

ORIGINAL ARTICLES

Awareness of antibiotics use among Omani patients

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Received: July 29, 2019

Accepted: October 28, 2019

Online Published: November 3, 2019

DOI: 10.5430/ijh.v6n1p12

URL: <https://doi.org/10.5430/ijh.v6n1p12>

ABSTRACT

Objective: Antibiotics are considered crucial in preventing and treating many infectious diseases. However, antibiotics use causes major side effects and consequences. Raising public awareness about proper use of antibiotics contributes to improving understanding and preventing irreversible consequences. The aim of this study was to measure the level of awareness of antibiotics use among Omani patients, and to assess the relationship between level of awareness of antibiotics use and selected demographic variables.

Methods: A cross-sectional design using a questionnaire, with a convenience sample of 354 patients was employed for this study.

Results: The findings of this study indicated that most of the participants (63%) reported poor levels of awareness of antibiotics use. The mean value of level of awareness was 19.3 and the standard deviation was 3. Participants ranked doctors as the most (27%) to receive education from. There were significant relationship between levels of antibiotics awareness and gender [r_{pb} (352) = -.126, $p < .05$]; levels of antibiotics awareness and employment [r_{pb} (352) = -.149, $p < .01$]; levels of antibiotics awareness across age groups [F (3, 350) = 2.308, $p = .049$]; and across levels of education [F (3, 350) = 3.268, $p = .014$].

Conclusions: Such findings are crucial because they form the basis for establishing awareness programs about antibiotics use which should be made accessible to patients and their families.

Key Words: Antibiotics use, Awareness, Education, Oman, Diwan

1. INTRODUCTION

Evidently, antibiotics have played a crucial role in preventing and treating many infectious diseases. They have contributed in saving patients' lives and decreasing the morbidity and mortality caused by many diseases. Patients receiving chemotherapy treatment; having chronic diseases; undergoing complex surgeries benefit from antibiotics in preventing many infections that may occur due to their vulnerability.^[1,2] Conversely, antibiotics use causes major side effects and consequences, particularly when prescribed or used inappropriately. Of these major consequences is resistant of antibiotics

that can affect any one regardless of age or geographic location. This is a global issue that places a substantial health and economic burden to many countries.^[3-5] Among the reasons that contribute to resistance are incorrect treatment indication, choice of agent, and/or duration of antibiotic therapy.^[6-8]

Most importantly, antibiotics resistance has been attributed to misuse or abuse of these medications by patients.^[9-11] Several contributing factors may be attributed with the problem of antibiotic misuse such as cultural and cognitive. Among these reported factors are lack of knowledge and awareness

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of the basic principles of antibiotics use and their indication for therapy.^[12-15] A survey of 12 countries (n = 9,772) indicated that 57% of the respondents are unaware of their role in minimizing antibiotic resistance. Many (43%) indicated that it acceptable to buy the same antibiotics when they get sick with the same symptoms. And 25% of them believed it is fine to use the same antibiotics that were given to their friends or to a family member with the same symptoms.^[15]

Further, many countries have less stringent regulations than others for non-prescription antibiotics, making access to antibiotics by average public easier. For example, in Saudi Arabia, Yemen, and Uzbekistan, the prevalence of non-prescription antibiotics use were 78%, 48% and 78%, respectively.^[16] The most common reported reasons for non-prescription antibiotic use were cough (40%) and influenza (34%). About 50% of participants discontinued antibiotics without doctor instruction when they felt better.

Although limited, documented studies in Oman^[17-19] related to antibiotics use report a comparable situation and call for more efforts to raise the public awareness. One of these studies^[17] reports that general Omani population has lack of knowledge related to antibiotics use. Many (53%) participants also believed that antibiotic can be stopped when felt better from symptoms. Forty percent share antibiotics with a member of family or a friend who had the same symptoms.

