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# Public Knowledge, Attitude, Practice, Antibiotics, Riyadh,KSA

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**Abstract**:

**Background:** Antibiotics are important drugs used against bacterial infections. Unfortunately, overusing them resulted in the development of resistant bacteria. There are limited data concerning antibiotic use so we worked on this study to provide more updated data.

**Objective**: The aim of this study was to assess public knowledge, attitude and practice regarding antibiotics use and related factors in Riyadh – KSA.

**Method**: It was a cross-sectional online and manual survey involving 474 respondents and was conducted in Riyadh, KSA in February 2016. The collected data were analyzed using SPSS version 20.

**Results**: Most of the respondents (86.5%) had used antibiotics for others (friends and family). Only 7% of respondents had good knowledge and about 50% of them had negative attitudes. Respondents' educational level was a predictor of negative attitude as those with a low level of education (below secondary) 66.7% were more likely to show negative attitude compared to those with high educational level (university and above; 40%). Poor level of knowledge was a predictor of negative attitude; as 65% of respondents with poor knowledge showed negative attitude compared to only 24.2%;those with a good level of knowledge.

**Conclusion:** This study concluded that females and married participants showed better practice toward antibiotics use. Higher education level was strongly associated with better knowledge, attitude and practice and was not associated with the increased risk of self-medication. Respondents with high income and those with better knowledge exhibited better practice.

**Keywords:** Public Knowledge, Attitude, Practice, Antibiotics, Riyadh, KSA.

## Introduction:

Antibiotics are important drugs for the treatment of bacterial infections in both humans and animals. They are effective drugs if used appropriately. It is important to use them in the right way, in the right dose and at the right time for the right duration, unfortunately, they are losing their effectiveness at an increasing rate, mainly due to the resistance that is developing against them which is driven by inappropriate and excessive use. Resistance occurs when an antibiotic loses its ability to effectively kill bacteria or control its growth; in other words, the bacteria continue to multiply in the presence of therapeutic levels of the drug.

Therefore, many public health organizations and experts working in the field of infectious diseases have increased their efforts to control and limit the misuse and over-prescription of antibiotics when it is not required aiming to avoid the development of new resistance and to prevent the resistance that already exists from spreading **(1)**.

Several studies demonstrated that antibiotics were often used inappropriately and between 14-43% of all courses of antibiotics were deemed unnecessary because there was no evidence of infection **(2)**. Furthermore, many other people take wrong doses of antibiotics which has contributed largely to the elimination of beneficial intestinal normal flora and most importantly to the emergence of new resistant strains that can cause longer and more serious infections, prolonged recovery and more-expensive treatments **(3,4)**.

Food and Drug Administration (FDA) data reported that the overuse of antibiotics is the biggest cause of antibiotic-resistant organisms(5) .Each year in the United States, at least 2 million people become infected with these organisms and at least 23,000 people die annually as a direct result of these infections. As an example, the death rate for patients with serious infections caused by common bacteria treated in hospitals can be about twice that of patients with infections caused by the same non-resistant bacteria (6) .

A cross-sectional survey was processed on a sample of 1,005 adults on 23 February



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2015 in Lithuania. The aim of the study was to assess public knowledge, beliefs, and behavior concerning antibiotic use and self-medication. The results of the study showed that more than half of the respondents (61.1%) had poor knowledge about antibiotics. (26%) of the respondents incorrectly identified antibiotics to be effective in the treatment of viral infections. The respondents with lower educational levels and those from rural areas were less knowledgeable about antibiotics [(7)].

