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Antibiotics Use and Misuse among University Students in Jordan

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ABSTRACT

Inappropriate use of antibiotics is one of the main determinants of development of antimicrobial resistance. Health education and promotion at universities can have an important impact on students and the community. There are few published studies in the world covering the area of antibiotic use and misuse amongst university students. The aim of the present study was to evaluate the current knowledge, attitude, and behavior regarding antibiotic use among university students in Jordan. The study was based on a cross-sectional research design and was conducted using a self-administered questionnaire in three of the largest public universities in Jordan. In total, 1158 students were surveyed. Around two-thirds of our sample stated that the goal of antibiotic use was to overcome pain (66.4%), decrease fever (65.7%), or overcome weakness or malaise (55.3%). Nearly half (45.5%) of the students thought antibiotics could be used to treat a viral infection. Slightly more than half our sample (50.8%) reported they always used antibiotics without a doctor's prescription. Although three-quarters (75.8%) of the students thought frequent and unnecessary use of antibiotics had negative consequences, only 48.2% of them correctly answered an open-ended question concerning the possible health outcomes of antibiotic misuse. Students at Jordanian universities have limited knowledge and poor perspectives on antibiotic use and misuse and practice inappropriate behaviors in antibiotic use. There is an urgent need for educational programs about antibiotic use and misuse in Jordan targeted at university students, specifically, and to the community in Jordan, in general.

Keywords: antibiotics, use, misuse, university students, Jordan

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INTRODUCTION

Antimicrobial resistance is a rapidly increasing worldwide problem(1-3).Therefore, there has been a growing consensus on the urgent need for development of new strategies for prevention of antibiotic-resistant bacteria(4, 5). Inappropriate use of antibiotics is one of the main determinants of resistance development(1-3).Studies have determined several predictors for the inappropriate use of antibiotics such as economic status, politics, physicians' knowledge and experience, diagnostic uncertainty, and pharmaceutical marketing. Another important factor leading to inappropriate antibiotic use is the sale of antibiotics without prescription. Educational interventions and awareness campaigns targeting patients and clinicians could lead to reduction of the frequency of antibiotic prescription without proper indication by clinicians and reduce their inappropriate use by patients(4, 5).

A recent study from Jordan based on a random sample of 1,141 Jordanians adult concluded that there are very limited knowledge, poor attitudes, and inappropriate behaviors regarding antibiotics use and misuse. Moreover, results showed that 67.1% of the participants believed that antibiotics could treat common cold and cough and that 28.1% misused antibiotics as analgesics. It also showed that 49.0% of the participants used leftover antibiotics without physician consultation while 51.8% use antibiotics

based on a relative's advice. Physician interviews revealed that 22.9% of them prescribe antibiotics over the phone and more than half of them routinely prescribe antibiotics to treat common cold symptoms(6). These results are consistent with a previous study from Jordan conducted in 2003/2004. This study revealed that there is confusion about the use of antibiotics for bacteria, but not for viruses. Lower level of education in this study was associated with self-medication with antibiotics(7).

Health education and promotion at universities can have an important impact on students and the community. However, the role of health education in antimicrobial resistance is limited. There are few published studies in the world covering the area of antibiotic use and misuse amongst university students and have shown limited knowledge amongst this group(8-10).

The estimated population of Jordan in 2012 was 6,388,000(11). In the academic year of 2012/2013, Jordan had 29 universities with a total number of 249,432 undergraduate students.(12) With this large number of undergraduate university students in Jordan, it is essential that universities play their role in health promotion for students and the community.(13) Moreover, we believe that university students should be familiar with common healthcare problems such as use and misuse of antibiotics. Universities should increase the awareness of their students about these topics.

In Jordan, there are published studies conducted among university students of different faculties in the field of antibiotics use and misuse. The aim of the present study was to evaluate the current knowledge about, attitudes toward, and behavior regarding antibiotic use among the students, excluding students studying health-related specialties, at three of largest universities in Jordan. We also attempted to determine the prevalence of self-medication with antibiotics in this population group.