Efforts to curb antibiotic misuse and raise the public awareness have been the endeavors of many countries.^[4,20-22] The Omani Ministry of Health (MOH) which regulates, delivers, and maintains the healthcare services through a free national health care system has initiated different efforts including a National Antimicrobial Resistance (AMR) campaign.^[23] The aim of such efforts is to raise the healthcare providers and public awareness of the use of antibiotics and improve understanding of antibiotic regimens to prevent irreversible consequences.

Due to the gap in knowledge about this topic in Oman, this study aimed to measure the level of awareness of antibiotics use among Omani patients, and assessed the association between level of awareness of antibiotics use and selected variables (age, gender, marital status, level of education, employment, region of stay, previous use of antibiotics, previous hospitalization, and source of education about antibiotics) of the participants. It also looked into the methods from which participants received education about antibiotics use; and methods by which participants would like to receive education about antibiotics use. The result of this study will add to the body of knowledge and contribute in understanding the public awareness of antibiotic use, which would be a platform to establish programs targeted to improve public

awareness about antibiotic use and bacteria resistance, hence, improve the quality of patient care.

2. METHOD

2.1 Data collection and sample

This study employed a quantitative cross-sectional design. Recruitment took place in the Diwan of Royal Court Health Complex (DRCHC); a governmental healthcare institution located in the capital of Oman, Muscat. This Health Complex mainly provides primary healthcare services to the employees and families of different governmental sectors including the Diwan of Royal Court. Such individuals come from all over the country, and hence, are considered good representation of the population of Oman. Right now there are about 250 thousands illegible patients to receive healthcare services from the DRCHC who are geographically located throughout the country. Sample size was determined by power analysis using Raosoft program.^[24] At 99 level of confidence and 5% margin of error, a minimum sample of 384 was required for this study. A convenience sample of 354 respondents participated in this study. Participants were included if there are Omani, able to comprehend the study questionnaire and purpose, and willing to participant. Healthcare providers or participants recently received education related to the researched topic were excluded as the study targeted average public. Data was collected using a questionnaire. Participants were approached in different locations of the Diwan health complex and were asked to participate in the study once they met the inclusion and inclusion criteria. They then were asked to fill a consent form and a questionnaire while waiting to see their doctors or waiting at the pharmacy.

2.2 Measurements and tools

Awareness of antibiotics use was measured using Antibiotics use Awareness Scale (AAS), which is a self-administered questionnaire that is developed by the researchers after reviewing previous literature.^[8,11,17,18,25] This questionnaire comprised of two parts: part-1 focuses on demographic characteristics and part-2 focuses on the level of awareness of antibiotics use. Part-2 of the questionnaire is a binary-type scale, in which subjects are required to indicate their degree of agreement to the statement provided using yes/no responses. Binary responses were selected for easy calculation and cutoffs which allow for smart and simple interpretation.^[26] The tool was reviewed by four experts in the field of pharmacy and medicine for the sake of face validity. Few modifications were made as a result of the experts' reviews. One item was added and three statements were restated to improve clarity. Hence, the final tool included 14 items with a minimum possible score is 14 and the maximum possible score is 28. High scores indicate higher level of awareness of

antibiotics use. The original tool was developed in English, therefore, it was translated to Arabic and back-translated to English by two different translators who are fluent in both Arabic and English to ensure accuracy of translation. The Cronbach’s α coefficient of the Arabic version of the AAS was .78, which exceeded the acceptable value of .70, indicating high internal consistency reliability.^[27]

2.3 Ethical consideration

Approval was obtained from the Research Ethics Committed (REC) of the Directorate General of Medical Services, Diwan of Royal Court (REC/1578/2017). The nature of the study was explained to the participants. Voluntary written informed consent was obtained. Privacy and confidentiality of data was assured.

