



# **Knowledge and Attitude towards Antibiotics Prescription and Antimicrobial Resistance among Dental Surgeons in Saudi Arabia**

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## **Authors Contribution**

*This work was carried out in collaboration among all authors. Author SMO did the study design, manuscript preparation. Authors AA, JAA, AFA, NNA, NIB, AKA and ABA study design, data collection, statistical analysis, manuscript preparation. All authors read and approved the final manuscript.*

## **Article Information**

DOI: 10.9734/JPRI/2021/v33i52B33604

Editor(s):

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Complete Peer review History, details of the editor(s), Reviewers and additional Reviewers are available here:

<https://www.sdiarticle5.com/review-history/77913>

**Original Research Article**

**Received 02 November 2021**

**Accepted 28 November 2021**

**Published 01 December 2021**

## **ABSTRACT**

**Aims:** To assess knowledge and attitude towards antibiotics prescription and antimicrobial resistance among dentist in Saudi Arabia.

**Study Design:** Cross-sectional, survey-based study.

**Place and Duration of Study:** Sample: Saudi Arabia, between June 2020 and October 2021.

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**Methodology:** This is was a cross-sectional, survey-based study in Saudi Arabia. Data was collected using a predesigned self-administered online questionnaire. The survey was distributed to dentist and dental surgeons in Saudi Arabia. It included demographic data, Knowledge about antibiotics, Attitude towards antibiotics, prescription of antibiotics based on the clinical situation. Data were analyzed by the SPSS program, version 25 at a level of significance of 0.05.

**Results:** A total of 208 study participants completed the survey questionnaire. The results showed that the half of study participants females. Moreover, more than half of the study participants were bachelor's degree. Additionally, 21.2% of the study participants earned dental internship. However, the least proportion had the master's degree or higher (4.3%).91.8% of the study respondents were general dentist compared to 2.9% were oral surgeon and the least portion 1% was endodontist.

**Conclusion:** The use of antibiotics inappropriately was common, and the drivers of inappropriate practices were found as young age, male sex, higher education, and a negative attitude regarding antibiotic use.

*Keywords: Antibiotics prescription; antimicrobial resistance; dental surgeons.*

## 1. INTRODUCTION

Dentists deal with different Orofacial infections that affect the mouth, jaw, and teeth [1]. Antibiotics are prescribed to treat these infections. Although they are not used for definitive treatment, their use can minimize infection periods and associated risks [2]. Dentists prescribe antibiotics both therapeutically and prophylactically to treat oral and dental infections. Because most orofacial infections are caused by odontogenic infections, the dentist's prescription of antibiotics has become an important part of dental practice. All common antibiotics clindamycin, metronidazole Beta-lactams, macrolides, tetracyclines, are prescribed by dentists between 7% and 11% of the time [3].

Antibiotic overuse creates serious health concerns and accelerates bacterial resistance. Infections resistant to antibiotics are now predicted to kill at least 50 000 people each year in Europe and the United States alone. As a result, it's reasonable to assume that the burden of antimicrobial resistance (AMR) would be substantially higher in resource-strapped countries, where inappropriate antibiotic use by healthcare professionals and consumers could be commonplace [4]. Poor regulation, weak health systems, inadequate surveillance and understanding, and an increase in infectious diseases are all contributing factors. If left unchecked, the global death toll from AMR is expected to reach 10 million per year by 2050 [5].

The kingdom of Saudi Arabia decided to reduce random antibiotic uses. And because there are few studies conducted at Saudi Arabia to assess knowledge and attitude towards antibiotics

prescription and antimicrobial resistance among dentist in Saudi Arabia.

## 2. MATERIALS AND METHODS

### 2.1 Study Design

This is a cross-sectional survey that was done in Saudi Arabia among dentists and dental surgeons. The data was gathered using an online survey. Participants, recruiting, and sample process are the topics of this study. Our target population includes all male and female dentists in the Kingdom of Saudi Arabia throughout the study period, with a confidence level of 90% and a margin of error of 10%. Using the Qualtrics calculator, a sample size of 160 was calculated. Inclusion criteria: dentists working as dentists in the Kingdom of Saudi Arabia, either male or female.

### 2.2 Data Collection

Data collection was done in the form of the participants' responses to the questions. The questionnaire included demographic features such as age, gender, and academic year. The participants were asked about Knowledge and Attitude Towards Antibiotics Prescription and Antimicrobial Resistance.

