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Knowledge, Attitude, and Practice of Antibiotic Use and Its Resistance among Undergraduate Students at the University of Science and Technology, Sana'a, Yemen

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Abstract: As a global public health problem, antibiotic resistance is a marker of misuse and overuse of antibiotics worldwide. The widespread use of such medications has been the primary reason for the evolution of antibiotic-resistant pathogens. This study, therefore, aims to assess the knowledge, attitude, and practice (KAP) among medical (MS) and non-medical students (NMS) towards antibiotic use in Sana'a city, Yemen. A descriptive cross-sectional study was conducted amongst 405 undergraduate students, 237 MS and 168 NMS, from February to July 2019 from the University of Science and Technology in Sana'a city, Yemen. Participants (N =405) completed a self-administered questionnaire. Descriptive statistical analysis was performed by MS and NMS to determine their knowledge, attitude, and practice on antibiotics use and resistance. Polytomous logistic regression technique was used to analyze the relationship between selected predictors and good knowledge, practice about the antibiotics. The Alpha level used was 0.05. The majority of students (n = 262, 64.7%) had a good knowledge of antibiotic resistance, while 66.4% (n = 269) of respondents have used antibiotics without prescriptions. A better attitude was noticed among MS compared to NMS. The findings demonstrated that overall, MS scored remarkably better knowledge and practice than NMS towards antibiotic use, respectively {odds ratio (OR) = 18.33 ($p < 0.001$), 95% confidence level (CL) 2.57 ($p < 0.001$*) 95% (CL)}. The self-medication rate was quite high, and more than 60% of students were found to consume antibiotics without the physician's prescription. Multivariate regression analysis did not show any significant association between self-medication and gender, the level of practice about antibiotics uses. Students of medical colleges have better KAP demonstrating the importance of curriculum and training in knowledge promotion. The inadequate knowledge about the risk and development of antibiotic resistance reflects the need to grow the students' awareness through adequate educational programs regarding proper antibiotic usage.

Keywords: antibiotic use, knowledge, attitude, practice, medical students, non-medical students.

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也门萨那科技大学本科生抗生素使用及其耐药性的知识、态度和实践

摘要：作为一个全球性的公共卫生问题，抗生素耐药性是世界范围内滥用和过度使用抗生素的标志。此类药物的广泛使用是抗生素耐药病原体进化的主要原因。因此，本研究旨在评估也门萨那市医学(多发性硬化症)和非医学学生(网络管理系统)对抗生素使用的知识、态度和实践(KAP)。2019年2月至7月，对也门萨那市科技大学的405名本科生、237名硕士和168名网络管理系统进行了描述性横断面研究。参与者(N=405)完成了自我管理的问卷。多发性硬化症和网络管理系统进行了描述性统计分析，以确定他们对抗生素使用和耐药性的知识、态度和实践。多分逻辑回归技术被用来分析选择的预测因子与抗生素的良好知识、实践之间的关系。使用的Alpha水平是0.05。大多数学生(n=262，64.7%)对抗生素耐药性有很好的了解，而66.4%(n=269)的受访者在没有处方的情况下使用过抗生素。与网络管理系统相比，多发性硬化症的态度更好。研究结果表明，总体而言，多发性硬化症在抗生素使用方面的知识和实践得分明显优于网络管理系统，分别{优势比（或者）= 18.33(磷<0.001)，95%置信水平(CL)2.57(磷<0.001*)95%(CL)}。自我药疗率相当高，超过60%的学生被发现在没有医生处方的情况下服用抗生素。多元回归分析未显示自我用药与性别、抗生素使用实践水平之间有任何显着关联。医学院校的学生有更好的KAP证明课程和培训在知识推广中的重要性。对抗生素耐药性风险和发展的认识不足反映了需要通过适当的抗生素使用教育计划来提高学生的认识。

关键词：抗生素的使用, 知识, 态度, 实践, 医学生, 非医学生。

1. Introduction

Antibiotics are among the most commonly prescribed medicines in modern medicine. They have been essential life-saving sources and are widely used to protect against bacterial diseases, so they are also called magic weapons against serious infectious diseases. However, the tendency of bacteria to rapidly develop resistance is a major drawback, which often leads to treatment failure [1, 2]. Antibiotics by themselves are not the problem as they are still one of the most effective drugs against bacterial diseases. However, the problem is the overuse or misuse of antibiotics, which can easily lead to the development of resistant bacterial strains and an economic burden on the national health system [3].