2.4 Data management and analysis

Once the data were entered in the SPSS program, the researchers visually compared the data with the original data from the questionnaires. Also, descriptive statistics using frequencies and means were calculated on all the variables to look for discrepancies in data. Missing values were assigned a numeric code “9.” The researchers analyzed missing data for pattern, distribution, and randomness. Data were then assessed for outliers through inspecting frequency distributions, box plots, and conducting statistical tests. Descriptive statistics using mode, mean, median, standard deviation, and percentage were used to describe the sample and the demographic variables of the study. Tables and charts such as bar and histogram charts were used to illustrate the findings. Relationships between level of awareness of antibiotics use and demographic variables were assessed by conducting point biserial (r_{pb}) correlation on dichotomous variables (e.g., gender, marital status, and employment), and by conducting one-way ANOVAs on each of the categorical variables (e.g., age, and level of education).

3. RESULTS

3.1 Characteristics of the sample

The target sample of this study was 384. Four hundred and fifty questionnaires were distributed for those who met the inclusion and exclusion criteria. A total of 364 questionnaires received back from participants who agreed to participate in the study. Ten of them were excluded for errors and incompleteness, constituting a response rate of 79%. Hence, the final sample used for this study was 354. Most of the participants were females (54%), and most of them (75%) were between 20 to 29 years old. The majority had taken antibiotics previously (86%), and most of them (59%) were from Muscat region (see Table 1).

Table 1. Demographic characteristics of the sample (N = 354)

Variables	Freq. (%)	
Gender	Male	161 (45.5)
	Female	193 (54.5)
Age (years)	20 to 29	265 (75)
	30 to 39	23 (6.5)
	40 to 49	57 (16.1)
	≥ 50	9 (2.5)
Marital status	Married	277 (78.2)
	Unmarried	77 (21.8)
Employment	Employed	238 (67.2)
	Unemployed	116 (32.8)
Level of education	No formal edu.	8 (2.2)
	Below h. school	43 (12)
	High school	160 (45.3)
	College level	143 (40.5)
Previous hospitalization	Yes	191 (54)
	No	163 (46)
Previous use of antibiotic	Yes	305 (86.2)
	No	49 (13.8)
Region	Muscat	209 (59)
	Dhakiliyah	37 (10.5)
	Albatina	84 (23.7)
	Sharqiyah	20 (5.6)
	Dhufar	2 (0.6)
	Dhahira	2 (0.6)

3.2 Levels of awareness

The findings of this study indicated that most of the participants (63%) reported poor levels of awareness of antibiotics use (see Figure 1). The mean value of level of awareness was 19.3 and the standard deviation was 3; the minimum score was 14 and the maximum was 28. Higher scores (≥ 24) of level of antibiotics awareness were achieved by only 4% of the participants. Most of the participants (73%) scored ≤ 20 on the level of antibiotics awareness. Only three participants scored 28 (see Figure 2).

Moreover, there were only three items in which the participants scored more correct than wrong answers: “antibiotics are effective against bacteria;” “i may stop antibiotics once symptoms disappear” and “antibiotic resistance occurs to patients in different country does not affect patients in Oman” (65%, 66% and 56%, respectively). The remaining items were scored more wrong than correct answers. The most wrong items participants responded to were: “i can stop antibiotics if symptoms did not improve” and “if antibiotic resistance occurs to my friend, it may occur to me too” (80% and 93%, respectively) (see Table 2).

Table 2. Responses of participants to questionnaire items (n = 354)

Items	Freq. (%)	Freq. (%)
1. Antibiotics are effective against bacteria.	229 (65)	125 (35)
2. Antibiotics are effective against viruses.	264 (75)	90 (25)
3. Antibiotics are used to relieve pains.	270 (76)	84 (24)
4. Antibiotics cure common colds more quickly.	268 (76)	86 (24)
5. Leftover antibiotics may be kept at home in case of future need.	254 (72)	100 (28)
6. Antibiotics can be purchased from pharmacies without prescription.	271 (76)	83 (23)
7. I may stop antibiotics once symptoms disappear.	121 (34)	233 (66)
8. I may use remaining antibiotics again for similar symptoms.	264 (75)	90 (25)
9. I can stop antibiotics if symptoms did not improve.	284 (80)	70 (20)
10. The course of Antibiotics should be continued even when side effects occur.	242 (68)	112 (32)
11. Antibiotics can be shared with my family/friends with similar symptoms to mine.	261 (74)	93 (26)
12. Taking antibiotics too often decreases its work in the future.	172 (49)	182 (51)
13. If antibiotic resistance occurs to my friend, it may occur to me too.	23 (7)	331 (93)
14. Antibiotic resistance occurs to patients in different country does not affect patients in Oman.	156 (44)	198 (56)