### 2.3 Statistical Analyses and Sample Size Calculation

Data was entered into the computer using the "Microsoft Office Excel Software" application for Windows (2016). After that, the data was transferred to the Statistical Package of the "Science Software (SPSS) program", "version 20 (IBM SPSS Statistics for Windows", "Version 20.0. Armonk", "NY: IBM Corp.)" for statistical analysis.

### 3. RESULTS AND DISCUSSION

A total of 208 study participants completed the survey questionnaire. The results showed that the half of study participants females. Moreover, more than half of the study participants were bachelor's degree. Additionally, 21.2% of the study participants earned dental internship. However, the least proportion had the master's degree or higher (4.3%). 91.8% of the study respondents were general dentist compared to 2.9% were oral surgeon and the least portion 1% was endodontist. As it can be noted from the data analysis, half of the study participants had less than two years of experience. Likewise, around 50% of study participants had worked in OMFS. The results indicated that study participants work in a variety of setting such as primary health centre, hospital, private practice and specialized centre. 41.3% of the study participants reside in the middle region compared to 12% live in northern and southern area. Interestingly, the majority of the dentist seem to prefer working in ministry of health 63% compared to 20.7% work in private setting. Table 1 presents the sociodemographic characteristics of the study participants.

In regards of the participants' knowledge and attitudes toward antibiotics. The study findings revealed that 93.3% of dentists indicated that excessive use of antibiotic produces resistance. The majority of those who responded to this item felt that Antibiotic resistance is prompted by self-prescription. Moreover, when asked whether prescribe medication for compromised patients, approximately 43.3% were not informed about this and the 33.2% believed they can prescribe antibiotic as other patient. Two thirds of those who answered questionnaire reported that antibiotic should not be prescribed for all types of dental infection.

In response to Question of asking the patient about the current use of medication, most of those surveyed indicated that the patients should be asked while they take health history. Interestingly, half of the study participants expressed they are not influenced by the patient preference to prescribe medication. A majority of participants (63.5%) indicated that dry socket can be reached after a week of teeth extraction compared to 22.6% who believe this outcome cannot be achieved. However, over half of the study participants thought patients can not treat dry socket at home individually compared with 26% who believed in patient ability to recover from the dry socket at home.

Almost two-thirds of the participants 61.1% said that the amoxicillin is not good choice to extract teeth in healthy person. Likewise, 64.8% stated that antibiotic is good management choice to treat tooth infection. Additionally, 64.9% of the study respondents expressed their agreement in ability of the effectiveness of antibiotic to treat infected tooth canal. The participants responses suggested that work pressure does not influence them to prescribe antibiotic. Table 2 shows the results of analysis regarding knowledge and attitudes towards antibiotic.

The results of study participants towards attitudes towards antibiotic showed study participants demonstrated that the life threatening of dental abscess is proportionate with severity of the infection, as it is evident 69.7% agreed with this statement. Additionally, Amoxicillin is the drug of the first choice in treating dental abscess (76%) whilst 22.1% preferred Augmentin as drug preference. However, approximately 43.3% and 42.8% reported that Clindamycin and Metronidazole as the second drug of choice, respectively. Approximately, two thirds of the participants indicated that the main signs of infection after tooth extraction is fever, pain, exudation, swelling of the gums and bitter taste in the mouth. Interestingly, almost all of the study participants demonstrated that several strategies can be adopted to avoid dry socket (88.9%), including stop smoking, eat cold and hot food as well as oral hygiene. Severe pain is the cardinal sign of dry socket (79.8%) and less frequent sign is the numbness of the lip. 46.6% of the study participants revealed that the jaw hurt, after tooth extraction takes one 2-3 days after extraction and half of them believe that antibiotic stays one week in circulation after stop taking medicine, as appeared in Table 3.

#### 3.1 Discussion

Antibiotic usage has been linked to a variety of adverse effects, ranging from GIT disorders to fatal anaphylactic shock, as well as the emergence of antibiotic resistance [2]. Misuse of antibiotics usage leads to the emergence of antibiotic-resistant strains, posing a significant threat to people's health and well-being [3]. Antibiotic misuse is not only seen as a key contributor to the rise of antimicrobial resistance (AMR), but also as a public health concern [4]. Thus, more escalations in the AMR level due to the misuse of antibiotics will result in adverse and broad impacts on the individual's health and well-being [5].

