

KNOWLEDGE OF ANTIBIOTICS AND ANTIMICROBIAL RESISTANCE AMONG CLINICAL DENTAL STUDENTS IN RIYADH & EASTERN REGION; A SURVEY-BASED STUDY

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ABSTRACT

Background: Antibiotics as one of the major factors of life-expectancy increment, are prescribed for infectious diseases caused by bacteria. However, the world faced the most significant issue of antimicrobial resistance. Several studies have conducted to gauge the level of awareness about antibiotics microbial resistance (AMR). According to the several researches, 54% dentists overprescribe antibiotics, and one-tenth of them believed that antibiotics should be used for the treatment of flu and the common cold.

Objective: The purpose of this study is to measure the knowledge of antibiotics and antimicrobial resistance among clinical dental students.

Method: A cross-sectional study was conducted among dental students in Riyadh and the Eastern region using an online survey. A total of 791 students participated in an online questionnaire consisted of demographic information followed by knowledge related questions about antibiotic prescription and bacterial resistance.

Conclusions: Antibiotics are highly used among dental students despite their good knowledge about antibiotics resistance. Female students showed better knowledge of an attitude towards the use of antibiotics as compared to males. 4th-year students showed better knowledge and attitude towards antibiotics resistance. There is a need to improve dental students' attitudes towards the use of antibiotics.

Key words: Antibiotics, microbial Resistance, Dental Students.

Introduction

Antibiotics are medicines that are prescribed for infectious diseases caused by bacteria and are a major factor that has increased the life expectancy of many. However, a major problem of antimicrobial resistance is now being faced by the world. The fast-evolving antibiotic resistance crisis jeopardizes the remarkable health advantages that have been accomplished through antibiotic medication. This resistance is not just a geographical threat but has become a worldwide problem. Another issue is the knowledge and information about these resistances, although the factor like the lifestyle that may lead to antibiotic/antimicrobial resistance but nearly all the knowledge regarding the antibiotics and AMR is limited in the English language, hence the penetration world over is very low^{1,2}. Infectious diseases have always constituted the most serious health issue in the world.³⁻⁶

Around 90% of all antibiotic prescriptions are made in primary care, and a wide gap has been detected between standards and medical practice being carried out. Sources of information on antibiotics are an important determinant of the quantity and quality of antibiotic prescribing in primary care. The receipt of the information on AMR does not always

guarantee an increase in awareness of antibiotic resistance. However, the least knowledgeable group having an indifferent world view are the most susceptible to have an increased awareness after the provision of such information. Other than lifestyle, misuse, and/or overuse of antibiotics is the main reason for the predicament of resistance^{7,8}.

Another major cause of the antibiotic resistance crisis is overdosage and self-medication. It is without a doubt that the world is moving towards a post-antibiotic period where due to negligence or otherwise, common and minor infections and/or injuries have been for decades treated with the use of antibiotics. Now such infections are resurgent, stronger than ever which may again lead to widespread epidemics. The inappropriate usage of antimicrobial drugs and control methods adds further to its relapse^{9,10}.

With the advancement of medical science, new antibiotics are being made every passing moment to provide us with a counter measure against the diseases. However, while prescribing these new antibiotics extreme caution should be taken as any improper use can lead to the emergence of new antimicrobial resistance for which there may be medicine

available for curing. Therefore, the antimicrobial stewardship team (AST) and the commission of infections (CI) have a very crucial task of achieving the acceptable use of these newly discovered antibiotics ¹¹.

Several studies have conducted to gauge the level of awareness about AMR, one of the study suggests that 54% dentists overprescribe antibiotics, and one-tenth of them believed that antibiotics should be used for the treatment of flu and the common cold. In face of such a global issue, it is therefore of primary importance to further educating dental students about the antibiotics and risks associated with its misuse ¹². Another study shows that the overall awareness about antibiotic use and understanding of AMR amongst students is higher in a developed country as compared to a developing country ¹³.

One of the studies signifies that the majority of the students believe that AMR is a preventable challenge but with appropriate strategies in place. Despite such a majority, they have poor knowledge regarding antimicrobial resistance. The study also suggests that improving the students' level of knowledge about antibiotics and antimicrobial resistance should be a method to enhance their approach and to optimize rather than reduce or overuse of their antimicrobial prescription ¹⁴.

Study hypotheses:

Knowledge of clinical dental students about antibiotic resistance is satisfactory.