The misuse of antibiotics induces the emergence of bacterial resistance traits among populations, representing a current and ongoing threat to individuals, the community, and animals [1, 2]. It is estimated that almost two-thirds of all oral antibiotics used worldwide are obtained without prescriptions and are misused for diseases such as tuberculosis, malaria, and pneumonia, as well as mild childhood infections[4]. Because of the previous successful use of antimicrobial agents, individuals in most societies tend to believe that they can manage subsequent illnesses without consulting a physician. This is a potential risk factor for antibiotic misuse since most patients lack knowledge about the disease and the appropriate drugs used in self-medication [5, 6]. An antibiotic-resistant bacterium is an essential medical concern worldwide. Thus, evaluating the use of antibiotics may help understand the causes of the emergence and prevalence of such issues and ultimately limit such a predictable disaster [7].

Besides the overuse and misuse of antibiotics, the other potential causes that contribute to rising antibiotic resistance include unorganized drug accessibility, insufficient antibiotics quality assurance, lack of access to healthcare, extensive dispensing of antibiotics by pharmacists without a prescription, inadequate regulatory monitoring, and prevalence of self-medication [8-10].

Other aspects can contribute to the spread of antibiotic misuse and bacterial resistance accordingly, such as insufficient physician education for patients and patients' knowledge, attitudes, and behaviors towards antibiotic use because most individuals in third world countries believe that antibiotics can be used for the common cold and diarrhea diseases. Prevailing and

using it on self-medicating grounds. Additionally, most people do not follow the entire course of antibiotics once they feel better [11, 12]. Increased bacterial resistance of antibiotics will affect its clinical efficacy, increase treatment failure, and lead to more prolonged and more severe disease episodes with higher cost and mortality rates [13].

Enhancing patients' knowledge and attitudes towards antibiotic use can significantly impact antibiotic overuse and misuse. Therefore, controlling this issue requires feasible means of intervention [14]. Students can play a critical role in reducing the antibiotics' overuse and misuse; In this context, an increasing number of research reports in the literature have focused their attention on investigating the knowledge, attitude, and practice (KAP) of medical students (MS) and non-medical students (NMS) towards antibiotics use [14]. Additionally, Interventions to promote awareness of KAP toward antibiotic use should focus more on students in NMS major [15].

In Yemen, increased self-medication with antibiotics was previously reported and was most likely related to respiratory infections. However, evidence of self-medication with antibiotics among students is insufficient. The problem of antibiotic resistance at the government hospitals in Sana'a city has been exacerbated, which should be considered a serious problem [10]. Therefore, the present study examines the KAP among MS and NMS towards antibiotic use at the University Science and Technology in Sana'a city and identifies the association between their socio-demographic information towards their knowledge, attitude, and practice.

2. Materials and Methods

2.1. Study Design

The present study was performed using a descriptive, cross-sectional study conducted among undergraduate medical and non-medical students from the first to the fifth year at the University of Science and Technology (UST), Sana'a, for six months, from February to July 2019.

2.2. Population and Sample

Based on a student population of less than 10,000 in the university, a minimum sample size of 373 participants was calculated using Open Epi, Version 3 (www.openepi.com/) at a confidence level of 95.0% and precision 5.0%. To increase the study power, 32 participants were added. A total of 405 students were recruited in this study; 237 were MS, and 168 were NMS.