A cross-sectional face-to-face survey of 1,177 residents aged 18 or over was conducted in 2011 in Korea. The aim of the study was to assess knowledge, attitudes and behavior regarding antibiotics use and misuse in the community. Most of the respondents (70%) didn't know that antibiotics are ineffective in treating coughs and colds. 48.2% of them believed that antibiotics help them to recover from cold more quickly. Two-thirds were unaware of the conditions under which antibiotic resistance occurs, despite understanding the concept of resistance. It also found that many of them had poor attitudes and behaviors toward antibiotic use, (46.9%) of them reused the unconsumed antibiotics from previously filled prescriptions without consulting a doctor and 77.6% of them stopped taking the medication when they felt better. However, Lower education level, older age, inadequate knowledge and no exposure to the education campaign was independently associated with poor attitude [(8)].

A cross-sectional survey was done by, University of Geneva, Switzerland, 2001. The survey was extended to 9 countries; (United Kingdom, France, Belgium, Italy, Spain, Turkey, Thailand, Morocco and Colombia). The aim of this study was to evaluate patient contribution in antibiotic use; requirements, adherence to treatment as prescribed and perception of respiratory tract infection. Findings revealed that majority of interviewees considered the last respiratory infection as a potentially severe condition, 62% of them worried if it could turn into something worse than a simple infection, 34% of the mothers thought that they are better than their doctors and 20% used home remedies [(9)].

A cross-sectional epidemiologic survey study was done in Italy, in December 2011. It was designed to sample randomly 630 parents of students between the ages of 5–18 years old. They found that only 9.8% knew the definition of antibiotic resistance and 21.2% knew when it was appropriate to use antibiotics. (32.7%) use antibiotics without prescriptions [(2)].

A cross-sectional survey involving 408 respondents was conducted from February to March 2009 using a validated questionnaire in Malaysia, among the general. They found that nearly 55% of the respondents had a moderate level of knowledge. (76.7%) of the respondents could correctly identify that antibiotics are indicated for the treatment of bacterial infections and aware of antibiotic resistance. However,%67.2 incorrectly thought that antibiotics are also used to treat viral infections. Poor level of knowledge was found in less than one-third of the respondents [(10)].

A cross-sectional survey was conducted on a sample of 770 randomly selected individuals in 2015 in Kuwait. The aim of the study was to determine knowledge, attitude and practice towards antibiotic use. The results of the study showed that almost 47% of participants had low knowledge regarding action, use, safety and resistance of antibiotics and 41% of respondents had attitudes towards using and accessing antibiotic inappropriately. Better knowledge was found to be a predictor for positive attitude [(1)].

A study was done in Cairo during 2011/2012 among 1006 participants through an interview questionnaire. It aimed to determine the extent to which patients use antibiotics without consulting a physician and patient characteristics associated with such antibiotic misuse. The study showed that 29.8% of the whole sample was found to be using un-prescribed antibiotics. It also revealed that 53% of youth and 34.2% of adults believe that common diseases are not worth consulting a physician. 57.7% admitted that the main reason for not consulting a physician in children is financial issues. Socioeconomic status was found to play important roles in antibiotics abuse [(11)].

A study was carried out using a cross-sectional design among 1500 Jordanian adults in 2009. The aim of this study was to assess knowledge, behavior and attitude toward antibiotics use among adults. The results showed that 30.0% of respondents have been obtaining antibiotics directly from pharmacies without a physician's prescription [(12)].

A cross-sectional study conducted in 2014 about public attitude and justification to antibiotics in the Eastern region Al-Ahsa of

Saudi Arabia, sample of 377 adults among the general population. They found that about (72.8%) of the participants believed that antibiotics used to treat illnesses [4.5] .While 19.4% of the participants admitted to taking self-prescribed antibiotics for both prevention and treatment of illnesses.

The study shows that 43.6% of the respondents were unaware of the serious consequences of the irrational use of antibiotics. They concluded that there is a high prevalence of administration of self-prescribed antibiotics in the community under study [13].

**Objectives:**

1. To assess public knowledge, attitude and practice regarding antibiotics use in Riyadh – KSA.
2. To identify the factors associated with the use of antibiotics.

