ORIGINAL ARTICLE

Attitude and Knowledge of Self-medication with Antibiotics among the Public in Riyadh, Saudi Arabia

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Abstract

Introduction: The increase of antibiotic resistance appears as a significant risk to human health globally. Self-medication with antibiotics is described as the procurement and self-administering of antibiotics to one's self or to children with the aim of treating an anticipated infection. **Aim:** The aim of this study is to determine the prevalence and incidence of self-medication with antibiotics, to explore and identify the reasons behind self-medication with antibiotics and the conditions most associated with this behavior, and to investigate the level of awareness and knowledge of this behavior among the public in Riyadh, Saudi Arabia. **Methodology:** This was a descriptive, cross-sectional study, and a self-administered online questionnaire has been distributed among the public in Riyadh, Saudi Arabia. **Results:** The prevalence rate of non-prescription antibiotic use in the past 6 months was found to be 37.4% (344/920). The results indicate that the most common reason for self-medication with antibiotics was past experience (67.4%). The most common antibiotic used for self-medication was amoxicillin/clavulanic acid and flu was the most common condition (47.83%) lead to self-medication with antibiotic in the study population. **Conclusion:** The majority of the study population was aware of potential adverse effects of antibiotics and yet the practice of self-medication with antibiotics was still present. Educational interventions are needed to promote the wise use of antibiotics among the public. There is a need for more strict law enforcement to limit the purchase of antibiotics without a prescription.

Key words: Antibiotics, prevalence, public, Saudi Arabia, self-medication

INTRODUCTION AND BACKGROUND

The increase of antibiotic resistance appears as a significant risk to human health globally. The World Health Report 2007 declared the problem of antibiotic resistance as one of the major problems to public health security in the 21st century.[1] Self-medication with antibiotics is described as the procurement and self-administering of antibiotics to one's self or children with the aim of treating an anticipated infection.[2] Inappropriate drug use in self-medication had also been identified, which includes taking incompetent doses, sharing medicines, and discontinuing the treatment on the alleviation of disease symptoms. Recent studies in Jordan,[3] Lao People's Democratic Republic,[4] and European countries[5] found that non-prescribed antibiotics were mostly used for treating the common cold; a viral infection for which antibiotic treatment is ineffective, as a consequence, this may lead to decrease effectiveness and worsen clinical conditions and has become an important factor driving antimicrobial resistance.[6] Infections caused by these and other antibiotic-resistant microbes had worried clinicians practicing in every field of medicine.[7] Saudi Arabia has been described as a country with global significance in the context of epidemiology antimicrobial resistance. Non-surveillance prescription of antibiotics has severe adverse health and economic effects; billions of Saudi Riyals are wasted yearly on transferring patients to second-line antibiotics due to the failure of first-line treatment.

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More than 50% of antibiotics are purchased privately without a prescription, from pharmacies or street vendors in the unofficial sector around the world.[8] The improper use of antibiotics through self-medication may lead to significant consequences and adverse events, such as antibiotic resistance, treatment failure, and drug toxicity.[9]

A cross-sectional study was conducted in the Al Ahsa Eastern province in 2012 with a number of 463 participants. The study found that 73.7% of the participants admitted self-medication by direct purchase of antibiotics to treat various conditions that they face.[10] Another cross-sectional study was conducted in six different non-medical universities of Karachi in 2014 and found that the prevalence of self-medication with antibiotics among those students was high; 47.6% of participants reported using antibiotics not prescribed by a doctor in the past 6 months, and of the 427 people surveyed who answered the question about adverse effect awareness, 330 (77.3%) were aware that antibiotic use could lead to adverse effects.[11] In Ulaanbaatar, the capital city of Mongolia, a community-based, cross-sectional study conducted in 2009, with a number of 503 participants, suggested that caregivers in Ulaanbaatar commonly use non-prescribed antibiotics for children younger than 5 years of age, and 42.3% (95% confidence interval, [CI]: 37.8–46.9) of the children were given non-prescribed antibiotics; some determinants of this practice were the child's age, caregivers' misconceptions about the efficacy of antibiotics for upper respiratory tract infections (RTI), caregivers' own experience with self-medication, and the availability of antibiotics at home.[8] In Accra (Ghana), a study was carried out to estimate the prevalence of self-medication with antibiotics among tertiary level students from September 2007 to April 2008 with 600 participants and revealed that the prevalence of self-medication was 70%, and the practice was significantly lower among medically inclined students ($P < 0.001$). Treatment failure was reported by 35% of the participants, and the main reasons cited for self-medication were that it was less expensive compared to medical care in the hospital and that medical care in hospitals was associated with longer delays. 49% of the participants had poor knowledge about the health implications of the irrational use of antibiotics, and 46% did not comply with the full duration of the course of antibiotics.[12]

