

Knowledge, attitudes and behavior regarding antibiotics usage among adults in Jeddah, Saudi Arabia

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Abstract:

Background: The development of antibiotic resistance is a threat to human health worldwide. Misuse of antibiotics is a major cause of the development of these antibiotic resistance. Because the community is the end user of antibiotics, it plays an important role in the development of antibiotic resistance. The present study was aimed to assess the knowledge, attitudes and behavior regarding antibiotics usage among adults in Jeddah, Saudi Arabia.

Methods: It was a cross sectional study in Jeddah, Saudi Arabia, conducted using electronic self-administered questionnaire that's published through social media tools. This study included (107) persons over 18 years old, and were selected randomly.

Results: A total of 107 questionnaires were analyzed. Only 42% knew that antibiotics are effective against bacterial infection, and 29.9% didn't knew any of the side effects of using antibiotics, 74.8% agreed that it necessary to complete the full course of antibiotics, 72% thought that there is antibiotic resistance, the thought of antibiotic resistance existing weren't significantly associated with gender, age, educational qualification, nationality, and income level due to ($P > 0.05$). 82.2% refused self-medication, while 36.4% practice it. The self-medication practicing is significantly associated with age ($P < 0.05$), but not significantly associated with gender, educational qualification, nationality, and income level ($P > 0.05$).

Conclusion: The study results identified some crucial gaps in the knowledge, attitudes and practices towards antibiotic usage among adults at in Saudi society. Therefore, it is necessary to improve societal knowledge and change their attitude regarding the use of antibiotics, and undertake interventions to reduce the indiscriminate use of antibiotics.

Keywords: Antibiotics, infections, infectious diseases, antibiotic resistance, antimicrobial resistance, bacterial strains, self-medication.

1 INTRODUCTION

Antibiotics (AB) represent one of the most important medical discoveries, and their introduction into the medical field is a success story (1). In the past 70 years, antibiotics have been applied successfully in the treatment of infections, it's also have facilitated the management of infectious diseases, and participated at the reduction of morbidity and mortality that's resulting from infectious diseases (2). But the randomly use of antibiotics could cause the development of antibiotic resistance (3).

In a World Health Organization (WHO) report in 2007, antibiotic resistance issue has been described as a serious threat of the public health security (4). Also in 2011, the theme of World Health Day was "Combat drug resistance: no action today means no cure tomorrow" (5). This shows the severity of the problem and the urgent need to undertake some serious actions among all population groups involved in the growth of antibiotic resistance and irrational use of antibiotic.

Pessimistic viewpoints concerning the low chances of success to stop the evolution of antimicrobial resistance have been reported frequently (6). The main impasse is that antibiotics are a non-renewable resource (7). As well as, their duration of availability and benefit seems limited at the biological level, a restriction not seen with therapies for other disease conditions (7). On the other hand, the overuse and irrational use antibiotics leads not only to appear of resistant bacterial strains, but it also lead to economical burden and adverse reactions on national health system (8).

The antibiotic irrational use is caused by economical factors, deficiency of physicians' concerns regarding long term resistance and effect in front of treating current symptoms, health policies related medical insurance, pharmaceutical marketing and antibiotics sale in some countries without prescription (8). Social factors also contribute to the development of antibiotic resistance, these factors includes; views regarding infectious diseases, unsuitable prescribing and use, self-medication, patient demand, and non-compliance (7). Rational antibiotic therapy should be depends on the correct indication, the suitable drug and dosage, the suitable period of use, the lowest treatment costs, and the drug of the first choice (9).

In most of the developing countries, antibiotics are among the most commonly sold drug classes (8). Where most of the patients visit a pharmacy to buy pharmaceutical products as if they would at a supermarket. Increases in antibiotic resistance rate has been reported in developing countries including Saudi Arabia (10).