Aims of the study:

- To determine the level of knowledge regarding antibiotics uses among dental students.
- To measure the extent of students' knowledge about bacterial resistance.
- To compare the findings based on gender and year of dental school.

Materials and Methods:

Study Design: This is a cross-sectional study conducted among dental students in Riyadh and the Eastern region using an online survey.

Study Sample: All dental universities in Riyadh and the Eastern regions were contacted and 491 students filled up the survey.

Study Instrument: Online questionnaire was constructed which consisted of demographic information followed by

knowledge related questions about antibiotic prescription and bacterial resistance.

Instrument Validity and Reliability: A pilot study was conducted by letting the survey be filled by 20 participants and the data was inserted in SPSS version 22 to determine the reliability by using Chronbach's coefficient alpha (Value was .791). The validity of the questionnaire was tested by sending it to experienced researchers in REU and no changes were made.

Statistical Analysis: Collected data were analyzed using SPSS version 22, where descriptive as well as inferential statistics was conducted. Comparisons between groups were made with the value of significance kept under 0.05.

Results:

Results show 47% were males and 53% females (Fig 1), 44% belonged to 4th year, 23% to 5th year, and 33% from the final year (Fig 2). 47% had reported regular medication use, 55% had used antibiotics in the last 12 months. 90% of females believed antibiotics were beneficial, 88% of females thought antibiotics are overused, and 88% of females supported its restrictive use. 96% of females reported that bacteria can become resistant against antibiotics, 72% of females thought a patient can stop taking antibiotics when feeling better without completing the course.

As far as dentistry years were concerned, 91% of the 4th year students supported antibiotic's restrictive use, 95% of the 5th year students believed one could get better from bacterial infections without the use of antibiotics. Only 33% of the final year student reported that antibiotics are effective against influenza. 96% of the 4th year students believed that resistant bacteria are becoming a common problem in Saudi Arabia. (Table 1)

Table 1: Queationaire results

Gender:	
Male	292 (47%)
Female	329 (53%)
Dentistry Year:	
4 th Year	275 (44%)
5 th Year	144 (23%)
Final Year	202(33%)
I Have Good Health	
Strongly Agree	398 (64%)
Agree	181 (29%)
Unsure	28 (5%)
Disagree	12(2%)
Strongly Disagree	4(1%)

<u>I Have Chronic Disease:</u>	
Yes	276 (44%)
No	329 (53%)
Will Not Report	17(3%)
<u>Smoker:</u>	
Yes	331 (53%)
No	257 (42%)
Sometimes	33(5%)
<u>Regular Medication Use:</u>	
Yes	295 (47%)
No	303 (49%)
Sometimes	24(4%)
<u>Antibiotic Use in last 12 months:</u>	
Yes	341 (55%)
No	243 (39%)
Don't Remember	37(6%)