So far, there are not many published studies on self-prescribed antibiotics in Riyadh City.[13]

This study aimed to assess the prevalence, extent, and factors that lead to self-medication with antibiotics among the public in Riyadh, Saudi Arabia.

It was also explored the most commonly used antibiotic in Riyadh city and the common condition for which antibiotics are usually used by the public.

METHODOLOGY

Study design and population

A descriptive, cross-sectional study was conducted in Riyadh, the capital and most populous city of Saudi Arabia, with an estimated population of 7.7 million people and area of 1.798 km² (General authority of statistics KSA, 2012-2015. Population in Riyadh region by Gender, Age Groups and Nationality Riyadh. https://www.stats.gov.sa/ en/3134).

The study was conducted during a period from January–April 2017. The study population consisted of citizens of Riyadh city between the ages 18-60 years old from different areas of Riyadh (North, South, East, West and Middle of Riyadh city).

The data collected from participants using validated self-administered questionnaire. The questionnaire underwent pilot testing before the final distribution. The data collected from the pilot testing was not included in the study sample or results.

Ethical considerations

The study was conducted in full conformance with the principles of the "Declaration of Helsinki" and within the laws and regulations of Saudi Arabia. Ethical approval for this study was obtained from "Ethical Committee of AlMaarefa University of science and technology." An informed consent was available at the first page of the questionnaire which states that participation is voluntary, ensured confidentiality and that all information will be used for research purposes only.

Questionnaire design

A literature review of similar previous studies was conducted to identify potential items for the study instrument. The questionnaire was comprised of three parts. Part 1 obtained the demographic characteristics of the participants, which include age, gender, marital status, education level, and other important information. Part 2 was designed to assess recent antibiotic usage among the participants for the past 6 months. It assesses if participants complete the antibiotics course or fail to complete it and if they know the name of the antibiotic used (if applicable). Participants were requested to provide further information regarding the source and reason for taking antibiotics if they had taken antibiotics within this period. Part 3 of the questionnaire evaluate knowledge and attitudes toward the consequences of antibiotics use. The questionnaire was initially developed in English and then translated into Arabic. It was assessed for face and content validity by a group of local experts. It was also pretested for content, design, readability, and comprehension on 20 individuals living in Riyadh, and modifications were made as necessary so that the questionnaire was simple to understand and answer yet gave accurate data.

Sampling and data collection

The sample size was determined using the Raosoft sample size calculator using a margin of error of 5%, a CI of 95%, and an expected response of 50%.[14] The minimum sample size estimated for the study was 385. Assuming a response rate of 50%, a larger sample size of 920 participants was enrolled in the study after assessment of all data and excluded any participants who did not meet the inclusion criteria.

The participants were recruited through online questionnaire distributed through social networks. Participants included in the study were between the ages of 18 and 60 years old and living in Riyadh.

Statistical analysis

All data were analyzed using Statistical Package for Social Sciences (SPSS). Descriptive statistic, frequencies and percentages were used to summarize the data regarding demographic characteristics, use of antibiotics, and knowledge and attitudes toward antibiotic adverse events. A chi-square test has been used to determine the prevalence of self-medication with antibiotics. Finally, the frequency of knowledge regarding antibiotic resistance was also calculated.