2.3. Data Collection Instruments

A close-ended questionnaire was used as the main tool for collecting the data from the sample because it is one of the usual and useful methods for such studies to identify the students' knowledge and practice of antibiotics at UST. The researchers developed a checklist that includes the criteria of students' knowledge and practice of antibiotics. A structured self-administered questionnaire was designed after referring to similar previous studies [16, 17] to involve all the main key points of the research and be suitable for the Yemeni population. Five academics and experts reviewed the structure and content validity of questionnaires at the UST. The reviewers were asked to evaluate the relevance, clarity, conciseness of the items, and ease of understanding the questions. Their comments and feedbacks were considered in the final draft of the questionnaire. For reliability, a total of 30 questionnaires were piloted to 30 university students to ensure that all the data needed to meet the research objectives could be collected with the questionnaire. Changes were made by deleting some items based on the correlation test between the items and variables of the questionnaire. In general, Cronbach's Alpha of the data collection instrument was 80.4%, while the Alpha½ of the sample responses was 89.7%.

2.4. Study Variables

The questionnaire included dimensions on the KAP (knowledge, attitude, and practices) towards antibiotic use. The data was collected in an excel sheet and analyzed with descriptive statistics and results expressed as means and standard deviations, frequencies, and percentages. The final questionnaire consisted of two parts of questions; the first part included questions related to the participants' socio-demographic characteristics, including gender, social status, faculty, level of study, and five questions related to sources of respondents' information. The second part included 20 questions consisting of three variables; knowledge (7 questions), attitude (3 questions), and practice (10 questions). Participants scored 0 on each question with the wrong answer and 1 for each question with the right answer. Total scores were calculated for the two dimensions of knowledge and practices, considering the summarized score for each question in each dimension. Scores ranged from 0 to 7 in the knowledge dimension and 0 to 10 in the practice dimension.

2.5. Ethical Considerations

The study protocol was endorsed by the Ethics Research Committee at the University of Science and Technology. All the participants had given their verbal consent, meaning they agreed to participate in the study after the objectives. The importance and the benefits of this research were explained, and they were informed that the participation was voluntary. Furthermore, the investigators guaranteed that the collected data would be treated with utmost confidentiality, and they will only be used for research works.

2.6. Statistical Analysis Methods

The data collected from the questionnaire were coded and analyzed using the IBM SPSS Statistics, version 21.0 (IBM Corp., Armonk, NY, USA). Cronbach's Alpha test was used to check the reliability of the study instrument and the consistency of the sample's responses, and the Chi-square test of independence was used to compare the frequency of participants who answered correctly between medical and non-medical students. The value of the statistical significance was considered at $p<0.05$. Finally, the Polytomous (multinomial) logistic regression model was used to detect the independent effects of explanatory variables, defined by univariate analysis, on the level of knowledge and practice about antimicrobial use and resistance. Explanatory variables included gender, student category, and the level of knowledge and practice about antibiotics. 95% confidence intervals (CI) were used as OR estimates. A two-tailed p-value was calculated to check statistical significance.

3. Results

3.1. Study Participants

A total of 405 participants were randomly selected, respondents were categorized into two groups based on their respective majors: 58.5% (n = 237) were majoring in one of the following health-related majors (medicine and health sciences, pharmacy, dentistry); while the remaining students 41.4% (n = 168) were studying a non-health-related major (administration sciences, information technology (IT), engineering, and humanities and social sciences).

3.2. Socio-Demographic Characteristics of the Participants

Of 405 respondents, the majority were males (n = 264, 65.2%), singles (82.0%), first education level (30.4%), and had a health-related major; medicine and health sciences (30.9%), pharmacy (19.0%), and dentistry (8.6). It was found that 36.6% had taken antibiotics within a month or less before conducting this study. Although most (64.7%) knew about antibiotics resistance, 66.4% of respondents have used antibiotics without prescriptions, as 58.3% sourced such information from their family members who work in the health sector (Table 1).

