

## Practices and Knowledge of Dental Professionals in Saudi Arabia Regarding Prescription of Analgesics and Antibiotics, Cross-Sectional Study

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### ABSTRACT

**Introduction:** Dentists are responsible for a large proportion of antibiotic and analgesic prescriptions. Due to excessive use of these medications, appropriate prescribing has become essential for all health-care providers.

**Aim:** This study was aimed to assess practices and knowledge of dental professionals in Saudi Arabia regarding analgesic and antibiotic prescriptions.

**Materials and Methods:** This observational cross-sectional study recruited 315 dental practitioners and undergraduate students to answer a self-administered questionnaire in English, which was taken from previous validated questionnaire with face validity and content validity ratio of 0.87. The questionnaire was distributed online in Saudi Arabia. The questionnaire consisted of three sections measuring demographic data, levels of knowledge, and the practices of dental practitioners regarding analgesic and antibiotic. Statistical analysis included chi-square, t-test, ANOVA, and linear regression. Statistical significance was set as a P-value of 0.05.

**Results:** Participants' mean (m) correct answers were 14.04 out of 18, with standard deviation (SD) of 2.68, indicating high knowledge levels. The differences in total knowledge scores were not statistically significant by gender or region. However, interns and practicing dentists (m=14.81, SD=2.11) had statistically higher scores (p < 0.001) than students in clinical years of study (m=13.34, SD=2.92). Most participants had favorable practices, with only 43 (13.65%) prescribing antibiotics because the patient expected it. Also, 130 (41.27%) consider the medicine's cost before prescribing.

**Conclusion:** This study found that there are moderate levels of knowledge and practices regarding antibiotic and analgesic prescribing among undergraduate, post-graduate, and practicing dentists in Saudi Arabia. Future studies should include other pharmacological aspects like drug effects on oral health and drug-drug interactions.

**Key words:** Dentists, Infection, Medications, Pain, Undergraduates

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### INTRODUCTION

Pain is a common reason for seeking dental care [1]. Along with Nonsteroidal anti-inflammatory drugs (NSAIDs), antibiotics and local anesthetics are useful for managing pain during and after dental procedures

[2]. Antibiotics are used in dentistry for prophylactic and therapeutic purposes [3]. Their selection depends on pharmacological, microbiological, and host factors [4,5]. Similarly, dentists prescribe analgesics mainly to provide relief from odontogenic pain or for pain control after invasive dental procedures, such as extractions [6].

Nevertheless, there are multiple undesirable side effects due to overuse or misuse of these medications, including the development of bacterial resistance to antibiotics [7] and *Clostridium difficile* infections due to the use of oral antibiotics [8]. Other considerations include the adverse effects related to NSAIDs, which can be mild, as with dyspepsia, or more severe, such as ulcer formation, gastric hemorrhage, or renal toxicity [9,10].

Due to excessive use of these medications, appropriate prescribing has become an essential element in all health-care providers' practices [11]. Indeed, dentists are considered to add significantly to antibiotic and analgesic prescriptions, whether necessary or not [12,13]. In fact, dentists are estimated to account for 7% to 11% of all antibiotic prescriptions [7]. Studies from Brazil [14], and Iran [15] found major errors made in dental prescriptions and concluded that the quality of prescribing ought to be improved to avoid further mistakes.

To evaluate dental practices regarding drug prescribing, studies have been conducted in the United States [16], Australia [17], Lebanon [18], and India [11]. These studies found an unwarranted increase in prescriptions for opioid analgesics among dentists [16], along with seemingly unnecessary antibiotic use for multiple dental treatments [17]. Dentists in Lebanon also reported low confidence in prescribing drugs [18], contrary to India, where dental students were reported to have adequate knowledge around prescribing medications [11]. In Saudi Arabia, studies have been conducted in Jeddah [19], Riyadh [20], and the North region [21] revealed that 83 (65.9%) of dentists in Jeddah did not adhere to formal prescription-writing guidelines for antibiotics [19]. Additionally, 73 (46.4%) of participants in the North region unnecessarily prescribed antibiotics for nonsurgical endodontic treatment [21]. These findings support the results of the study conducted in Riyadh [20].