RESULTS

Of the 1045 participants who answered the questionnaire, 125 participants have been excluded, leaving 920 participants who met all criteria. 40.8% of participants were from the age group of 18–25 years old. More than two-thirds of the participants (68.5%) were female. More than 70% were at the university level or higher. The demographic characteristics of the participant are detailed in Table 1.

Table 1: Demographic characteristics of participants

Characteristics	Number (%)
Age (years)	
18–25	375 (40.76)
26–33	151 (16.41)
34–40	139 (15.11)
41–60	255 (27.72)
Gender	
Male	290 (31.5)
Female	630 (68.5)
Marital status	
Single	407 (44.2)
Married	489 (53.2)
Other	24 (2.6)
Having kids	
Yes	469 (50.98)
No	451 (49.02)
Educational level	
High school or less	191 (20.76)
University	647 (70.33)
Higher education	82 (8.91)
Region of residence	
North	344 (37.39)
East	374 (40.65)
West	81 (8.80)
South	59 (6.41)
Middle	62 (6.74)
Being a health-care provider	
Yes	249 (27.1)
No	671 (72.9)
Having close relatives in health care	
Yes	467 (50.76)
No	453 (49.24)
Income	
No income	267 (29.02)
<4K	156 (16.95)
4–10K	166 (18.04)
11–15K	147 (15.97)
16–20K	74 (8.04)
>20K	110 (11.95)

Demographic characteristics of participants

About 37% (344/920) of participants used antibiotics in the past 6 months, and 62% (576/920) of participants have not. The results indicate that the most common reason for self-medication with antibiotics was past experience (67%) [Table 2].

About 48.6% of participants used antibiotics at least once in the past 6 months, 61.8% knew the name of the antibiotic that they usually use, and augmentin was the most commonly used antibiotic with a percentage of 83.9%. 49.6% (457/920) of participants completed their course of antibiotic and stopped taking them at the end of the course, and 24% (221/920) stopped taking the antibiotic once the symptoms disappeared. 57% (526/920) of participants stated that they usually keep the leftover antibiotic at home after finishing the course. 42.2% (388/920) of participants chose their antibiotic based on past prescriptions, while 33.7% (310/920) chose the antibiotic based on the pharmacist's advice [Table 2]. 86.8% (785/904) of our participants do not prefer to give their child antibiotics without a prescription [Table 2].

As for the most common conditions that lead participants to take antibiotics, flu came in first (47.83%), follow by

Table 2: Usage of antibiotic

Variables	% (*n*)
Usage of antibiotics without a prescription in the past 6 months	
Yes	37.4 (344)
No	62.6 (576)
If yes, reason for taking antibiotic without prescription	
Cheaper to seek medication from the pharmacy	5.8 (20)
No access to physician care	6.4 (22)
Previous experience	67.4 (232)
Saving time	18.9 (65)
Other	1.5 (5)
Frequency of antibiotic use in the past 6 months	
None	40.7 (374)
Once-twice	48.6 (447)
35 times	7.6 (70)
>5 times	3.1 (29)
Do you know the name of the antibiotic you have used/usually use	
Yes	61.8 (569)
No	38.2 (351)
If yes, name of the antibiotic has been used in the past 6 months	
Augmentin	83.9 (772)
Curam	2.6 (24)
Azomycin	5.9 (54)
Winex	3.5 (32)
Ciprax	3.5 (32)
Other	0.7 (6)
When to stop taking antibiotics	
After a few days regardless of the outcome	8.6 (79)
After symptoms disappeared	24 (221)
After antibiotic ran out	9.8 (90)
After completion of the course	49.6 (457)
After consulting a doctor/pharmacist	7.1 (65)
Other	0.9 (8)
Keeping the rest of antibiotics at home after finishing the course	
Yes	57.2 (526)
No	42.8 (394)
Selection of antibiotic is based on	
Recommendation by community pharmacists	33.7 (310)
Opinion of family members	4.8 (44)
Opinion of family friends	0.9 (8)
My own experience	18.4 (169)
Previous doctor's prescription	42.2 (388)
Advertisements	0.1 (1)
Giving your child none-prescribed antibiotic (if you have a child)	
Yes	13.2 (119)
No	86.8 (785)
The most common conditions that lead participants to take antibiotics (can choose more than one answer)	
UTI	13 (120)
Toothache	28.8 (265)
Diarrhea	3.4 (31)
Tonsillitis	31.1 (286)
RTI	24.2 (221)
Sore throat	43.5 (400)
Flu	47.8 (440)