Table 1. Sociodemographic characteristics of participants (n = 208)

Characteristics	Frequency	Percentage
<b>Gender</b>		
Male	104	50.0%
Female	104	50.0%
<b>Education Level</b>		
Dental student	14	6.7%
Dental internship	44	21.2%
Bachelor's degree	141	67.8%
Master's degree or Higher	9	4.3%
<b>Are you a/an? *</b>		
General dentist	191	91.8%
Oral surgeon	6	2.9%
Prosthodontist	4	1.9%
Pedodontics	5	2.4%
Endodontist	2	1.0%
<b>Years in practice</b>		
0-2	105	50.5%
3-5	55	26.4%
6-10	32	15.4%
11-20	16	7.7%
<b>Have you worked in an OMFS department? (as student, attachment or resident)</b>		
No	92	44.2%
Yes	105	50.5%
Not applicable	11	5.30%
<b>Your Place of Work</b>		
PHC	61	29.3%
Specialized Dental center	47	22.6%
Hospital	62	29.8%
Private practice	38	18.3%
<b>In which region of KSA do you work* ?</b>		
Middle region	86	41.3%
Eastern region	41	19.7%
Western region	30	14.4%

Characteristics	Frequency	Percentage
Southern region	25	12.0%
Northern region	26	12.5%
<b>Your workplace is affiliated to* ?</b>		
MOH	131	63.0%
NGHA	9	4.35
Ministry of defense	14	6.7%
Private	43	20.7%
Others	11	5.3%

Table 2. Study participants knowledge and attitude section

Subscale	Yes	No	I do not know
Improper use of antibiotics can cause antibiotic resistance?	194 (93.3%)	8 (3.8%)	6 (2.9%)
Antibiotic resistance is prompted by self-prescription?	166 (79.8%)	23 (11.1%)	19 (9.1%)
Do you prescribe Antibiotics for Medically compromised patient after tooth Extraction?	69 (33.2%)	49 (23.6%)	90 (43.3%)
Antibiotics should be prescribed for all types of dental infections.	33 (15.9%)	157 (75.5%)	18 (8.7%)
We should ask if the patient is currently taking antibiotics during our consultation?	177 (85.1%)	23 (11.1%)	8 (3.8%)
Does pressure from patients influence in your decision regarding prescribing antibiotics?	39 (18.8%)	108 (51.9%)	61 (29.3%)
Can a patient get a Dry Socket in 7 days after the extraction?	132 (63.5%)	47 (22.6%)	29 (13.9%)
Can the patient treat the Dry Socket at home?	54 (26%)	122 (58.7%)	30 (14.4%)
Is Amoxicillin good after tooth extraction in healthy individuals?	58 (27.9)	127 (61.1%)	23 (11.1%)
Can antibiotics cure the tooth infection?	135 (64.9%)	56 (26.9%)	17 (8.2%)
Can antibiotics heal an infected root canal?	135 (64.9%)	56 (26.9%)	17 (8.2%)
Does the number of patients that you see at the clinic influence your decision to prescribe antibiotic	34 (16.3%)	119 (57.2%)	55 (26.4%)

**Table 3. Study participants knowledge and attitude section**

<b>Subscale</b>	<b>Frequency</b>	<b>Percent</b>
Is dental abscess a life-threatening condition?		
Yes	26	12.5%
No	12	5.8%
Sometimes	25	12.0%
Depends on the severity of the infection	145	69.7%
What is your 1st choice of antibiotic?		
Augmentin	46	22.1%
Amoxicillin	158	76.0%
Metronidazole	4	1.9%
What is your 2nd choice antibiotic?		
Erythromycin	27	13.0%
Clindamycin	90	43.3%
Metronidazole	89	42.8%
Other	2	1.0%
What are the signs of infection, after tooth extraction?		
Fever, Pain, exudation	38	18.3%
Swelling of the gums	13	6.3%
Bitter taste in the mouth	2	1.0%
All of the above	154	74.0%
None of the above	1	0.5%
How to avoid Dry Socket ?		
Stop smoking	13	6.3%
Eat cold and soft food to avoid irritation	2	1.0%
Good oral hygiene	8	3.8%
All of the above	185	88.9%
What is the FIRST sign of a Dry Socket?		
Severe pain	166	79.8%
Extended bleeding from socket	17	8.2%
Numbness of the lip	4	1.9%
Visible Bone within the socket	21	10.1%
How long does the jaw hurt, after tooth extraction ?		
7 Days	68	32.7%