Multiple studies have assessed prescription knowledge among dentists worldwide [11,16-21], but it was found no studies in the body of literature that assessed knowledge about prescribing both analgesics and antibiotics among dental professionals in different Saudi Arabian cities. Therefore, this study aimed to assess the practices and knowledge about prescribing analgesics and antibiotics among dental professionals in Saudi Arabia.

## MATERIALS AND METHODS

For this descriptive observational cross-sectional study, data were collected in from June to July 2022 using a self-administered survey. The research team worked from Makkah and Jeddah cities, but the questionnaire

was distributed digitally online. The questionnaire was distributed online using a convenience sampling method. Social media platforms, such as WhatsApp, Twitter, Instagram, Telegram, and others, were used to distribute the survey. Additionally, team members sent the survey to dental groups and personal contacts to all reachable social media groups as possible, and requested to send the invitations to other groups as snow-ball technique. After the aims of the study were clarified for them. The research team tried to maximize the invited participant from all cities in Saudi Arabia and all universities the team can reach. The participants who responded were from 35 cities/ areas, 14 dental colleges, governmental and private hospital/clinics as explained in the results. However, the response was with unequal distribution because the numbers of dental students and dentists are different between cities in Saudi Arabia. Using sample size calculation of 5% precision, confidence interval of 90% and estimated prevalence of 50%, the number required for this study was 271. The study was approved by the ethics committee at Umm Al-Qura University with number HAPO-02-K-012-2022-06-1116. Participants had to approve an electronic consent form before answering the survey. Any information that would expose a participant's identity was deleted, and no personal information was included in data collection.

The inclusion criteria included participants who are dental students in the clinical years (4th, 5th, 6th years and interns), dental practitioners/graduates, specialists, or consultants in Saudi Arabia. The exclusion criteria included participants who did not sign the study consent. The electronic questionnaire did not count the number of excluded participants who did not sign the consent form.

A self-administered English-language questionnaire was taken from previous validated questionnaire [11], but the research team made a modification by adding a demographic section to the questionnaire that is little different from the original study. The questionnaire comprised a total of 36 questions in three sections. The first section consisted of six questions gathering demographic data, including gender, age, qualification, city, region, and nationality. Region question was divided into five categories; Western, Central, Southern, Eastern, and Northern. While nationality was divided into two categories; Saudi, and Non-Saudi. Section two measured levels of knowledge about prescribing analgesics and antibiotics using 18 true/false questions with only one correct answer. Each correct answer received a point, and total knowledge scores could range from 0 (no knowledge at all) to 18 (best possible score). The final section measured the practices of dental practitioners regarding analgesic and antibiotic prescriptions and comprised 12 closed-ended yes/no questions. Sections two and three were adapted from a prior study that was validated with Cronbach's coefficient 0.80, face validity and content validity ratio of 0.87 [11].

Data entry and analysis were conducted using the software SPSS version 27 (IBM, INC., Armonk, NY, USA) and Excel (Microsoft Corp., Redmond, WA, USA). Descriptive statistics were used to present the data

as mean (m), standard deviation (SD), count, and percentage. For data analysis, chi-square, t-test, ANOVA, and linear regression were used. Statistical significance was set as a P-value of 0.05.

**RESULTS**

The total 315 participants completing this study's questionnaire had a mean age of 26.94 (SD=6.73) and came from 35 Saudi Arabian cities/areas: Riyadh, Makkah, Jeddah, Almadinah, Yanbu, Unayzah, Turaif, Taif, Tabuk, the southern borders, Sakaka, Majmaah, Khobar, Khayber, Khamis Mushait, Alkhirj, Al-Jouf, Alahsa, Ahad Rufaidah, Abha, Qatif, Qassim, Qahma, Nuayriah, Najran, Muhayel Asir, Jazan, Harajah, Haql, Hail, Hafer al baten, Duba, Dammam, Bisha, and Asir. The participants responded from 14 different dental colleges which are King Abdulaziz University, King Saud University, Umm AlQura University, Prince Sattam university, Imam Abdulrahman Bin Faisal University, Jazan University, King Khalid University, Aljouf university, Majmaah University, Riyadh Elm University, Al Farabi College (vision colleges), Batarjee medical college, Dar Al Uloom University and Ibn Sina Colleges. In additions, responses came from Ministry of Health hospital/clinics, Armed Forces hospitals/ clinic, Saudi Health clusters, and private clinics. The accurate number of dental students and dental practitioners in each of the previous colleges or hospital/clinic is not known to the research team. The participants' demographic data is provided in Table 1.