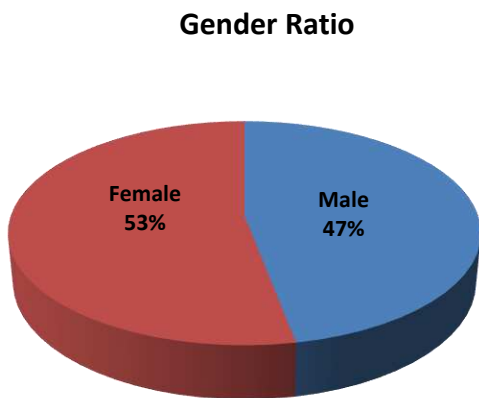


Fig. 1: Gender Ratio

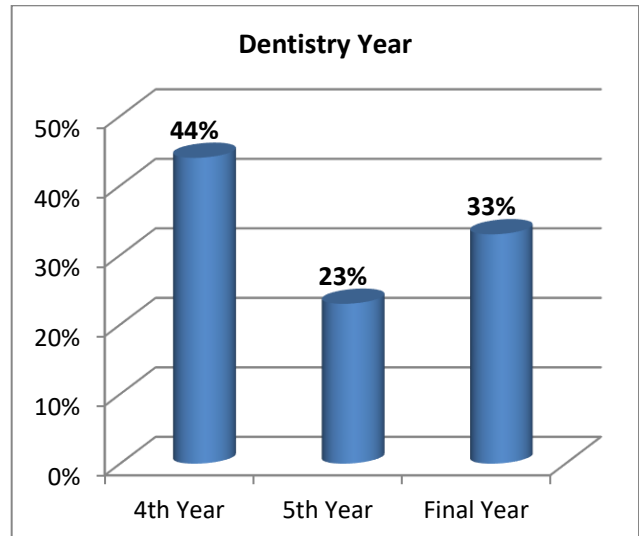


Fig. 2: Dentistry Year Distribution of Study Participants

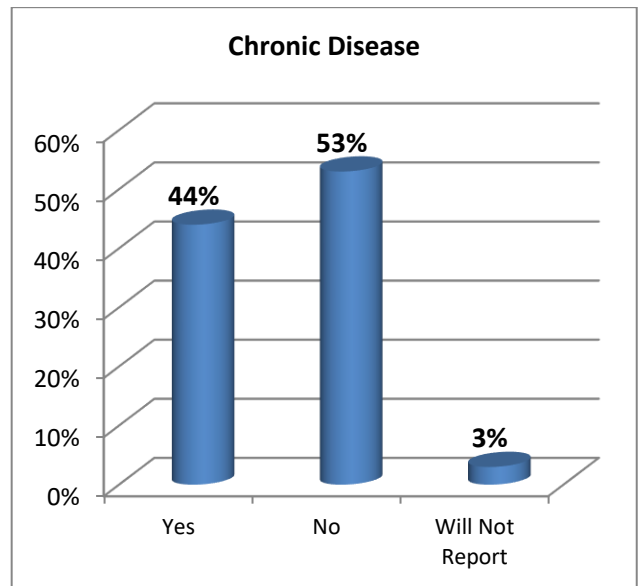


Fig. 3: Chronic Disease Distribution of Study Participants

Table 2: Comparison based on Gender

Item	Male	Female	P-Value
I Have Good Health	Strongly Agree 52%	Strongly Agree 74%	0.000
	Agree 38%	Agree 22%	
	Unsure 6%	Unsure 3%	

	Disagree 3%	Disagree 1%	
	Strongly Disagree 1%	Strongly Disagree 0%	
I have Chronic Disease	Yes 29%	Yes 59%	0.000
	No 67%	No 40%	
	Will No Report 4%	Will No Report 2%	
Smoker	Yes 46%	Yes 60%	0.000
	No 45%	No 38%	
	Sometimes 9%	Sometimes 2%	
Regular Medication Use	Yes 31%	Yes 62%	0.000
	No 65%	No 34%	
	Sometimes 4%	Sometimes 3%	
Antibiotic Used In Last 12 Months	Yes 42%	Yes 67%	0.000
	No 52%	No 28%	
	Don't Remember 6%	Don't Remember 6%	
Beliefs About Medicines			
Beneficial	Agree 81%	Agree 90%	0.003
	Disagree 4%	Disagree 1%	
	Uncertain 15%	Uncertain 9%	
Harmful	Agree 70%	Agree 86%	0.000
	Disagree 11%	Disagree 3%	
	Uncertain 19%	Uncertain 11%	
Overused	Agree 75%	Agree 88%	

	Disagree 9%	Disagree 4%	0.000
	Uncertain 16%	Uncertain 8%	
Attitude About Antibiotics			
Restrictive Attitude Supported	Agree 79%	Agree 88%	0.005
	Disagree 4%	Disagree 1%	
	Uncertain 18%	Uncertain 11%	
Non-Restrictive Attitude Supported	Agree 46%	Agree 67%	0.000
	Disagree 16%	Disagree 5%	
	Uncertain 39%	Uncertain 27%	
Antibiotics In General			
Antibiotics will kill our beneficial bacteria on the skin or stomach/intestines	True 88%	True 98%	0.000
You can get well from bacterial infections without antibiotics	True 81%	True 92%	0.000
Antibiotics are effective against colds	True 48%	True 70%	0.000
Other medications may influence the effect of antibiotics	True 87%	True 92%	0.021
Antibiotics are effective against influenza	True 48%	True 70%	0.000
You can take antibiotics together with all kinds of food	True 49%	True 70%	0.000
ANTIBIOTICS RESISTANCE			
Bacteria can become resistant against antibiotics	True 90%	True 96%	0.002
Unnecessary use of antibiotics can make them less effective	True 86%	True 95%	0.000
If you are well halfway through the antibiotics cure and feel well, you can stop the treatment.	True 43%	True 72%	0.000
One can be a carrier of resistant bacteria without being sick	True 81%	True 93%	0.000
Infections by resistant bacteria are increasing in Saudi Arabia	True 90%	True 94%	0.109
Resistant bacteria are a problem at Saudi Arabian hospitals	True 87%	True 93%	0.018
Humans can become resistant against antibiotics	True 87%	True 96%	0.000