Table 1 Socio-demographic characteristics of the participants (n = 405)

Socio-demographic characteristics	Frequency	Percentage
Gender		
Male	264	(65.2%)
Female	141	(34.8%)
Marital status		
Single	332	(82.0%)
Married	69	(17.0%)
Divorced	4	(1.0%)
Education		
Health-related major	237	(58.5%)
Non-health related major	168	(41.4%)
Faculty		
Medicine	125	(30.9%)
Pharmacy	77	(19.0%)
Dentistry	35	(8.6%)
Engineering	56	(13.8%)
IT	24	(5.9%)
Administration science	54	(13.3%)
Humanities and Social Sciences	34	(8.4%)
Education level		
First	123	(30.4%)
Second	79	(19.5%)
Third	95	(23.5%)
Fourth	68	(16.8%)
Fifth	40	(9.9%)
Is a member of your family working in the health sector?		
Yes	236	(58.3%)
No	169	(41.7%)
When did you use antibiotics last time?		
less than one month	72	(17.8%)
one month	76	(18.8%)
two months	56	(13.8%)
six months	67	(16.5%)
before one year	134	(33.1%)
What places do you most buy antibiotics from?		
Hospital	111	(27.4%)
Pharmacy	269	(66.4%)
Clinic	25	(6.2%)
Have you ever used antibiotics without a prescription?		
Yes	269	(66.4%)
No	136	(33.6%)
Do you know about the resistance to antibiotics?		
Yes	262	(64.7%)
No	143	(35.3%)

3.3. Participants' Knowledge of Antibiotics Use

Table 2 indicates the frequency and percentage of participants' answers for each question related to knowledge, attitude, and practices towards antibiotics use. The percentage of students in MS who got the correct answer was higher than those in NMS for all questions related to knowledge. These differences in scores were statistically significant in most of the questions. The biggest difference in the answers of students from the two groups was in the question about antibiotic resistance meaning followed by the question about using antibiotics to treat viral infections, where 79.5% and 76.6% of MS gave the correct answer compared to only 20.5% and 23.4% of NMS respectively.

3.4. Participants' Attitude towards Antibiotics Use

The percentage of participants who gave correct answers in the MS was higher than the NMS group on all questions related to attitude. The difference in scores between the MS and the NMS groups was statistically significant in all of the questions except about attitudes towards health depending on antibiotics for any infectious symptoms. The percentage difference

of participants who had the correct attitudes towards antibiotic use was the highest in non-using the antibiotic, making a person very sick and vulnerable to infections (62.3% vs. 37.7% for MS and NMS groups, respectively) (Table 2).

3.5. Practices on Antibiotics Use among Participants

The percentage of participants who gave correct answers in MS was higher than the NMS group on all questions related to practice. The difference in scores was higher in the MS group from the NMS group, with a statistically significant difference for only four questions related to practice (Table 2).

Table 2 Number and percentage of the correctly answered questions related to knowledge, attitude, and practice among participants (n = 405)

Knowledge/Attitude/ Practice	Correct Answer of Participants		
	MS N (%)	NMS N (%)	P-value
Knowledge			
Antibiotics are used to treat bacterial infections.	173 (73.0)	64(27.0)	0.000*
Viral infections are treated with antibiotics	108 (76.6)	33(23.4)	0.000*
It is better to take a lower dose of the antibiotic than not to take a dose.	123 (71.9)	48(28.1)	0.131
Antibiotic resistance means the body's resistance against bacteria after taking antibiotics.	70 (79.5)	18(20.5)	0.011*
Self-medication with Antibiotic is appropriate	157 (58.1)	113(41.9)	0.052
Antibiotic resistance means that the antibiotic loses its ability to treat a bacterial infection.	134 (72.0)	52(28.0)	0.000*
Overuse of antibiotics can lead to long-term loss of antibiotic effectiveness.	176 (61.1)	112(38.9)	0.046*
Attitude			
Not using the antibiotic makes me very sick of the infection.	96 (62.3)	58 (37.7)	0.000*
If you experience any symptoms at this point, your health depends on antibiotics.	160 (61.8)	99 (38.2)	0.095
Frequent antibiotic use makes me dependent on it in the future.	150 (57.0)	113 (43.0)	0.025*
Practice			
I would expect my doctor to prescribe an antibiotic if I am experiencing any symptoms?	139 (52.7)	125(47.3)	0.001*
I will take antibiotics as soon as symptoms appear in order to keep my disease from getting worse.	74 (52.9)	66 (47.1)	0.088
I will take antibiotics if symptoms do not go away after a few days without consulting a doctor.	80 (55.9)	63 (44.1)	0.414
Sometimes I take low antibiotic doses for a limited time without a prescription?	79 (51.6)	74 (48.4)	0.025*
I will use the rest of the antibiotics when I have the same symptoms at another time.	80 (52.3)	73 (47.7)	0.042*
Sometimes I share my antibiotic use with my family when we experience the same symptoms.	76 (53.9)	65 (46.1)	0.159
I will buy antibiotics at the pharmacy without seeing a doctor.	99 (55.6)	79 (44.4)	0.271
If I had knowledge of the use of antibiotics, I would continue to ignore the knowledge and pursue common use.	40 (58.8)	28 (41.2)	0.974
I will stop my antibiotic when my symptoms improve.	146(69.2)	65 (30.8)	0.000*
I will continue to keep antibiotics at home as stock for emergency use.	93 (53.8)	80 (46.2)	0.089