**Materials and methods:**

The study was conducted between 2016 and 2017 in Riyadh (the largest and the capital city of Saudi Arabia, which is located in the center of the Arabian Peninsula and has an estimated population of 6.8 million people [14]. using a cross-sectional study design. The target population of the study was adults from different socioeconomic and educational levels. The sample size was calculated using this equation:

(Z alpha) ^2 * p * (100-p)/ d^2

Z= 1.96 (from the standard normal variant table)

P: expected proportion in the population.

(A literature review research reveals that other investigators have reported knowledge of 33.2% among adults (above than 18 years old) so we considered p =33.2 %)

d: relative precision

(Calculated as the proportion from p values, since the permissible limit is 20% so

d= 20% * p = 20% * 33.2 = 6.64)

The sample size = ((1.96) ^2 * 33.2 * 66.8)/ (6.64) ^2

= **201 respondents**

Data of the study was collected from 474 respondents to enhance data credibility. Random sampling was used for the selection of the study population. Inclusion criteria included (1) adults in the age group of 18 and above (2) respondents who were Riyadh residents. Exclusion criteria included (1) respondents aged less than eighteen (2) visitors from other regions or people living outside Riyadh (3) health care providers.

A pretested specially designed self-administered questionnaire was developed and distributed online and manually. In the administered self-completion questionnaire, the questions were clear, close-ended, easy to follow and not too long.

This questionnaire was composed of 5 parts; parts 1 and 2 were designed to obtain the demographic characteristics of the respondents and the frequency of antibiotic use respectively. Part 3 was designed to evaluate the consumers' practices and consisted of 12 questions. Part 4 was composed of 7 questions and designed to assess the respondents' knowledge about antibiotics. Part 5 consisted of 5 questions and it evaluated the consumers' attitudes towards antibiotics. In parts 2, 3 and 4, when evaluating the consumers' practices, knowledge and attitude, 1 mark was given for each correct answer and 0 marks for each wrong or unsure answer with maximum obtained score of 12, 7, and 5 for each part respectively. The total scores were categorized as follows:

**Part 3:**

| Consumer practices | Total score |
|---|---|
| Poor | 0-3 |
| Moderate | 4-8 |
| Good | 9-12 |

**Part 4:**

| Consumer knowledge | Total score |
|---|---|
| Poor | 0-2 |
| Moderate | 3-5 |
| Good | 6-7 |

**Part 5:**

| Consumer attitudes | Total score |
|---|---|
| Negative | 0-2 |
| Positive | 3-5 |

A descriptive and comparative statistical data analysis was processed with the Statistical Package for Social Sciences (SPSS), Chi-square test was used as a test of significance and when the p-value was less than 0.05 it was considered significant.

**Ethical considerations:**

The proposal was approved by the ethical committee in AlMaarefa College. Participants' responses were confidential and no identification data such as names or e-mails

were collected. Also, an electronic informed consent was obtained before each participant started the survey, in which he/she had the choice to either agree or disagree to participate in the research.

**Results**

**Table 1: 19.5%** of male respondents showed poor practice compared to **6.3%** of female, while only **18%** of males showed good practice compared to **52.8%** of females. There was a statistically significant association between gender and practice (**P**=0.000), with female behaving better than males.

**Table 2**: About 77% used antibiotics 3 times or more for themselves the variation in frequency of use of antibiotics for one's self did not attain statistical significance.

**Table 3: 30.8%** of respondents aged between18-33 had used antibiotics for others more than 6 times compared to **40.7%** in those aged between 34-49 and **28.9%** in older respondents. **41.6%** of respondents aged between18-33 had used antibiotics for others less than 3 times compared to **22%** in those who aged between 34-49 and **21.1%** in older respondents. There was a statistically significant association between the age of respondents and frequency of providing antibiotics ~~for~~ to others (**P**=0.004). Provision of antibiotics to others increased with age.

**Table 4:** Most of the respondents (**53.5%)** aged between 18-33 showed poor levels of knowledge compared to **34.7%** in those aged between 34-49 and **26.3%** in older respondents. There was a statistically significant association between the age of the respondents and levels of knowledge (**P**= 0.000). Older age groups showed better knowledge.