METHODS

Study design and study setting

This was a cross-sectional study conducted in three of the largest public universities located in the three administrative regions of Jordan: Mutah University (MU) in Karak (South), the University of Jordan (UJ) in Amman, the capital of Jordan (Middle), and the Jordan University of Science and Technology (JUST) in Irbid (North).

A study questionnaire was developed by the research team based on literature review and discussions with randomly selected university students. The two main studies that helped in the questionnaire development were conducted at universities in Turkey and China.(8, 14) We also used some of the items reported in the previous two national studies conducted in Jordan. After literature review and discussions with students, we modified the wording of some questions to meet the Jordanian environment and culture. Finally, thirty copies of the questionnaire were piloted and later excluded from the data analysis.

The study questionnaire consisted of five sections. The first section covered socio-demographic data (e.g. age, sex, faculty, academic year, education of the parents, nationality, religion). The second section assessed knowledge of antibiotic use; it asked about the aims of the antibiotics used and when the student started using them. It also asked students about using antibiotics for viral illnesses. This section also evaluated participant's knowledge of adverse outcomes of antibiotics misuse and to report these outcomes if they answered "Yes" to this question. The second part of this section was on the sources of antibiotics and sources of information about antibiotics.

The third section assessed student's perceptions and knowledge about antibiotic misuse in Jordan, while the fourth section evaluated participant's personal use of antibiotics for respiratory symptoms.

The final section included items related to antibiotic misuse and some behaviors related to this phenomenon (such as insisting the treating physician provide a prescription for antibiotics, even when he/she advised against them).

This study was approved by the Scientific and the Ethics Committees of the Faculty of Medicine at Mutah University.

Sample Size

For sample size estimation, we depended on the published statistics of the year of 2012/2013 because they were the most recent published by the Ministry of Higher Education in Jordan. In this academic year, Jordan had ten public universities with a total number of 185,617 undergraduate students. The number of undergraduate students at MU, the UJ, and JUST were 16,826; 32,912; and 21,739; respectively(12). The number of undergraduate students in the participating universities (71,477) constituted more than one third (38.5%) of Jordan's total undergraduate students. Using the Kish formula for sample size estimation at a 95% significance level and a 5% error margin, the representative samples in these universities were 376, 380, and 378, respectively.(15)

Sample Collection

Data collection took place during the second semester of the academic year of 2013/2014. Research assistants helped us in the data collection. They were mostly medical students who received training on

the questionnaire and the data collection methodology. Exclusion criteria were studying a health-related specialty, or being a post-graduate student or first-year student. To ensure equal representation of the different faculties, each university was stratified by faculty and the number of questionnaires collected was therefore based on the percentage of students in each faculty. Questionnaires were randomly distributed to students in each faculty at different weekdays and times of day. After the students agreed to participate in the study, they were asked to fill out the study questionnaire. Filling out the questionnaire took between 10 and 15 minutes, and while completing it, the students were instructed not to discuss the answers with each other.

Statistical Methods

Analysis of the data was carried out using SPSS software version 18.0 (SPSS Inc., Chicago, IL, USA). The questions with missing answers were eliminated when testing for associations and calculating proportions. Testing for factor association was performed using the χ^2 (chi-2) testing procedure and a *P*-value of <0.05 was considered statistically significant. We presumed that the students' responses were affected by their social and economic standings. To incorporate the socioeconomic status into the analysis, a Socioeconomic Index (SEI) was calculated following the suggestions of Hollingshead.(16)A total score was calculated for each student based on four factors: (1) area of residence (being a village, town, or city), (2) education of father (at six levels of education), education of mother (at six levels of education), and monthly family income (at five levels). These total scores were then divided into three categories of equal frequency forming the SEI. The three categories were low (12–40), medium (41–53), and high (54–76).