Many previous studies reported that antibiotic regime non-adherence and inappropriate antibiotic use are associated strongly with public knowledge and awareness of antibiotics (9). Research among adults in different parts of Saudi Arabia showed patterns of inadequate knowledge and practice regarding antibiotics (10). Hence, this study conducted to assess the knowledge, attitudes and behavior regarding antibiotics usage among adults in Jeddah, Saudi Arabia.

2 OBJECTIVES

2.1 General objective

To increase Saudi Society awareness regarding antibiotics usage.

2.2 Specific objectives

- Assess the knowledge regarding antibiotics usage among adults in Jeddah, Saudi Arabia.
- Assess the attitudes regarding antibiotics usage among adults in Jeddah, Saudi Arabia.
- Assess the behavior regarding antibiotics usage among adults in Jeddah, Saudi Arabia.

3 SUBJECTS AND METHODS

This study was performed to assess the knowledge, attitudes and behavior regarding antibiotics usage among adults in Jeddah, Saudi Arabia, using a cross-sectional study. During the period from 20, Oct 2017 to 1, Des 2017. Data was collected using electronic self-administered questionnaire. Social media tools used to publish the electronic self-administered questionnaire. A representative sample of around 107 participants living in various regions of Saudi Arabia was selected randomly to this study. The study included Saudi citizens of both genders, different age groups for adults and different cultural levels. All questionnaires that do not belong to persons less than 18 years old have been excluded.

The questionnaire contained three items. The first item was about socio-demographic characteristics which included age, gender, nationality, income level. While second item included the questions regarding the knowledge toward antibiotics like the purpose of antibiotic use. And third item included questions regarding the attitude and practice toward antibiotics like how to store antibiotics, and the purchase of antibiotics without a prescription.

Collected data was coded and analyzed using statistical analysis program (SPSS v.22), in addition to using of necessary statistical methods to achieve the objectives of the study including frequencies, percentages, and graphs.

4 POPULATION & SAMPLE OF THE STUDY

The study population includes all population of Saudi Arabia aged 18-25 years. a sample of (107) Person was selected randomly, the next table shows their properties according to their personal data.

Table 1
Distribution of the sample study to the demographic data.

Variable		N	%	P-value
Gender	Male	78	72.9	.00*
	Female	29	27.1	
Age (years)	18- 25 y	67	62.6	.00*
	25 to 30 y	17	15.9	
	31 to 35 y	4	3.7	
	More than 35 y	19	17.8	

Educational Level	Secondary or less	29	27.1	.00*
	Diploma	7	6.5	
	Bachelor	67	62.6	
	Master and more	4	3.7	
Nationality	Saudi	101	94.4	.00*
	Other	6	5.6	
Income level	< 5000 SR	70	65.4	.00*
	5000 - 10,000 SR	18	16.8	
	> 10000 SR	19	17.8	

Chi-squared test: **Significant at 0.01

It is clear from the previous table that almost 73% of the participants were males, while almost 27% of them were females. and their distribution according to their ages almost 63% of them were less than (25) years old, almost 16% of them were between (25-30) years old, almost 4% of them were between (31-35) years old, and almost 19% of them were more than (45) years old.

And their distribution according to educational level, almost 27% of the them were Secondary or less, almost 7% of them were Diploma, almost 63% of them were Bachelor, and almost 4% of them were Master and more. And their distribution according to nationality, almost 94% of them were Saudi, while almost 6% of them were Non-Saudis. and their distribution according to income level, almost 65% of them were Less than 5000 SR, almost 17% of them were between 5000 to 10,000 SR, and almost 19% of them were More than 10000 SR.

5 THE STUDY TOOL

The questionnaire was the study tool, it was prepared by the researcher with the help of specialists and experts in this field, and the questionnaire includes a part of questions on socio-demographic data as age, gender, educational level, nationality, and income level.

While the second section consisted of (8) questions to measure the knowledge of Saudi society uses antibiotics. And the third section consisted of (8) questions to measure the attitude and behavior of the Saudi society uses antibiotics.