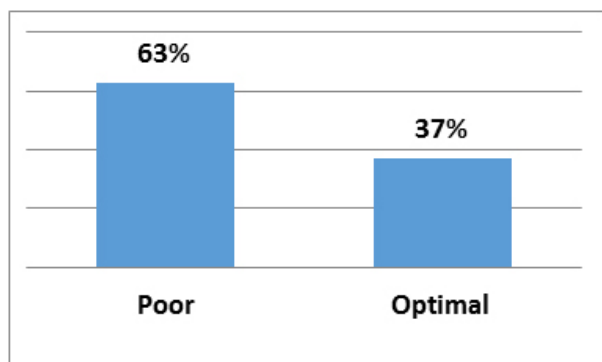


Figure 1. Levels of awareness based on percentage of correct (optimal) versus wrong (poor) answers (n = 354)

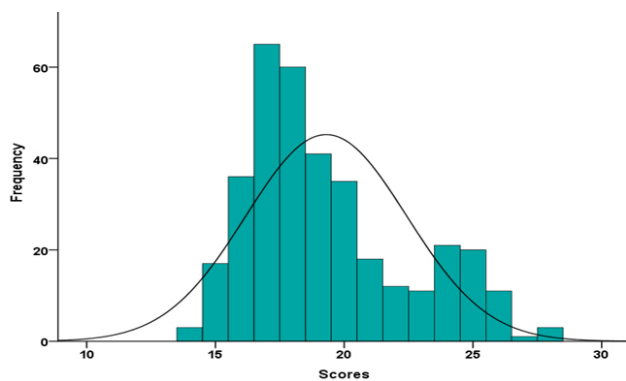


Figure 2. Scores on the Levels of antibiotics use questionnaire (n = 354)

3.3 Source of previous antibiotics education

In relation to previous education about antibiotics, participants ranked doctors as the most (27%) to receive education from. Second comes social media like whatsapp application and Facebook. Conversely, nurses and pharmacist were

ranked the least to receive education about antibiotics from (7.5% and 16%, respectively) (see Figure 3).

3.4 Source of preferred antibiotics education

Participants were also asked to rank the source from which they prefer to receive education about antibiotics in the future. Similar to “previous source of education,” doctors were ranked to be the most preferred source to receive education about antibiotics from (53%). Second comes pharmacists (19%), whereas, least were the nurses (6.5%) (see Figure 4).

3.5 Relationship between levels of antibiotics use awareness and demographic characteristics

A point biserial correlation analysis indicated a significant relationship between levels of antibiotics awareness and gender [$r_{pb} (352) = -.126, p < .05$], and between levels of antibiotics awareness and employment [$r_{pb} (352) = -.149, p < .01$]. Males and employed participants scored significantly higher on antibiotics awareness than females and unemployed participants. There were no significant relationships between levels of antibiotics awareness and marital status, previous hospitalization, and previous use of Antibiotics (see Table 3).

Further, one-way ANOVA indicated that levels of antibiotics awareness vary significantly across age groups [$F (3, 350) = 2.308, p = .049$], and across levels of education [$F (3, 350) = 3.268, p = .014$]. Post hoc tests using Fisher’s LSD showed that patients with higher education levels and/or younger scored significantly higher on antibiotics awareness. Additionally, there were no significant differences found across different regions (provinces) with respect to antibiotics awareness [$F (5, 348) = .144, p = .21$].

The current study also assessed whether sources of previous

education about antibiotics use had any relationship with the level of awareness, and found that there was no significant relationship between these variables.