The participants' knowledge about prescribing analgesics and antibiotics was assessed with 18 questions (Table 2), with correct answer scores of m=14.04 out of 18 (SD=2.68). Only 127 (40.32%) of respondents identified that "More dosage of drug should be prescribed in more pain" is a false statement. That was the item with the fewest correct answers. A total of 308 participants (97.78%) stated that some medicines may cause allergies.

According to t-test and ANOVA (Table 3), the differences in total knowledge scores were not statistically significant by gender (p=0.241) or region (p=0.305). However, the ANOVA test showed a statistically significant difference according to qualifications (p<0.001). Interns and practicing dentists (m=14.81, SD=2.11) scored statistically better (p<0.001) than students in clinical

**Table 1: Participants' demographic Data (N=315).**

Variable	N	%
Gender	Male	141 44.8
	Female	174 55.2
Qualification	Student in clinical year (4th, 5th, and 6th)	155 49.21
	Intern/graduate (bachelor's)	134 42.54
	Specialist/consultant	26 8.25
Region	Western	98 31.1
	Central	47 14.9
	Southern	116 36.8
	Eastern	34 10.8
Nationality	Northern	20 6.3
	Saudi	304 96.5
	Non-Saudi	11 3.5

**Table 2: Participant Knowledge about analgesics and antibiotics (N=315) [11].**

Variable (Statement)	Answer	N	%
Some medicines may cause allergies.	True*	308	97.78
	FALSE	5	1.59
	I don't know	2	0.63
Some medicines can be used for both children and adults.	True*	255	80.95
	FALSE	46	14.6
	I don't know	14	4.44
Some medicines are not suitable for use by children.	True*	300	95.24
	FALSE	11	3.49
	I don't know	4	1.27
Tablet size affects a medicine's efficacy.	TRUE	81	25.71
	False*	138	43.81
	I don't know	96	30.48
Unit dosage form affects a medicine's efficacy.	True*	238	75.56
	FALSE	29	9.21
	I don't know	48	15.24
A medicine's color affects its efficacy.	TRUE	37	11.75
	False*	214	67.94
	I don't know	64	20.32
Some medicines can lead to adverse effects when used incorrectly.	True*	298	94.6
	FALSE	10	3.17
	I don't know	7	2.22
The same medicine may be used to treat different illnesses.	True*	280	88.89
	FALSE	21	6.67
	I don't know	14	4.44
Some medicines should be taken before or after eating.	True*	293	93.02
	FALSE	16	5.08
	I don't know	6	1.9
Certain medicines have to be kept in the refrigerator.	True*	273	86.67
	FALSE	11	3.49
	I don't know	31	9.84
Heat and direct sunlight damage medicines.	True*	287	91.11
	FALSE	10	3.17
	I don't know	18	5.71
The route of drug administration affects a medicine's effectiveness.	True*	271	86.03
	FALSE	26	8.25
	I don't know	18	5.71
More dosage of drug should be prescribed in more pain.	TRUE	152	48.25
	False*	127	40.32
	I don't know	36	11.43
Antibiotic resistance is the ability of microbes to resist the effects of drugs.	True*	282	89.52
	FALSE	13	4.13
	I don't know	20	6.35
Efficacy is better if antibiotics are newer and more costly.	TRUE	62	19.68
	False*	208	66.03
	I don't know	45	14.29
NSAIDs cause gastrointestinal problems.	True*	248	78.73
	FALSE	28	8.89
	I don't know	39	12.38
No drug can be prescribed during pregnancy.	TRUE	35	11.11
	False*	265	84.13
	I don't know	15	4.76
Antacids should be added to all prescriptions to avoid GI upset.	TRUE	70	22.22
	False*	142	45.08
	I don't know	103	32.7

years (m=13.34, SD=2.92). However, the interns' and practicing dentists' scores were not statistically different (p=0.718) from specialists/consultants (m=14.38,