6 STATISTICAL METHODS

The statistical analysis program (SPSS v.22) was been used in the study in data entry and analysis, with the use of necessary statistical methods to achieve the objectives of the study. The following statistical methods were used:

- 1.Frequencies.
- 2.Percentages.
- 3.Graphs.
- 4.Chi-square test.

7 RESULTS

7.1 knowledge about the use of antibiotics

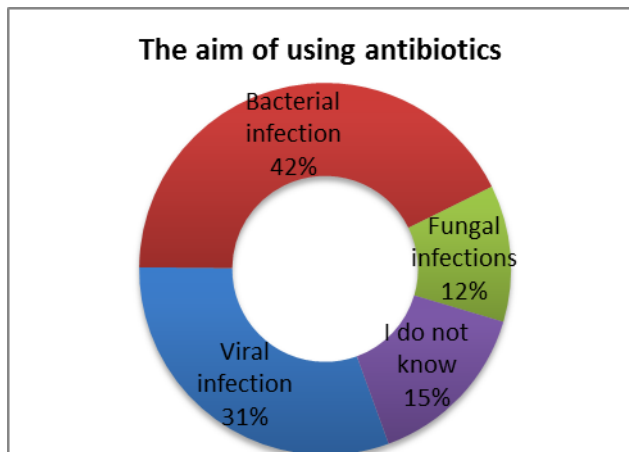
The following figure shows the participants' distribution according to their belief in the use of antibiotics, where it is clear that 42% of the participants believe that antibiotics used to treat the bacterial infection, while 31% believe that antibiotics used to treat viral infection, and 12% believe that antibiotics Are used to treat

fungal infections, while the rest have no knowledge of the use of antibiotics.

without medical supervision can reduce its effectiveness, almost 72% of them believe that antibiotics are not always effective in the treatment of the same infection in the future.

We also note from the table that almost 39% of the participants believe that women can't take antibiotics during breastfeeding, while almost 25% believe that women can take antibiotics during breastfeeding. Also note that almost 36% of the participants believe that women can't take antibiotics during pregnancy, while almost 26% believe that women can take antibiotics during pregnancy.

Figure 1
Shows the participants' distribution according to their belief in the use of antibiotics.



The following table shows the participants' distribution according to their knowledge of the side effects of antibiotic use. almost 19% of the participants believed that nausea / vomiting was a side effect of antibiotics, while almost 18% believed that diarrhea was a side effect caused by the use of antibiotics, And almost 14% of them believed that side effects from the use of abdominal antibiotics or stomach, almost 4% of them believed that the side effects of the use of antibiotics headache, and almost 6% of them believe that the side effects of the use of antibiotics Skin rash, And almost 30% of the participants had no knowledge of the side effects caused by the use of antibiotics.

Table (3)
Shows the participants' distribution according to the need to complete a full course of antibiotics, if they are taking medication with another without medical supervision, the extent of their knowledge of whether the antibiotics will always be effective in the treatment of the same infection in the future, and the possibility taken it women to antibiotics During pregnancy or breastfeeding.

	Yes (%)	No (%)	I don't know (%)	P- value
Is it necessary to complete a full course of antibiotics?	80 (74.8)	15 (14.0)	12 (11.2)	0.00 0*
Taking medication with another without medical supervision can reduce its effectiveness?	78 (72.9)	14 (13.1)	15 (14.0)	0.00 0*
Do antibiotics will always be effective in the treatment of the same infection in the future?	14 (13.1)	77 (72.0)	16 (15.0)	0.00 0*
Can women take antibiotics during breastfeeding?	27 (25.2)	42 (39.3)	38 (35.5)	0.18 4
Can women take antibiotics during pregnancy?	28 (26.2)	38 (35.5)	41 (38.3)	0.27 3

Chi-squared test: **Significant at 0.01

7.2 Attitude and behavior towards antibiotics

The following table shows the participants' distribution according to the time of taking antibiotics. almost 5% of them take antibiotics before meals, almost 65% take antibiotics after meals, and almost 30% take antibiotics before or after meals (without preference).