**Table 5: 57.1%** of married respondents showed positive attitude regarding antibiotic use. While **42.7%** of respondents other than married showed a positive attitude. There is a significant association between marital status and attitude (**P**=0.004).

**Table 6: 40.7%** of respondents with no children showed positive attitude compared to respondents **61%** who had 1-5 children and **56.6%** of respondents with more than 6 children. There was a statistically significant association between the number of children and attitude (**P**=0.000). The positive attitude was noted among those who had children.

**Table 7:** Only 7% of the study population had good knowledge about antibiotics. Most of them came from those with a university or above educational level. **9.6%** of respondents with a university or above educational levels showed good levels of knowledge compared to **2.8%** of those with secondary school educational levels and none of those below the secondary school. There was a statistically significant association between the educational level and knowledge (**P**=0.001). Respondents with a university or above educational levels showed better knowledge.

**Table8: 59.4%** of respondents with an educational level of university or above showed positive attitude compared to **42.4%** of respondents with secondary school educational levels and **33.3%** of those below the secondary school. There was a statistically significant association between the educational level and attitude (**P**=0.000). Respondents with a university or above educational levels showed better attitude.

**Table 9: 34.9%** of respondents with university or above educational levels had used antibiotic more than 6 times for themselves compared to **44.4%** of those with secondary school educational levels and **51.9%** of those below secondary school while **24.8%** of respondents with educational level of university and above had used antibiotics less than 3 times for themselves compared to **20.1%** of those with secondary school educational levels and **14.8%** of those below secondary school. This variation did not reach statistical significance **(P**= 0.151).

**Table 10: 23.5%** of respondents with a monthly income equal to or less than 3000 riyals showed poor practice compared to **6.5%** of those with a monthly income between 10000 and 20000 Riyals and **9.5%** of those with a monthly income more than 30000 Riyals. On the other hand, **22.2 %** of the respondents with a monthly income equal to or less than 3000 Riyals or showed good practice compared to **47.7%** of those with a monthly income between10000 and 20000 Riyals and **52.4%** of those with a monthly income more than 30000 Riyals. There was a statistically significant association between monthly income and practice (**P**=0.002). Respondents with higher income showed better practice.

**Table 11: 32.6%** of respondents who showed poor levels of knowledge had used antibiotics more than 6 times for others compared to only **24.2%** of those who had shown good levels of knowledge. There was no association between

knowledge and frequency of use of antibiotics for others (**P**= 0.347).

**Table 12:** About **72.7%, 48.2%** and **21.4%** of those with good, moderate and poor levels of knowledge respectively showed good practice. There was a statistically significant association between knowledge and practice (**P**= 0.000). Those with better knowledge exhibited better practice.

**Table 13:** Positive attitude was shown by about **75.8%** of those with good knowledge, **65.5%** of those with moderate knowledge and **35.8%** of those with poor knowledge.

There was a statistically significant association between knowledge and attitude (**P**=0.000). The better attitude was noted among those with better knowledge.

**Table 1: Gender * Practice:**

| Gender: | | Practice | | Total |
|---|---|---|---|---|
| | Poor | Moderate | Good | |
| Male | **40 (19.5%)** | 128 | **37 (18%)** | 205 |
| Female | **17(6.3%)** | 110 | **142 (52.8%)** | 269 |
| Total | 57 | 238 | 179 | 474 |

**19.5%** of male respondents showed poor practice compared to **6.3%** of female, while only **18%** of males showed good practice compared to **52.8%** of females.