Notes: MS - medical students; NMS - non-medical students; N - frequency; % - percentage

3.6. Analysis of Overall Knowledge and Practice Scores

Overall knowledge scores of the participants were calculated and later divided into three categories. Namely, poor score where the participants achieved from 0 to 2, moderate score where the participants achieved from 3 to 5, and high score where the participants achieved from 6 to 7. A high proportion among MS was found to have moderate (34.99%) and high knowledge (12.41%), while among NMS, it was found to have poor (16.87%) and moderate knowledge (23.08%) (Figure 1).

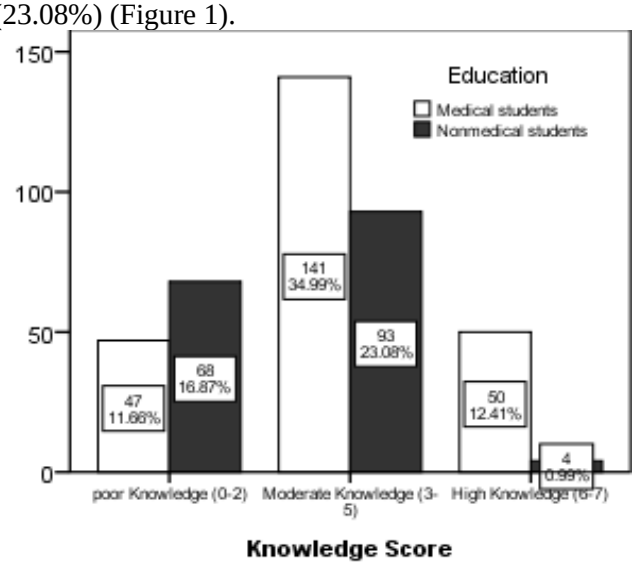

Fig. 1 The distribution of overall knowledge scores among medical and non-medical students. The values in the x-axis represent the total number of correct answers. Y-axis represents the count and its percentage

On the other hand, the participants' overall practice scores were calculated and later divided into three categories. Namely, Poor score where the participants achieved from 0 to 4, moderate score where the participants achieved from 5 to 7, and high score where the participants achieved from 8 to 10. A high proportion of MS was found to have moderate (21.61%) and high practice (21.36%), while NMS were found to have poor (17.34%) and moderate practice (13.07%) (Figure 2).

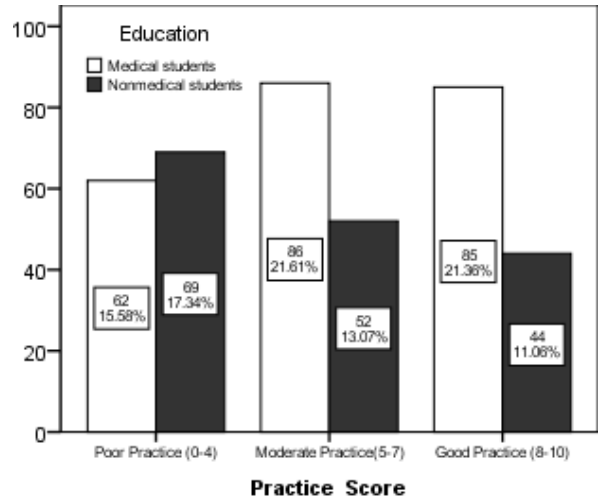

Fig2. 2 The distribution of overall practice scores among medical and non-medical students. The values in the x-axis represent the total number of correct answers. Y-axis represents the count and its percentage