Table (4)
Shows the participants' distribution according to the time of taking antibiotics.

The answer	N	%
Before the meal	5	4.7
After the meal	70	65.4

Table 2
Shows the participants' distribution according to their knowledge of the side effects of antibiotic use.

The answer	N	%
Nausea / vomiting	20	18.7
Diarrhea	19	17.8
Abdominal or stomach pain	15	14.0
Headache	4	3.7
Rash	6	5.6
None of these	11	10.3
I don't know	32	29.9
Total	107	100.0

The following table shows the participants' distribution according to the need to complete a full course of antibiotics, if they are taking medication with another without medical supervision, the extent of their knowledge of whether the antibiotics will always be effective in the treatment of the same infection in the future, and the possibility taken it women to antibiotics During pregnancy or breastfeeding.

It is clear from the table that almost 75% of respondents believe the need to complete a full course of antibiotics, and almost 73% of them believe that antibiotics with other treatment

Before or After (without preference)	32	29.9
Total	107	100.0

The following table shows the participants' distribution according to the method of taking antibiotics. We note that almost 95% of them were taking antibiotics with water, almost 1% was taking antibiotics with juice, and almost 4% had other methods of taking antibiotics.

Table (5)

Shows the participants' distribution according to the method of taking antibiotics

The answer	N	%
With water	102	95.3
With juice	1	.9
Other methods	4	3.7
Total	107	100.0

The following table shows the participants' distribution according to the method of storage of antibiotics (tablets - capsules), where we note that almost 26% of them store antibiotics in the medicine cabinet, almost 13% of them store antibiotics on the kitchen shelf, and almost 61% of them store antibiotics in the refrigerator.

Table (6)

Shows the participants' distribution according to the method of storage of antibiotics (tablets - capsules)

The answer	N	%
In the medicine cabinet	28	26.2
On the kitchen shelf	14	13.1
In the fridge	65	60.7
Total	107	100.0

The following table shows the participants' distribution according to their sources of antibiotics, other than the doctor or clinic; almost 14% of them said they could get an antibiotic prescription through a prescription from a similar disease, while almost 14% said they could get On the prescription of antibiotics through the family, and almost 10% of them replied that they can get a recipe for antibiotics through the Internet, and almost 5% of them replied that they can get a recipe for antibiotics through friends, and almost 1% of them replied that they can get On a prescription for antibiotics through television. More than half of respondents almost 56% said they could not get a prescription for antibiotics without a doctor or clinic.

Table (7)

Shows the participants' distribution according to their sources of antibiotics, other than the doctor or clinic.

The answer	N	%
Recipe for treatment of a similar previous disease	15	14.0
TV	1	.9
Internet	11	10.3
Friends	5	4.7
Family	15	14.0
I didn't do this never	60	56.1

Total	107	100.0
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The following table shows the participants' distribution according to: their agreement to the possibility of obtaining antibiotics without a prescription, whether they purchased antibiotics from the pharmacy without a prescription, their use of antibiotics as prevention, their use of antibiotics through the advice of relatives, neighbors or friends, what If they keep antibiotics at home for emergencies for children.

The table shows that almost 82% of the participants do not agree to receive over-the-counter antibiotics, almost 36% of whom purchased antibiotics from the pharmacy without a prescription, while almost 64% did not.

Almost 19% of the participants use antibiotics as prevention, almost 20% of the participants use antibiotics through the advice of relatives, neighbors or friends, almost 37% of the participants keep antibiotics at home for children's emergencies.

Table (8)

Shows the participants' distribution according to: their agreement to the possibility of obtaining antibiotics without a prescription, whether they purchased antibiotics from the pharmacy without a prescription, their use of antibiotics as prevention, their use of antibiotics through the advice of relatives, neighbors or friends, what If they keep antibiotics at home for emergencies for children.