<b>Subscale</b>	<b>Frequency</b>	<b>Percent</b>
1 Day	24	11.5%
2-3 Days	97	46.6%
1 Month and above	19	9.1%
How long does an antibiotic stay in the circulation, once the patient stops taking it* ?		
7 Days	109	52.4%
4 Weeks	24	11.5%
4-5 Days	69	33.2%
One Year	6	2.9%
how many patients you attend on a daily basis ?		
3-5	85	40.9%
5-10	93	44.7%
more than 10	30	14.4%
Which of the following is your emergency treatment approach for Acute periapical abscess case?		
Antibiotics without drainage	30	14.4%
Antibiotics with drainage	164	78.8%
Don't know can't say	14	6.7%
Which of following is your emergency treatment approach for oral infection with diffuse facial swelling ?		
Antibiotics only	43	20.7%
Antibiotics and analgesics (with drainage)	152	73.1%
I do not know	13	6.3%

The amoxicillin and amoxicillin which combined with metronidazole were the most commonly prescribed antibiotics. However, several factors may contribute to this difference, including dentists' qualifications (undergraduate or postgraduate), dentists, clinical experiences and situations, the duration of symptoms, fear of spreading infection, advance care plans, use of diagnostic resources and patient expectations [5]. Future research direction may focus on evaluating the prescription of antibiotics in both regular and emergency dental services, including evaluating the possible factors contributing to the prescription of dental antibiotics, such as dentists' qualifications and experiences, dentist's workload, and time of the day in which antibiotics were prescribed [5-8].

Over the past decade, antibiotic resistance has been increased annually in the United States, antibiotic-resistant bacteria are responsible for 23,000 deaths and 2 million illnesses. [1]. In Saudi Arabia, the rate of carbapenem-resistant GNB has grown in the previous decade when compared to the 1990s rates. A new Saudi study shows that *Streptococcus pneumoniae* are resistance to penicillin G in 33%, and resistance to erythromycin in 26% [9]. Antibiotics are not recommended for the treatment of non-proliferative infections of the teeth and alveolar bone in healthy individuals according to clinical guidelines from the UK Department of General Dental Practice (FGDP UK) and the Scottish Clinical Effective Dentistry Program (SDCEP) [10].

Monitoring dentists' antibiotic prescribing trends can reveal previously unrecognized opportunities for prescribing control and identify areas of concern in services or areas that have the potential to improve and optimize antibiotic treatment and contain the emergence and spread of resistance. can be identified. [11].

To minimize the problem of antibiotic resistance, healthcare providers can play an important role through communication. Health care providers can communicate the correct use of antibiotics for their patients through effective communication. Horn confirmed this by emphasizing the importance of interacting and communicating with patients and health care providers. This interaction may promote optimal patient compliance with antibiotics. However, the results of this study showed that some respondents reported this, regardless of gender, age, occupation, and educational background.

Doctors and pharmacy staff do not have time to teach you how to use antibiotics [12-14].

Furthermore, one of the causes of antibiotic misuse is a lack of understanding of which conditions can and cannot be treated with antibiotics, and this lack of knowledge can lead to the development of resistance [14,15].

This is among the few globally reported nationwide population-based surveys that measure knowledge, attitude and practice of antibiotics and ABR. The study employed rigorous data quality and management approaches and had a high percentage of response. One of the main limitations of this study was that the results were self-reported, and thus, findings might be underestimated or overestimated. This could introduce information or recall bias.

#### 4. CONCLUSION

Inappropriate antibiotic use practices were prevalent, and young age, men, high education levels and poor attitudes toward appropriate antibiotic use were identified as determinants of inappropriate antibiotic use. Ongoing programs are encouraged to raise awareness of the rational use of antibiotics and to educate the public about widely used antibiotics.

#### CONSENT AND ETHICAL APPROVAL

This study was approved by Ministry of Health Research Centre. Written consent was received from all participants, after the brief demonstration about the objectives of the study and also the contents of this Questionnaire. The raw data and identity of the patients were kept confidential which include personal information.

#### ACKNOWLEDGEMENTS

Special thanks to the Deanship of Scientific Research (DSR) and the Faculty of Dentistry at King Abdulaziz University, Jeddah, for supporting this project.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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*Peer-review history:*  
*The peer review history for this paper can be accessed here:*  
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