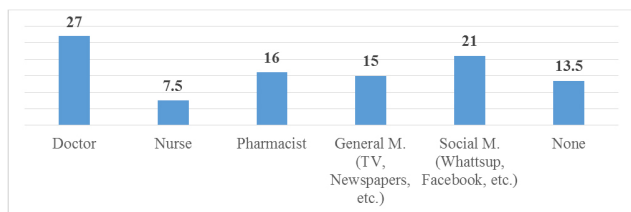


Figure 3. Source of previous antibiotics education % (n = 354)

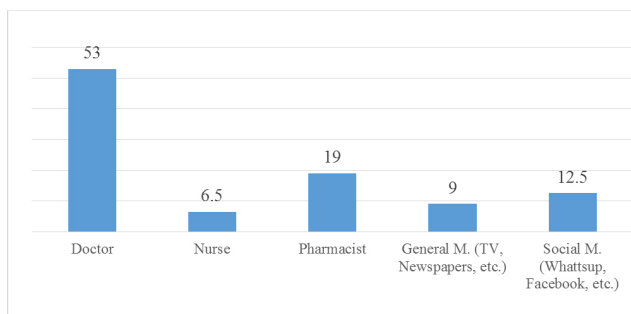


Figure 4. Source of preferred antibiotics education % (n = 354)

Table 3. Point biserial correlation between level of antibiotics awareness and demographic characteristics (N = 354)

Variables	Antibiotics Awareness
Gender	-.126*
Marital Status	-.029
Employment	-.149**
Hospitalization	-.032
Use of Antibiotics	-.009

Note. * $p < .05$ level (2-tailed); ** $p < .01$ level (2-tailed).

4. DISCUSSION

Awareness of antibiotics use by patients contributes to better understanding of their purpose and prevents complications of misusing them. Equipping patients with the appropriate information about their health issues particularly about antibiotics use makes them in a better position to care for themselves. Findings of the current study suggest that most of the participants (63%) have poor level of awareness of antibiotics use. Few of them (4%) were able to achieve higher scores (≥ 24) on the level of awareness. For example, more than 74% of the participants responded “yes” for the statements “antibiotics are used to relieve pains” and “antibiotics are effective against viruses.” These findings are consistent with research

in Oman^[17,19] and elsewhere.^[8,11,13] Several reasons could be attributed to poor levels of awareness of antibiotics use. Among these are lack of education about antibiotics use and their complications, lack of access to structured educational programs related to antibiotics use, and misconception about the use of antibiotics. Although the country represented in the MOH initiated a national campaign to raise the awareness of the public about antibiotics use and resistance, structured educational programs regarding this topic are not available for patients in most of the healthcare institutions. Currently, healthcare providers provide education about antibiotics use through a didactic unsystematic manner in which the patients may or may not have access to due to scarce of health care resources. Merely using didactic strategies to teach will unlikely result in patients adhering to the recommended advices.

Furthermore, the findings indicated that male participants had significantly higher scores on antibiotics awareness than female participants. These findings were similar to other research conducted by Eng et al.,^[9] but were inconsistent with research of Shehadeh^[11] and Jose^[17] who indicated that there were no differences in levels of antibiotics awareness across genders. These differences might be because females are less likely to be exposed to education about antibiotics use since in most of the time they stay home due to culturally reasons. Differences in employment status across gender ($\chi^2 (1) \geq 66.171, p = .000$) with female participants less employed than males could also support the likelihood of outside exposure to antibiotic education from healthcare institutions or alike. This subsequently, might explain the differences in level of awareness of antibiotic between male and female participants. No differences in levels of education across gender were found that could explain the differences in levels of awareness.