RTI: Respiratory tract infections, UTI: Urinary tract infections

sore throats (43.39%), RTI (24.27%), tonsillitis (31.18%), diarrhea (3.40%), toothache (28.84%), and urinary tract infections (UTI) (13%) [Table 2].

Usage of antibiotic

About 42.9% (395/920) used antibiotic for both viral and bacterial infections. 68.4% of participants stated that they seek doctors' help in the event of any side effects associated with antibiotic use. 69.6% of participants do not advise their friends and family to take the antibiotic without a prescription [Table 3].

The relationship between females and giving children non-prescribed antibiotics

Giving children non-prescribed antibiotics was significantly affected by the practice of self-medication with antibiotics ($P < 0.001$) [Table 4]

DISCUSSION

Saudi Arabia has a well-established policy not to dispense antibiotics without a prescription. However, in spite of the regulation, dispensing antibiotics without a prescription remained a major challenge within the community under study.[12] In view of this situation, the prevalence rate of non-prescription antibiotic use in this study in the past 6 months was 37.4%. A 6-month period was chosen to eliminate recall bias among those who used antibiotics. The results indicate that the most common reason for self-medication

with antibiotics was past experience (67.4%) because they considered themselves to be knowledgeable about antibiotic use, but this indicates lack of awareness of the risks of antibiotics. As for the most common conditions that lead participants to take antibiotics, flu came in first (47.8%), which is not a correct indication for antibiotics. This could be explained by the participants' unawareness of the correct use of antibiotics and inability to differentiate between viral and bacterial infections. Other conditions included sore throats (43.4%), RTI (24.3%), tonsillitis (31.2%), diarrhea (3.4%), toothache (28.5%), and UTI (13%). According to this study, 48.6% of participants used antibiotics at least once in the past 6 months, and 61.8% (569/920) of participants knew the name of the antibiotic they usually use, which could indicate misuse, as 67.4% (232/920) of participants stated that their choice of antibiotic is based on past experience.

Similar to results from studies done in Khartoum State (Sudan), Yogyakarta City (Indonesia), Mongolia, Karachi (Pakistan), Accra (Ghana), and Al-Ahsa region in Saudi Arabia, the most commonly used antibiotic was augmentin (amoxicillin/clavulanic acid).[2,6,8,10,11]

Table 3: General knowledge about antibiotics and attitude toward antibiotic adverse events

Variables	% (*n*)
What are antibiotics used for?	
Virus infections	15.5 (143)
Bacterial infections	41.5 (382)
Both	42.9 (395)
When you experience side effects from antibiotics, do you consult your physician or other healthcare professionals?	
Yes	68.4 (629)
No	31.6 (291)
Keeping in view your personal experiences, would you recommend antibiotics to your family and friends?	
Yes	30.4 (280)
No	69.6 (640)

However, 49.6% (457/920) of the participants completed their course of antibiotics; still, this percentage is low compared to studies conducted in other countries.[1] 24% (221/920) of the participants who used antibiotics in the past 6 months or at any time of their life did not complete their antibiotic course, but this percentage is alarming and it needs more attention as this behavior can lead to antibiotic resistance; since once the patient stops taking the antibiotic before completing the course, some bacteria may survive and it will be more virulent and will become resistant. One of the possible causes of self-medication with antibiotics is the availability of these medications at home. 57.2% (526/920) of participants revealed that they usually keep the rest of prescribed antibiotics at home after finishing the course, which can contribute to the inappropriate use. Availability of these medications at home can be the result of physicians overprescribing antibiotics or failure of community pharmacies to follow local regulations regarding the dispensing of antibiotics without a prescription or poor adherence.