**Table 3: The difference in participants knowledge by demographic data (N=315).**

		Total knowledge score		P-value
		Mean	Standard deviation	
Gender*	Male	14.25	2.54	0.241
	Female	13.9	2.77	
Qualification**	Student in clinical year (4th, 5th, or 6th)	13.34	2.92	< 0.001
	Intern/Graduate (Bachelor)	14.81	2.11	
	Specialist/Consultant	14.38	2.58	
Region**	Western	14.28	2.61	0.305
	Central	14.6	2.17	
	Southern	13.72	2.8	
	Eastern	14.03	3.1	
	Northern	13.7	2.36	

\*\*ANOVA

\* T-test

**Table 4: Participant practices regarding prescribing analgesics and antibiotics, (N=315) [11].**

Variable (Statement)	Answer	N	%
I often prescribe antibiotics because the patient expects it.	Yes	43	13.65
	No	272	86.35
I often take time to carefully consider whether antibiotics are needed or not.	Yes	286	90.79
	No	29	9.21
I instruct the patient every time to complete the course of treatment with medicines, even if they feel better.	Yes	280	88.89
	No	35	11.11
I consider general factors (e.g., past drug history, systemic disease, pregnancy) before prescribing any drug.	Yes	303	96.19
	No	12	3.81
I prescribe medicines only when indicated.	Yes	308	97.78
	No	7	2.22
I follow the rational prescription process.	Yes	288	91.43
	No	27	8.57
I prescribe medicines by their generic name.	Yes	170	53.97
	No	145	46.03
I consider the cost of a medicine before prescribing it.	Yes	130	41.27
	No	185	58.73
When prescribing medicines, I take care to ensure appropriate drug dosages.	Yes	304	96.51
	No	11	3.49
When prescribing, I take the time to instruct patients on the use of the medicine.	Yes	293	93.02
	No	22	6.98
I take a drug allergy history before prescribing medicines.	Yes	302	95.87
	No	13	4.13
I inform patients about the possible side effects of a drug.	Yes	267	84.76
	No	48	15.24

SD=2.58). Also, students in clinical years did not score statistically differently than specialists/consultants ( $p=0.138$ ). Using simple linear regression, age had a direct significant relationship with the total knowledge score ( $p<0.001$ ,  $R^2=0.066$ ).

Participants were asked several questions about their practices in prescribing medications (Table 4). Only 43 (13.65%) prescribed antibiotics because a patient expected it. A total of 170 participants (53.97%) prescribe medicines by the generic name, and 130 participants (41.27%) consider a medicine's cost before prescribing. According to chi-square, none of the practice questions were significantly different between males and females ( $P>0.05$ ).

## DISCUSSION

This present study aimed to assess practices and

knowledge of dental professionals in Saudi Arabia regarding analgesic and antibiotic prescriptions. Overall findings were moderate knowledge and practices regarding the prescription of analgesics and antibiotics, with lower knowledge scores in dental students in the clinical years. For newly qualified doctors, modern medicines might be too powerful for prescribing without providing proof of their competence [22]. Thus, for this study, 315 undergraduate post graduates, and practicing dentists across Saudi Arabia were assessed for their knowledge levels and practices prescribing medications. Participants were able to answer about 14 out of 18 items correctly, which indicates high knowledge levels. This aligns with a study from India [11], but contradicts studies from Mexico [2] and Lebanon [18]. This could be due to the education levels of the participants in the Mexican study, which included only fourth-year students



[2]. Also, the relatively small sample size in the Lebanese study might not accurately reflect the level of dentists' knowledge in Lebanon [18]. However, the discrepancies might also result from the variety of cultural and educational systems that differ from country to country.