	Yes N (%)	No N (%)	P- value
Do you agree that antibiotics can be obtained without a prescription?	19 (17.8)	88 (82.2)	0.000*
Did you buy antibiotics from the pharmacy without a prescription?	39 (36.4)	68 (63.6)	0.005*
Do you use antibiotic prophylaxis?	20 (18.7)	87 (81.3)	0.000*
Do you use antibiotics through advice from relatives, neighbors or friends?	21 (19.6)	86 (80.4)	0.000*
Do you keep antibiotics at home for emergencies for children?	40 (37.4)	67 (62.6)	0.009*

Chi-squared test: **Significant at 0.01

4 DISCUSSION

Antibiotics use is common practice by the general public around the world (3). The misuse and extensive use of antibiotics led to selection and globally spread of antibiotic resistant bacteria, at the present time we face the risk of entering a post-antibiotic phase, where our medical advances are hopeless. If we do not deal with the problem now, we may face in the next few years setbacks that are unimaginable, medically, economically, and socially (1). Therefore this study aimed to assess the knowledge, attitudes and behavior regarding antibiotics usage

among adults in Jeddah, Saudi Arabia.

The present study showed inadequate knowledge towards antibiotic usage among adults at in Saudi society. 42% of our participants knew that antibiotics are using to treat the bacterial infections, while, 31% thought that antibiotics are using to treat viral infection. Our results here close to the results of another study conducted in Saudi Arabia found that 29.7% believed that antibiotics kill viruses (11). Also, a study conducted among adults in the community of Jordan found that participants revealed inadequate knowledge about whether the activity of antibiotics were against bacteria, parasites, and/or viruses (8). While, Pereko et al. reported that, the majority of the participants of their study in Namibia thought that antibiotics kill viruses (2). As well as, Oh et al. found in Malaysia, the majority thought that antibiotics kill viruses (12). This misunderstanding of the antibiotics indication is reported globally (2). This misunderstanding could be because a lot of people do not understand the differences between viruses and bacteria, so they believed that antibiotics work against bacteria and viruses (8). This misunderstanding of the antibiotics indication lead to misuse of antibiotics which will increase the risk of antibiotic resistance (3).

Ignoring completing the full course of antibiotics causes an increased risk of improving resistant bacterial strains (13). Because, the incomplete dosage regimen lead to existence of sub-inhibitory concentrations of antibiotic in the body, which may causes the development of resistance by the pathogen that's generating the infection being treated (14).

The most of our participants agreed that it necessary to complete a full course of antibiotics. This finding compatible with Hassali et al. (3), Shehadeh, et al. (8). While, RAO found that 65.55% of the participants believed that they can stop antibiotics when they feel better or that the symptoms of infections have stopped (14).

The emergence of resistant bacteria is occurring rapidly worldwide, which endangering the antibiotics efficacy (15). So, antibiotics will not be always effective in the treatment of the same infection in the future. In the present study 77% of participants thought that antibiotics will not be always effective in the treatment of the same infection in the future. According to our results there was no association between knowledge regarding antibiotic resistance and gender, age, educational qualification, nationality, and income level. While Shehadeh et al. reported that only 26.4% thought that antibiotics are less likely to be influential in the future(8).

At the present study participants showed a poor knowledge about safety of antibiotics usage by women during breastfeeding and pregnancy. This finding unlike the finding of Al-Shibani et al. who found good knowledge about safety of antibiotics usage by women during breastfeeding and pregnancy

(10). This difference in results between the two studies is due to the fact that most of the participants in our study are male, while in Al-Shibani et al. study more than half of the participants were female, and this good knowledge among females could be due to medical awareness during pregnancy and consistent follow-up with the gynecologist.