In logistic analysis, the student category showed a statistically significant association with higher knowledge levels about antibiotics at $p \leq 0.05$ and was included in a multiple regression analysis. Similarly, the student category showed a statistically significant association with good practice levels about antibiotics at $p \leq 0.05$ and was included in multiple regression analysis [OR = (18.33, 2.57) 95% CI (Table 3). In a multivariate regression analysis, there was no significant association between self-medication and gender, student category, or the level of knowledge about antibiotics (Table 4).

Table 3 Estimated effects of selected predictors about practice using polytomous logistic regression model

Variables	Moderate practice OR (p-value)	95% CI	High practice OR (p-value)	95% CI
Education				
MS	2.011 (0.006*)	1.233-3.307	2.57 (< 0.001*)	1.52-4.33
NMS	Reference			
Gender				
Male	0.651(0.121)	0.70-1.80	0.340 (< 0.001*)	0.198-0.58
Female	Reference			
Marital status				
Single	1.98 (0.037*)	1.03-3.77	1.78 (0.084)	0.95-3.41
Married	Reference			

Notes: MS - medical students; NMS - non-medical students; OR – regression

Table 4 Estimated effects of selected predictors about knowledge using polytomous logistic regression model

Variables	Moderate knowledge OR (p-value)	95% CI	High knowledge OR (p-value)	95% CI
Education				
MS	2.169 (0.001*)	1.373-3.426	18.33((<0.001*)	6.18-54.36
NMS	Reference			
Gender				
Male	1.121(0.637)	0.70-1.80	0.876(0.716)	0.43-1.80
Female	Reference			
Marital status				
Single	1.366 (0.290)	0.77-2.40	1.87(0.180)	0.74-4.63
Married	Reference			

Notes: MS - medical students; NMS - non-medical students; OR - regression

4. Discussion

This study surveyed MS and NMS at the UST in Sana'a city, Yemen, to assess their knowledge, attitude, and practice towards antibiotics use. As per our knowledge, this is the first study assessing the KAP of antibiotic use among MS and NMS in Sana'a city, Yemen, among university students.

The current study found that 36.6% of participants had taken antibiotics within a month or less before conducting this study; this percentage is higher than in an earlier study conducted in Malaysia (25.7%) [18]. This result implies that the general use of antibiotics among university students in Yemen can be considered quite high. The education that MS relies upon is not sufficient, and that better education on the appropriate use of antibiotics is required.

In this study, MS had better knowledge, had a more informed attitude towards dealing with the problem of antibiotic use, and they were able to apply their knowledge during real-life practice regarding antibiotic use (had higher percentages of correct answers in all questions related to knowledge, attitude, and practice). Thus, exhibiting good knowledge, satisfactory behavioral attitude, and practice towards the rational use of antibiotics compared to NMS, who was less satisfactory as expected. This indicates that MS may be exposed to educational programs on antibiotic use and the serious consequences of antibiotic misuse during the early years of their study at university. Additionally, consistent with the World Health Organization (WHO), which established a key strategy to reduce antibiotic misuse by educating the public [19], NMS are supposed to be more exposed to such educational programs during their study at university. Compared to our findings, similar findings were conducted in Malaysia, Lebanon, and UAE, which reported that MS have more knowledge about antibiotic use than NMS [14, 15, 18]. Furthermore, other recent studies conducted in Zambia and Rwanda reported that MS have good knowledge of antibiotic resistance [20, 21]. In contrast, other studies showed moderate to insufficient knowledge of antibiotic use among MS in India and Malaysia [17, 22].