Multinomial logistic regression was used to build prediction models for the following survey questions:

1. Can antibiotics be used to treat infections caused by viruses? (possible answers: Yes, No, Don't know)
2. Do you think that frequent and unnecessary use of antibiotics has any negative consequences? (possible answers: Yes, No, Don't know)
3. Have you ever used antibiotics without a doctor's prescription? (possible answers: Always/Often, Rarely/Sometimes, Never)
4. If the doctors refused to prescribe antibiotics for you, would you insist on the doctor doing so? (possible answers: Always/Often, Rarely/Sometimes, Never)
5. From the list below, please specify the source of antibiotics that you usually use? (list of choices: antibiotics available at home, school colleagues, off-shelf antibiotics, and pharmacy with prescriptions, health centers, hospitals, other). Provided participants' choices were categorized as being correct or incorrect choice of antibiotic source. Multinomial logistic regression was used to identify predictors for correct sources of antibiotics.
6. Source of your information about antibiotics? (list of choices: physicians, pharmacists, TV or radio or newspapers, people around you, drug leaflets, Internet, other). Sources of information were classified as reliable and unreliable sources of information. Predictors for the reliable sources of information were identified through Logistic regression.

The stepwise selection method; with parameters alpha to enter of 0.15 and alpha to remove of 0.2; was used to identify predictors for the answers of the above questions. Candidate predictors used were: gender (male, female), nationality (Jordanian versus international students), age in years, academic year (2nd, 3rd, 4th, 5th, 6th), faculty type (scientific, humanities), and SEI (low, medium, high).

RESULTS

Demographic characteristics

A total of 1,158 students were surveyed; 58.4% of them were from scientific faculties while the remaining 41.6% were from humanities. Their mean age was 20.8 ± 2.1 years (range: 17–45 years) and the proportion of male students was 39.5% ($n = 469$). The majority of students were Jordanians (92.5%, $n = 1,089$) while the remaining (7.5%) were Arabs in international programs (Table 1).

Students' knowledge about the use of antibiotics

Around two-thirds of our sample (66.4%) stated that the goal of antibiotic use is to overcome pain or decrease fever (65.7%), while a majority (55.3%) reported overcoming weakness or malaise as the aim of antibiotic use.

Although 88.8% of the students thought that antibiotics can be started based on the instructions of a doctor, it was also reported that antibiotics could also be initiated based on a pharmacist's advice (70.8%); according to what is available at home (50.3%); or based on advice of friends who tried specific antibiotics (26.9%).

The proportion of students who thought that antibiotics could be used to treat a viral infection was 45.5%. About a third of students (33.2%) answered "no" and 21.3% answered "don't know".

Student knowledge about the consequences of unnecessary and frequent use of antibiotics showed only partial understanding of the risks. Although 75.8% of the students thought that the frequent and unnecessary use of antibiotics had negative consequences, only 48.2% of them correctly answered this open-ended question. Only 5.6% of students reported this would lead to bacterial resistance, while 12.3% reported this could lead to kidney or liver damage. Decreased efficacy and decreased response of future antibiotic use were reported by 18.1% and 1.8%, respectively (Figure 1).

Addiction to antibiotics was the most commonly reported wrong answer of the participants (9.9%).

Regarding time of stopping the antibiotics, 41.0% answered that antibiotics should be stopped once the symptoms decreased, while 55.0% answered after the symptoms disappeared. Only 63% of the students said that they would continue taking the antibiotics, based on the doctor's instructions, regardless of whether the symptoms decreased or disappeared.

Sources of antibiotics

The most commonly reported source of antibiotics was pharmacy with a doctor's prescription (56.8%), while pharmacy without a doctor's prescription was reported by 32.0% of participants. Hospitals and health centers were the sources for 35.6% and 39.3% of the students, respectively. Antibiotics available at home and from friends were reported by 45.3% and 6.6%, respectively. Finally, other unspecified resources were reported by 1.8% of participants. Around half our sample (50.8%) reported that they always used antibiotics without a doctor's prescription while 36.9% reported that they rarely did so, and 12.2% reported they had never done so.

Sources of information about antibiotics

The most commonly reported sources of information about antibiotics in descending order were doctors (61.1%), pharmacists (46.0%), medication leaflets (42.5%), Internet (27.6%), "people around me" (27.5%), TV, radio, or newspapers (14.7%), and other sources (2.6%). Only 22.8% of the students reported that they had ever attended a lecture or read a pamphlet in the university about the correct use of antibiotics.