The evaluation of the society's use of antibiotics would provide valuable information to help at developing interventions targeting to improve antibiotics use (14). Participants in the current study revealed a moderate-level of attitude and practice towards the use of antibiotics

Taking antibiotics before a meal improves absorption. However, The majority of our participants 65.4% takes antibiotics after the meal. Our results are compatible with Abu-Mostafa et al. who found that 61% of the participants thought that antibiotic should be takes after the meal (11). Also, Shehadeh et al. who found that 72.1% of participants takes antibiotics after a meal (8). The presence of this misconception in patients may be due to that patients are usually instructed to take NSAIDs like diclofenac sodium, aspirin, or ibuprofen, after a meal. so, they may suppose that all medications should be taken at the same way (11).

Self-medication is defined as the drugs using to treat self-diagnosed symptoms or disorders, or the intermittent or continued use of a prescribed drug for recurrent or chronic disease or symptoms. Self-medication is used to treat the most of illnesses in developing countries. the main self-medication shortage is the absent of clinical evaluation of the condition by a trained medical professional, that's could led to wrong diagnosis and late in appropriate treatments (16). In the present study, 82.2% of participants agree that antibiotics can't be obtained without a prescription, however, the rate of self-medication using antibiotics was 39 %. Another studies conducted in several Arab countries found that self-medication rate was 35.4% in Riyadh, Saudi Arabia (17), 73.7% in Al Ahsa, Saudi Arabia (18), 33.0% in Palestine (19), 31.6% in Kuwait, 42 % in Lebanon (21). The most common motives causing obtaining self-medication were saving the time and cost and having minor illness which does not need visit a doctor (22).

According to our results there was a significant association between Self-medication with antibiotics practicing and age ($P \leq 0.001$), but there was no significant association between Self-medication with antibiotics practicing and gender, educational qualification, nationality, and income level. Shehadeh et al., found , significant association between Self-medication with antibiotics and level of education, age, and gender, but there was no significant relation between household monthly income and Self-medication with antibiotics (8). Hassali et al., found that gender, race, and income level were significantly

associated with Self-medication with antibiotics (3). Awad et al., found that Self-medication with antibiotics significantly associated with age, gender, level of education, and income (16). Ilhan et al., found that Male sex, being single, and educational increased Self-medication with antibiotics (23). Al-Azzam et al., found that Self-medication with antibiotics significantly associated with age, level of education, and income (24). Widayati et al., found that gender, marital status, and health insurance were significantly associated with self-medicate with antibiotics (25).

keep antibiotics at home for emergencies is unacceptable, because using antibiotics use should be done according to a prescription not according a personal judgment. In the current study 37.4% of participants keep antibiotics at home for emergencies for children Our finding here similar to Hassali et al. who found that 39% reported that they keep antibiotics at home in case of emergency (3). Also, Shehadeh et al. reported that 28.5% kept antibiotics at home for emergencies (8).

4 CONCLUSION

This study showed inadequate knowledge towards antibiotic usage among adults at in Saudi society. This means that there is a need to improve Saudi society knowledge towards antibiotic usage. Also, there was some gaps of attitude and practice towards the use of antibiotics. More than a third of the participants actually practiced self-medication with antibiotics, this is a significant proportion and procedures must be taken to reduce it, because self-medication with antibiotics has a role in the emergence of antibiotic resistance. There was a relationship between the practice of self-medication with antibiotics and age, but there was no relationship between the practice of self-medication with antibiotics and gender, educational qualification, nationality, and income level.

5 LIMITATIONS

This study is depend on self-administered questionnaire. So, like all self-reported data the results of this study may contain recall bias. Also, narrow study time.

4 RECOMMENDATION

- Educating the community about antibiotics, it's effectiveness, and it's side effects.
- Educate both the community and pharmacists on the issue of self-medication and try to overcome this phenomenon.
- Educate the community about the problem of antibiotic resistance its causes and consequences.

- Employ media and social media to raise awareness about the problem of antibiotic resistance, and how to reduce them.
- As well as, tighter enforcement of pharmaceutical laws and regulations related to issue the medicines without a prescription.
- The imposition of fines on pharmacists who provide medicines without a prescription.

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