Table 3: Comparison of the Dentistry Year

Item	4 th year	5 th Year	Final Year	P-Value
I Have Good Health	Strongly Agree 77%	Strongly Agree 61%	Strongly Agree 49%	0.000
	Agree 16%	Agree 31%	Agree 45%	
	Unsure 5%	Unsure 5%	Unsure 3%	
	Disagree 2%	Disagree 2%	Disagree 2%	
	Strongly Disagree 0%	Strongly Disagree 1%	Strongly Disagree 1%	
I have Chronic Disease	Yes 72%	Yes 24%	Yes 21%	0.000
	No 25%	No 71%	No 77%	
	Will No Report 2%	Will No Report 4%	Will No Report 2%	
Smoker	Yes 70%	Yes 42%	Yes 39%	0.000
	No 26%	No 51%	No 55%	
	Sometimes 4%	Sometimes 7%	Sometimes 6%	
Regular Medication Use	Yes 74%	Yes 32%	Yes 22%	0.000
	No 24%	No 62%	No 73%	
	Sometimes 2%	Sometimes 6%	Sometimes 4%	
Antibiotic Used In Last 12 Months	Yes 78%	Yes 38%	Yes 36%	0.000
	No 19%	No 50%	No 58%	
	Don't Remember 3%	Don't Remember 12%	Don't Remember 6%	
Beliefs About Medicines				
Beneficial	Agree 92%	Agree 80%	Agree 82%	0.001
	Disagree 1%	Disagree 6%	Disagree 2%	

	Uncertain 7%	Uncertain 15%	Uncertain 15%	
Harmful	Agree 89% Disagree 5% Uncertain 7%	Agree 76% Disagree 6% Uncertain 18%	Agree 65% Disagree 11% Uncertain 24%	0.000
Overused	Agree 88% Disagree 4% Uncertain 8%	Agree 74% Disagree 10% Uncertain 16%	Agree 80% Disagree 7% Uncertain 12%	0.008
Attitude About Antibiotics				
Restrictive Attitude Supported	Agree 91% Disagree 1% Uncertain 8%	Agree 80% Disagree 2% Uncertain 18%	Agree 76% Disagree 5% Uncertain 20%	0.000
Non-Restrictive Attitude Supported	Agree 76% Disagree 4% Uncertain 20%	Agree 59% Disagree 8% Uncertain 33%	Agree 31% Disagree 21% Uncertain 49%	0.000
Antibiotics In General				
Antibiotics will kill our beneficial bacteria on the skin or stomach/intestines	True 95%	True 93%	True 91%	0.338
You can get well from bacterial infections without antibiotics	True 92%	True 95%	True 83%	0.003
Antibiotics are effective against colds	True 78%	True 58%	True 36%	0.000
Other medications may influence the effect of antibiotics	True 93%	True 85%	True 88%	0.013
Antibiotics are effective against influenza	True 79%	True 59%	True 33%	0.000
You can take antibiotics together with all kinds of food	True 79%	True 62%	True 34%	0.000
ANTIBIOTICS RESISTANCE				
Bacteria can become resistant against antibiotics	True 95%	True 90%	True 93%	0.122

Unnecessary use of antibiotics can make them less effective	True 96%	True 86%	True 87%	0.000
If you are well halfway through the antibiotics cure and feel well, you can stop the treatment.	True 78%	True 60%	True 32%	0.000
One can be a carrier of resistant bacteria without being sick	True 91%	True 82%	True 86%	0.050
Infections by resistant bacteria are increasing in Saudi Arabia	True 96%	True 90%	True 89%	0.011
Resistant bacteria are a problem at Saudi Arabian hospitals	True 94%	True 89%	True 86%	0.011
Humans can become resistant against antibiotics	True 94%	True 85%	True 93%	0.005

Discussion

This study was conducted to assess the knowledge of antibiotics and antimicrobial resistance among clinical dental students in Riyadh & the Eastern region. A total of 621 dental students participated in the survey and provided the needed insight into the subject matter. The students chosen were from 4th to final year of dentistry. 64% of the respondents said that they believe that they have good health, however, 44% of the students said that they suffer from some form of chronic disease. (Fig 3) It is pertinent to note 53% of the students said that they smoked regularly. A high percentage (47%) of the students used medicine regularly and most of them (55%) had used an antibiotic in the last 12 months. table (3). In another study, similar results were found where 57.7% of the respondents had taken antibiotics in the last 12 months ¹⁵.