**Table 2: Age * Using antibiotic for** one's **self:**

| Age | Using antibiotic for one's self | | | Total |
|---|---|---|---|---|
| | < 3 | 3-6 | >6 | |
| 18-33 | 64 (22.4%) | 117 | 105 (36.7%) | 286 |
| 34-49 | 36 (24%) | 56 | 58 (38.7%) | 150 |
| 50 or older | 8 (21%) | 9 | 21 (55.3%) | 38 |
| Total | 108 **(22.8)** | 182 **(38.4)** | 184 **(38.8)** | 474 |

About 77% used antibiotics 3 times or more for themselves the variation in frequency of use of antibiotics for one's self did not attain statistical significance.

**Table 3: Age *Providing antibiotic to others (friends or family):**

| Age | Using antibiotic for others (friends or family) | | | Total |
|---|---|---|---|---|
| | < 3 | 3-6 | >6 | |
| 18-33 | **119 (41.6%)** | 79 | **88 (30.8%)** | 286 |
| 34-49 | **33 (22%)** | 56 | **61 (40.7%)** | 150 |
| 50 or older | **8 (21.1%)** | 19 | **11 (28.9%)** | 38 |
| Total | 160 | 154 | 160 | 474 |

**30.8%** of respondents aged between18-33 had used antibiotics for others more than 6 times compared to **40.7%** in those aged between 34-49 and **28.9%** in older respondents. **41.6%** of respondents aged between18-33 had used antibiotics for others less than 3 times compared to **22%** in those who aged between 34-49 and **21.1%** in older respondents.

**Table 4: Age * Knowledge:**

| Age: | Knowledge | | | Total |
|---|---|---|---|---|
| | Poor | Moderate | Good | |
| 18-33 | **153 (53.5%)** | 115 | 18 | 286 |
| 34-49 | **52 (34.7%)** | 84 | 14 | 150 |
| 50 or older | **10 (26.3%)** | 27 | 1 | 38 |
| Total | 215 | 226 | 33 (7%) | 474 |

Most of the respondents (**53.5%)** aged between 18-33 showed poor levels of knowledge compared to **34.7%** in those aged between 34-49 and **26.3%** in older respondents

**Table 5: Marital status: * Attitude:**

| Marital status: | Attitude | | Total |
|---|---|---|---|
| | Negative | Positive | |
| Married | 141 | 188**(57.1%)** | 329 |
| Others | 81 | 62 **(42.7%)** | 145 |
| Total | 224 | 250 | 474 |

**57.1%** of married respondents showed positive attitude regarding antibiotic use. While **42.7%** of respondents other than married showed a positive attitude.

**Table 6: Number of Children*Attitude:**

| Number of Children: | Attitude | | Total |
|---|---|---|---|
| | Negative | Positive | |
| No children | 108 | **74 (40%)** | 182 |
| 1-5 | 93 | **146 (61%)** | 239 |
| 6 children or more | 23 | **30 (56.6%)** | 53 |
| Total | 224 | 250 | 474 |

**40.7%** of respondents with no children showed positive attitude compared to respondents **61%** who had 1-5 children and **56.6%** of respondents with more than 6 children.

**Table7: Education level * Knowledge:**

| Education level | Knowledge | | | Total |
|---|---|---|---|---|
| | Poor | Moderate | Good | |
| Below secondary | 16 | 11 | **0 (0%)** | 27 |
| Secondary | 82 | 58 | **4 (2.8%)** | 144 |
| University and above | 117 | 157 | **29 (9.6%)** | 303 |
| Total | 215 | 226 | 33 (7%) | 474 |

Only 7% of the study population had good knowledge about antibiotics. Most of them came from those with a university or above educational level. **9.6%** of respondents with a university or above educational levels showed good levels of knowledge compared to **2.8%** of those with secondary school educational levels and none of those below the secondary school.

**Table 8: Education level * Attitude:**

| Education level: | Attitude | Total |
|---|---|---|

| | Negative | Positive | |
|---|---|---|---|
| Below secondary | 18 | **9 (33.3%)** | 27 |
| Secondary | 83 | **61 (42.4%)** | 144 |
| University and above | 123 | **180 (59.4%)** | 303 |
| Total | 224 | 250 | 474 |

**59.4%** of respondents with an educational level of university or above showed positive attitude compared to **42.4%** of respondents with secondary school educational levels and **33.3%** of those below the secondary school.