Less than half of the participants 127 (40.32%) knew that "More dosage of drug should be prescribed in more pain" is false, which was lower than results from India 452 (52%) [11]. This could be due to the vagueness of the statement, which can be read to have dissimilar meanings. According to World Health Organization (WHO) analgesic ladder, analgesics should be given to patients in accordance with the severity of their pain [23]. For example, NSAIDs are given to patients with mild pain, and if those are not helpful, a stronger analgesic, such as opioids, may be administered [23]. The frequency of drug administration can be modified depending on patient need [23,24], but each drug has a specific dose that should not be exceeded in order to avoid toxicity [23].

The present study showed that 255 (80.95%) of participants were aware that some medicines can be used in both children and adults, which is a slightly higher result than in the Indian study [11]. Furthermore, the study's results showed that students' knowledge scores for drug prescribing were significantly lower than those of interns and practicing dentists, which suggests a deficiency in pharmacological education during undergraduate years. These findings are consistent with the India study [11]. Another considerable finding was that increased age had a significant relationship with increased total knowledge scores, which can be explained by the extra years of experience for older dentists. This supports the assertion that dental students may need more training for pharmacological information [11,20].

When it comes to practices, the majority of the participants 286 (90.79%) agreed that they often take the time to carefully consider whether antibiotics are needed. While this is an appropriate practice, these findings were not consistent with studies in Australia [17] and the northern region of Saudi Arabia, where 73 (46.4%) of dentists prescribed antibiotics in cases where they were unnecessary [21]. Another study, conducted in Riyadh, found that a great number of dental students considered antibiotics to be necessary in cases that can be treated without them [20]. This study's results contradicting with other local studies might be due to differences in the cities involved. This study had participants from 35 cities in Saudi Arabia. Nevertheless, there was uneven distribution of participants from these cities, which was due to differences in the distribution of dental students and dentists in Saudi Arabia. Future studies should take this into consideration to increase the external validity of results.

It is well-known that cost plays a crucial role in getting medications to patients [25]. A positive health outcome is achieved when a patient can consistently pay for prescribed medications [26]. Therefore, the study's

survey included a statement that they consider the cost of a medication before prescribing it, and 130 (41.27%) of the participants agreed with it. This percentage was much lower than what was found in India 654 (75.2%) [11]. One explanation for this discrepancy might be governmental cost coverage of medications in Saudi Arabia, which causes dentists working in the governmental sector to be unconcerned about medication costs. Additionally, antibiotics and analgesics are considered to be cheap in commercial pharmacies in Saudi Arabia, with amoxicillin 500 mg costing approximately 10-11 USD, paracetamol 500 mg at 1-2 USD, and ibuprofen 400 mg at 2-3 USD [27].

The results of this study showed that knowledge and practices regarding medication prescription were above average among dental practitioners in Saudi Arabia. This is useful for better understanding the multiple dental programs' education levels for dentists throughout the country.

### LIMITATIONS

The sample was collected using a convenience sampling method and is considered small. Also, although it was attempted for all cities and dental schools of Saudi Arabia to be contacted and included in the study, this was not accomplished. Thus, the results might not be suitably representative of a large country with a sizable population. Another limitation of this study is that it utilized an online survey with generalized questions. Further studies should be conducted with specific intensive questions and proper categorization of dental practitioners throughout Saudi Arabia so an accurate determination of awareness levels of dental practitioners can be reached. Future studies might also include other pharmacological aspects, such as the effects of drugs on oral health and drug-drug interactions.

### CONCLUSION

This study found that there are moderate levels of knowledge and practices regarding antibiotic and analgesic prescribing among undergraduate, post-graduate, and practicing dentists in Saudi Arabia. However, dental students in clinical years can benefit from additional pharmacological modules. Future studies might ensure a more proportionally representative sample of dental students and dentists across Saudi cities and include other pharmacological aspects, such as drug effects on oral health and drug-drug interactions.

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