The results were also compared against students' gender and the years spent in the dentistry college as well to assess if any statistically significant incidences exist for the furtherance of this research.

As far as gender is concerned, statistically significant differences were found, that the female gender was more inclined towards, when inquired about having good health (p-value: .000), having the chronic disease (p-value: .000), regularly smoking (p-value: .000), regular usage of any medication (p-value: .000) and taking an antibiotic in the last 12 months (p-value: .000). table (2).

The female gender also thought that the medicines are beneficial (p-value: .003) and they do have harmful effects as well (p-value: .000) they also thought that medicines are often overused (p-value: .000), more than the male gender, as statistically significant differences were found in these results. table (2).

The awareness of the female gender was also higher when asked about their attitude about antibiotics, and they supported a restrictive attitude towards antibiotics (p-value: .005) and also supported non-restrictive attitude (p-value: .000). table (2). These results are similar to another study where it was shown that the Male gender has a less restrictive attitude toward antibiotic use ¹⁶.

Also, they showed more knowledge when inquired about antibiotics in general, whether Antibiotics also kill beneficial bacteria on the skin or stomach/intestines (p-value: .000), whether one can get well from bacterial infections without antibiotics (p-value: .000), whether Other medications may influence the effect of antibiotics (p-value: .021), whether one can take antibiotics together with all kinds of food (p-value: .000). However, the female gender was more inclined to misuse as compared to male as they erroneously answered when inquired whether antibiotics are effective against colds (p-value: .000), whether antibiotics are effective against influenza (p-value: .000), table (2)

The female gender as compared to male gender also showed more awareness about antibiotics resistance as statistically significant differences were found when asked whether bacteria can become resistant against antibiotics (p-value: .002) table (2). and that unnecessary use of antibiotics can make them less effective (p-value: .000) table (2). whether if one is well halfway through the antibiotics cure and feel so, he/she can stop the treatment (p-value: .000) table (2). that one can be a carrier of resistant bacteria without being sick (p-value: .000) table (2). Females in the survey also think that resistant bacteria is a problem at Saudi Arabian hospitals (p-value: .000) table (2).and that humans can become resistant against antibiotics (p-value: .000) table (2).

In another study conducted it showed that 76.9% of the people would choose the antibiotic-free option as they showed awareness for the harmful effects of its usage ¹⁷.

When assessed against the number of years spent in the dentistry college, the students in the 4th year thought that the medicines are beneficial (p-value: .001) table (3). and they do have harmful effects as well (p-value: .000) table (3). they also thought that medicines are often overused (p-value: .008) table (3). more than students of 5th or final year, as statistically significant differences were found in these results. table (3).

The awareness of 4th-year students was also higher when asked about their attitude about antibiotics, and they supported a restrictive attitude towards antibiotics (p-value: .000) and also supported non-restrictive attitude (p-value: .000). table (3). Also, they showed more knowledge when inquired about antibiotics in general, whether one can get well from bacterial infections without antibiotics (p-value: .003) table (3). whether Other medications may influence the effect of antibiotics (p-value: .013) table (3). whether one can take antibiotics together with all kinds of food (p-value: .000). table (3). The 4th year students also erroneously answered when inquired whether antibiotics are effective against colds (p-value: .000) table (3). and whether antibiotics are effective against influenza (p-value: .000). table (3). In a similar study, 30% of the students stated that antibiotics are effective against viruses, cold, and influenza ¹⁶.

The 4th year students as compared to 5th or final year students also showed more awareness about antibiotics resistance as statistically significant differences were found when asked that unnecessary use of antibiotics can make them less effective (p-value: .000) table (3). whether if one is well halfway through the antibiotics cure and feel so, he/she can stop the treatment (p-value: .000) table (3). that one can be a carrier of resistant bacteria without being sick (p-value: .050) table (3). 4th-year students in the survey also think that resistant bacteria is a problem at Saudi Arabian hospitals (p-value: .011) table (3). and that humans can become resistant against antibiotics (p-value: .005) table (3). In one of the studies carried out, the students in a dental college were found to be not aware of the antimicrobial resistance ¹⁸.

Conclusions:

- Antibiotics use is high among dental students despite their good knowledge about antibiotics resistance.

- Female students showed better knowledge of an attitude towards the use of antibiotics as compared to males.
- 4th-year students showed better knowledge and attitude towards antibiotics resistance.
- There is a need to improve dental students' attitudes towards the use of antibiotics.

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