reasonable request from the corresponding author.

Ethical Approval
This project was approved by the ethics committee of the university with the ethical code IR.KMU.AH.REC.1396.1915.

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