**Table 9: Education level: * Using antibiotic for one's self:**

| Education level: | Using antibiotic for one's self | | | Total |
|---|---|---|---|---|
| | < 3 | 3-6 | > 6 | |
| Below secondary | **4 (14.8%)** | 9 | **14 (51.9%)** | 27 |
| Secondary | **29 (20.1%)** | 51 | **64 (44.4%)** | 144 |
| University and above | **75 (24.8%)** | 122 | **106 (34.9%)** | 303 |
| Total | 108 | 182 | 184 | 474 |

**34.9%** of respondents with university or above educational levels had used antibiotic more than 6 times for themselves compared to **44.4%** of those with secondary school educational levels and **51.9%** of those below secondary school while **24.8%** of respondents with educational level of university and above had used antibiotics less than 3 times for themselves compared to **20.1%** of those with secondary school educational levels and **14.8%** of those below secondary school.

**Table10: Monthly Income * Practice:**

| Monthly Income: | Practice | | | Total |
|---|---|---|---|---|
| | Poor | Moderate | Good | |
| <= 3000 | **19 (23.5%)** | 44 | **18(22.2%)** | 81 |
| 3000 to 10000 | 27 | 124 | 85 | 236 |
| 10000 to 20000 | **7(6.5%)** | 49 | **51(47.7%)** | 107 |
| 20000 to 30000 | 2 | 13 | 14 | 29 |
| >30000 | **2(9.5%)** | 8 | **11(52.4%)** | 21 |
| Total | 57 | 238 | 179 | 474 |

**23.5%** of respondents with a monthly income equal to or less than 3000 riyals showed poor practice compared to **6.5%** of those with a monthly income between 10000 and 20000 Riyals and **9.5%** of those with a monthly income more than 30000 Riyals. On the other hand, **22.2 %** of the respondents with a monthly income equal to or less than 3000 Riyals or showed good practice compared to **47.7%** of those with a monthly income between10000 and 20000 Riyals and **52.4%** of those with a monthly income more than 30000 Riyals.

**Table11: Knowledge*Using antibiotic for others (friends or family):**

| knowledge | Using antibiotic for others (friends or family) | | | Total |
|---|---|---|---|---|
| | < 3 | 3-6 | > 6 | |
| Poor | 76 | 69 | **70 (32.6%)** | 215 |
| Moderate | 69 | 75 | 82 | 226 |

| | | | | |
|---|---|---|---|---|
| Good | 15 | 10 | **8 (24.2%)** | 33 |
| Total | 160 | 154 | 160 | 474 |

**32.6%** of respondents who showed poor levels of knowledge had used antibiotics more than 6 times for others compared to only **24.2%** of those who had shown good levels of knowledge.

**Table12: Knowledge * Practice:**

| knowledge | Practice | | | Total |
|---|---|---|---|---|
| | Poor | Moderate | Good | |
| Poor | 39 | 130 | **46 (21.4%)** | 215 |
| Moderate | 17 | 100 | **109 (48.2%)** | 226 |
| Good | 1 | 8 | **24 (72.7%)** | 33 |
| Total | 57 | 238 | 179 | 474 |

About **72.7%, 48.2%** and **21.4%** of those with good, moderate and poor levels of knowledge respectively showed good practice.

**Table13: Knowledge * Attitude:**

| knowledge | Attitude | | Total |
|---|---|---|---|
| | Negative | Positive | |
| Poor | 138 | **77 (35.8%)** | 215 |
| Moderate | 78 | **148 (65.5%)** | 226 |
| Good | 8 | **25 (75.8%)** | 33 |
| Total | 224 | 250 | 474 |

**Discussion**

This study was conducted in Riyadh, to determine knowledge, attitudes and practice towards antibiotic use among the public. The first step was providing baseline quantitative data about the frequency of use, knowledge and attitudes regarding antibiotic use among people who live in Riyadh.