Concerning students' knowledge, most MS in the current study (76.6%) believed that viral infections could not be treated by antibiotics compared to 23.4% of NMS, with a statistically significant difference between MS and NMS responses. Comparing with our findings, 83.2% of Italian respondents were aware that antibiotic medications could not cure viral infections [23], whereas 34.2% and 35.5% of respondents in UAE and China, respectively, were confused about whether antibiotics can cure viral infections or not [14, 18]. Additionally, a previous study conducted among medical and non-medical university students in Jordan showed that 44% of non-medical students and 28.1% of medical students agreed that antibiotics could cure viral infections [24].

Regarding the attitude of MS and NMS towards antibiotics use, our results showed that MS scored higher than the NMS according to the correct answers. They showed statistically significant differences in the majority of questions related to attitude. A previous study was consistent with our results in agreement with our findings, as MS significantly scored higher attitude than NMS in UAE [14]. However, another study conducted in Trinidad and Tobago showed poor attitudes among MS towards antibiotic use [25]. Altogether, our study shows that students of medical faculties have better knowledge about antibiotic application and resistance, even though the net knowledge level is generally unsatisfactory. The educational background plays a crucial role in developing knowledge, improving antibiotic medication use. Recently, there have been numerous universities in Yemen with a hundred thousand students. Therefore, students can play an important role in preventing antibiotic resistance if proper knowledge can be delivered to them. Therefore, continued educational training is usually recommended for knowledge build-up.

Moreover, a better attitude is associated with knowledgeable people [26, 27]. Thus, planning intensive and short courses for all undergraduates may enhance their awareness of antibiotic use [28]. The current survey could not identify any significant link between self-medication and gender, student category regarding antibiotics uses.

Regarding students' practice towards antibiotic use, our results showed that overall MS scored higher than NMS on all questions related to practice. In detail, out of ten questions, MS scored significantly higher only on four questions according to the participants' correct answers. When comparing with the current findings, previous studies conducted in UAE, Zambia, Chennai, and India showed a statistically significant difference between MS and NMS regarding antibiotic use [14, 20, 27, 29]. However, a previous study in Rwanda revealed that MS failed to apply their knowledge during real-life practice regarding antibiotic use [21]. Based on our and others' findings, the urgent implementation of awareness campaigns about knowledge and appropriate use of antibiotics seems to be a priority. More efforts should be well-planned and performed among universities' students and the public through course curriculums and public education programs, as well as providing clear guidelines for medical practitioners, which may provide a quicker and more effective route to the prudent and rational use of antibiotics eventually reversing the current trend [30]. The absence of such implementation could lead to more serious consequences on the development of antibiotic resistance.

5. Conclusion

In summary, this study indicated that although this study showed that the overall MS performed better than NMS on the KAP of antibiotic use, the education and course curriculums that medical students rely upon is not sufficient and more effort for better education on the appropriate use of antibiotics is required to improve their attitude and practice towards antibiotics use. The present study highlights the compulsory need for sustainable knowledge-based educational programs, including curriculum review starting at lower levels and in non-medical related majors, which seems to be a priority based on our and others' findings. Strict policies should be put in place to restrain the prevalence of antibiotic misuse among students, promote the judicious use of antibiotics, and prohibit the purchase of antibiotics without a prescription. We recommend making a short course for students of all colleges' indicating the significance of proper use of antibiotics, the negative effect of improper use, and antibiotic resistance problems. We also recommend performing more KAP-based studies in different social groups in Yemen to promote awareness among the community.

6. Limitations of the Study

This study has several limitations even after having a high rate of response to the questionnaire. This study was questionnaire-based, and the information provided by the participants was dependent on their memory leading to a potential recall bias. This study was also conducted within one private university in Yemen; thereby, it may not represent the overall level of the Yemeni student community. Additionally, the current work is a cross-sectional type known as an observational study usually conducted to detect prevalence and risk factors. It mostly focuses on the determination of the snapshot of the research project rather than the details of the picture. Finally, the relationship between the educational background and socioeconomic data was not taken into consideration. The sample size was also small. There were insufficient questions related to attitude; therefore, the total scores have not been calculated.

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