Consistent with other research,^[9,11,17] the current study found that level of awareness varies across levels of education, age groups, and employment status, in that, participants with higher education levels, youngsters, and employed scored significantly higher. Apparently, higher level of education is associated with higher level of literacy.^[28] Learning about antibiotics use is a multifaceted that requires comprehension and gaining specific knowledge, in which having a higher level of education forms a strong base that enhances this process, resulting in better awareness. Along the same line, the differences across age and level of awareness could also be considered in the context of level of education. Older participants in this study had significantly lower levels of education compared to younger participants ($\chi^2 (1) \geq 29.369, p = .000$). Although employment is usually considered a constraint that challenges individuals to maintain a balance between family

and job responsibilities, the differences found in this study could be explained in light of the likelihood of outside exposure to antibiotic education as previously explained. Generally, being employed exposes people to outside world where learning about antibiotics or similar topics may happen from work colleagues, campaigns, attending exhibitions, or alike. In contrast, other research^[25] found inconsistent results to the current study.

While previous experience with antibiotics use or hospitalization should generally give people a better exposure to learn about them as previous research^[9,25] indicated, the findings of our study indicated contrarily. This could be due to the fact that such participants haven't had the chance to learn about antibiotics use due to lack of available educational programs in the place at which they were hospitalized or received their antibiotics from.

Further, most of the participants in this study received and preferred to receive antibiotics education from doctors. This is consistent with Arab culture,^[29] in which doctors in most of the time are ranked at the top with respect to authority and knowledge related to healthcare issues. Similarly, Popoola^[30] found that 84% of the participants in their study would like to receive education about their health issues by talking to a physician. Noticeably, the findings of the current study indicated that social media has a potential contribution in patients' education about antibiotics use, though participants preferred other means of receiving education. A consideration of such mean then need to be taken when establishing an educational program related to antibiotics use.

Pharmacists, on the other hand, were ranked second with respect to preferred source of antibiotics education, but third to previous source of antibiotics education. This may be attributed to the scarce resources that makes pharmacists unavailable to systematically teach patients about antibiotics use. Healthcare providers, particularly pharmacists, are considered the cornerstone in the process of awareness about antibiotics use and their role cannot be overemphasized. This awareness occurs through establishing a structured educational program that helps the patients make decisions related to their health independently.

It was not a surprise that nurses in this study were ranked the least in this aspect, though a critical aspect of their role is to teach patients. This could be explained by the fact that this study took place in a primary healthcare setting in which nurses has lesser contact with patients compared to doctors and pharmacist. Once the patients see the doctor, they are referred directly to the pharmacy to get their medications.

A concerning result in our study which needs attention is that 13% of the participants reported not receiving any education about antibiotics use, which put them in jeopardy of many side effects and consequences. Hence, an educational program to raise awareness of antibiotics use that subsequently prevent harmful events is required. This result goes along with the main results of the study that indicated poor level of awareness of antibiotics use among the participants, and might partially explain them.

This study is not without limitations. Data was collected using a tool that was established by the researches from reviewing the literature, which has no previous psychometrics information. Although its internal consistency reliability exceeded the acceptable value, a more comprehensive confirmatory assessment is needed. Moreover, the study sample was small to represent the majority of the regions of Oman, thus, generalizability of the findings would be a challenge.

5. CONCLUSION

This study measured the level of awareness of antibiotics use among Omani patients. Poor level of awareness was indicated by the majority of the participants. Such findings are crucial as they form the basis for establishing awareness programs about antibiotics use. Healthcare providers have responsibility toward the patients and the society as whole to improve the quality of care provided and protect them. A major consequence of lack of knowledge of antibiotics use or misusing them is bacterial resistance that is associated with subsequent financial and personal cost. Collected efforts need to be taken to prevent this from happening. A significant way to do this is by establishing antibiotics awareness programs that are made accessible to patients and their families, and delivered systematically using variety of teaching strategies, particularly using social medial technology. Based on the results of the current study, further exploration of the issue of antibiotics use is necessary. Factors contributing to antibiotics awareness may be explored using qualitative research that better capture participants' perspectives. Also, different educational interventions targeted toward raising awareness of antibiotics use need to be tested to ensure the best feasible one.

ACKNOWLEDGEMENTS

The researchers would like to acknowledge the Directorate General of Medical Services, Diwan of Royal Court, Oman for the in-kind support this study has received.

CONFLICTS OF INTEREST DISCLOSURE

The authors declare no conflicts of interest.

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