In this study, females showed better practice than males. These results are similar to a survey conducted in Hong Kong, in which (87.6%) of female showed good practices compared to 81.3% of males [(15)]. This good practice in females apparently may be because of their interest in asking doctors, reading and sharing information between them about diseases and the need to use antibiotics to treat them.

The results of this study showed that there was no association between the frequency of use of antibiotics for one's self and age of the respondent. On the other hand, another study was conducted in Jordan [(12)]. and found that there was a significant association between self-medication and age p= (0.001). This difference may be due to the difference in age groups used in both studies.

This study indicated that there was a strong association between the age of respondents and levels of knowledge, this result is similar to a study conducted in Jordan [(12)], which found a significant association between them p= (0.042). This similarity may be due to the increase in levels of knowledge with the increase in age.

Regarding attitudes and marital status, this study showed that there was a significant association between attitude toward antibiotic use and marital status. This finding was similar to a study conducted in Bangkok, Thailand (p=0.008)[(16)]. This similarity may be due to individual variations in socioeconomic status and the level of education.

This study found that the level of education was positively associated with better knowledge about antibiotics, that was similar to a study conducted in Lithuania 2015 which found that respondents with higher education levels were more aware of antibiotics and their rational use than respondents with lower educational levels ($P = 0.001$)[10]. Higher education level was not associated with the increased risk of self-medication which is similar to the study in Lithuania ($P= 0.142$)[7]. These similarities maybe because the educational index in Lithuania is nearly similar to the educational index in Saudi Arabia [17].

In terms of attitude toward antibiotic use, the study findings showed that respondents with high education level were found to express more positive attitude than those with low education level, which is similar to the results of a previous study from South Korea (42% of respondents with educational level of university or above showed positive attitude compared to 23% of those below secondary school) [8]. This similarity may be because respondents with low levels of education do not have enough information about side effects, contraindications and indications regarding the usage of antibiotics.

In the present study, low monthly income (less than 3000 riyals) was identified as a positive predictor of poor practice regarding antibiotic use, which was similar to a study conducted in the USA that found that 16.5% of all respondents who used antibiotics frequently and showed poor practice were identified as low-income groups [18]. This similarity may be due to the frequent use of antibiotics by low-income population to avoid visiting doctors which might be quite expensive.

This study showed that the highly knowledgeable respondents showed better practices regarding the use of antibiotics compared to another study conducted in Jordan 2009 which showed that being more knowledgeable was statistically associated with practices regarding the use of antibiotics. (30.5% of those with high levels of knowledge showing poor practices in Jordan research)[12]. This big difference may be because that the respondents in this research give a clearer picture about their practice regarding the use of antibiotics than those in Jordan research because the collection of the data in this research was electronic which gives the respondent more privacy and freedom in answering the survey.

In this study, good knowledge about antibiotics was shown to be a predictor for a positive attitude toward antibiotic use which is similar to the results of the previous study from South Korea (42.6% of people with adequate knowledge showed positive attitude compared to 29.1% of those with inadequate knowledge)[8]. The possible explanation for this similarity may be because good knowledge is associated with better understanding which has a positive impact on personal decisions regarding antibiotic use.

**Conclusion:**

This study concluded that females and married participants showed better practice toward antibiotics use. Higher education level was strongly associated with better knowledge, attitude and practice but was not associated with the increased risk of self-medication. Respondents with high income and those with better knowledge exhibited better practice.

**Recommendations:**

1-Raise public awareness about the risks of antibiotics misuses through social media, organizing informative lectures, distributing brochures and social events.
2-The Ministry of Health should take measures to prohibit dispensing antibiotics without prescriptions. 3-The health care providers should educate the patients about the importance of compliance with the treatment as prescribed.

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