A previous study conducted in Mongolia addressed this issue and recommended physicians to appropriately prescribe the correct dosage, properly instruct patients to complete their antibiotic courses, and encourage them to discard any leftover drugs.[8]

About 42.2% (388/920) of our participants chose their antibiotic depending on past prescriptions from a physician, which may have led them to not consider this practice "self-medication." Professional regulations and population-tailored health education are needed to prevent such practice.

Our findings have shown that most of the participants do not prefer to give their children antibiotics without a prescription (86.8%) which reflects a good awareness of the mothers about the risks of giving their children antibiotics without consulting a doctor, unlike community-based, cross-sectional study which was conducted in the study conducted in Ulaanbaatar, Mongolia (2010) which showed that 42.3% of caregivers used non-prescribed antibiotics for children younger than 5 years of age to treat symptoms such as cough, fever, and nasal discharge.[8] One of the possible reasons for this high level of awareness may be because 50.76% (467/920) of our participants had relatives working in the medical field and 27.1% of participants are health-care providers; thus, they have a good background about the antibiotic dangers if

Table 4: The relationship between females and giving children non-prescribed antibiotics Chi-square tests

Statistics	Value	df	Asymptotic significance (two-tailed)	Exact significance (two-tailed)	Exact significance (one-tailed)
Pearson Chi-square	65.47	1	0.000	0.000	0.000
Likelihood ratio	61.92	1	0.000		
Fisher's exact test					
Continuity correction	63.43	1	0.000		
Linear-by-linear association	65.36	1	0.000		
n of valid cases	618				

used without consulting a doctor. Many participants (42.9%) thought that antibiotics were used for both viral and bacterial infections, while 15.5% thought that they were used for viral infections. Antibiotics do not work on viruses, such as those that cause colds, flu, bronchitis, or runny noses. Antibiotics are only needed for treating infections caused by bacteria. Such practice could lead to the global health-care issue of antibiotic resistance.

These results suggest that the participants had inadequate knowledge about antibiotics, which is represented in them taking antibiotics from previous prescriptions once they experienced the same symptoms.

A good practice done by pharmacists is that they consult doctors and refer patients when they experience side effects related to antibiotic use (68.4%). Facing adverse effect under physician control (68.4%), refraining from giving their child (86.8%), and not advising family members and friends to take antibiotics from past experience (69.6%) are all positive practices that point to good awareness levels as well.

Interpretation of the findings of this study should take into account certain potential limitations that might impact on its conclusions. This study was conducted in the city of Riyadh using convenient sampling method because randomization was not possible due to the limited time for the research though efforts were made to obtain representative sample and data collected from different areas in Riyadh city. The questionnaire on this study was distributed through social networking websites which formed some obstacles to researchers in this study such as the presence of participants who did not complete the questionnaire, which led to the emergence of some missing information, and all questionnaires with missing data (incomplete) had to be excluded which decreased the sample size. Furthermore, most of the participants in the current study were either in the medical field or have a close relative who is in the medical field; thus, they already have a good background about antibiotics and the consequences of using them without consulting a doctor.

Despite these limitations, the present findings provide important information for evaluating and improving knowledge, attitude, and practice toward antibiotics use.

Recommendation for future studies

To obtain more precise results in the future, future researchers should apply this study on other cities of Saudi Arabia, including the capital city. An additional question should be added to assess whether the participants have attended any awareness programs related to antibiotic usage or not, as it can alter their awareness level.

In addition, the presences of educational and awareness programs and campaigns for educating the public about the proper use of antibiotics should be created and more restrictive regulations on pharmacist and prescriber during antibiotic prescription and dispensing should be applied.

CONCLUSION

The results obtained can help in providing a framework for designing programs that will create awareness about the risks of self-medication with antibiotics. The majority of the study population was aware of the potential adverse effects of antibiotics and yet the practice of self-medication with antibiotics was still present. The study suggested that there is a need for educational programs emphasizing on the risks associated with indiscriminate antibiotic use, in which health-care providers, pharmacists, and others, including parents, should be actively involved in. It would help to inculcate the practice of responsible use of antibiotics among the general population at an early age.

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