Personal use of antibiotics for respiratory symptoms

Students' responses on statements related to antibiotic use for treatment of different respiratory symptoms reported that antibiotics should always/often be used for throat pain (62.1%), common cold symptoms (61.0%), cough with fever (59.8%), as well as other respiratory symptoms (Figure 2).

Perceptions about antibiotics

Overall students had a good awareness of antibiotic misuse in Jordan with 77.9% of participants reporting that there is a current misuse of antibiotics in the country (Table 2). Two-thirds of students (66.5%) either agreed/strongly agreed with the statement "antibiotic resistance can negatively affect my health and the health of my family". Slightly more than half the students (54.7%) agreed/strongly agreed that antibiotic misuse is the main reason for antibiotic resistance; and 41.2% of them agreed/strongly agreed that antibiotic resistance is a problem in Jordan. Interestingly, 47.3% of students agreed that there is misuse of antibiotics by pharmacists and 44.4% reported a misuse by doctors. On the other hand, 29.2% of them agreed/strongly agreed that antibiotics should be allowed to be purchased in pharmacies without intervention of doctors in Jordan.

Students' personal experience with antibiotics

Students' personal experiences with antibiotics indicated that 55.4% of the students often/always used antibiotics without a doctor prescription. Interestingly, 55.4% of the participants reported they were sold antibiotics by pharmacists without a doctor's prescription.

Slightly fewer than half the participants (47.5%) reported that a doctor ever explained to them the correct use of antibiotics. Unexpectedly, 36% of students reported that if the doctor did not prescribe antibiotics for them, they would ask the doctor to do so. If the doctor refused, 24.2% of them reported they would insist (Table 3).

Regression results

Academic year ($P = 0.048$), sex ($P = 0.141$), nationality ($P = 0.007$) and SEI ($P = 0.018$) were the significant predictors for the use of antibiotics without a doctor's prescription. Model parameters estimates have shown that as students advance in their study, they tend to use antibiotics without a doctor's prescription more often. In regards to gender, male students have a higher probability of using antibiotics without a doctor's prescription than female students. In addition, Jordanian students tend to use antibiotics without a prescription more often with a higher probability than non-Jordanian students. An inverse relation between SEI and the frequency of using antibiotics without a prescription is indicated by the parameter estimates. That is, students with low SEI tend to use antibiotics without a prescription more often than students with high SEI.

Participants' perceptions towards the treatment of viral infections using antibiotics can be predicted, based on the final logistic regression model, by age ($P < 0.001$), SEI ($P = 0.007$), nationality ($P = 0.005$) and

faculty type ($P = 0.021$). Positive correlation is shown between age of participants and their knowledge of antibiotic usage. As anticipated, students with higher SEI level tend to provide a correct answer to this question than those with lower SEI level. Surprisingly, Jordanian students tend to agree on the use of antibiotics to treat viral infections while non-Jordanian students have lower probability for this perception. As anticipated, students of scientific faculties tend to provide a “no” answer to this question with higher probability than those enrolled in humanities faculties.

Significant predictors of whether frequent and unnecessary use of antibiotics were found to be related to: age ($P = 0.072$), sex ($P = 0.120$), and type of faculty ($P = 0.097$). These results indicate that elderly students have higher probability of providing a “yes” answer to this question. Male students would provide a “yes” answer with a higher probability than females. As expected, students attending scientific faculties had higher probability for a “yes” answer than those enrolled in humanities.

Answers of whether participants insisted on doctors prescribing antibiotics after an initial refusal could be predicted by: academic year ($P = 0.131$), sex ($P < 0.001$), SEI ($P = 0.048$), and type of faculty ($P = 0.001$). The following remarks are based on these predictive estimates: students of higher academic years insisted less on doctors prescribing antibiotics; similarly, male students tended to insist more often for antibiotic prescriptions than did female students; students with low SEI tended to insist more on obtaining prescription for antibiotics than those with higher SEI levels; since scientific faculty students are aware of the negative effects of excessive use of antibiotics, they had lower probability of insisting on prescriptions than humanities faculty students.

In regard to selecting the correct source of antibiotics, none of the candidate predictors was significant at the chosen levels of stepwise selection method parameters. Gender ($P = 0.001$) was the only significant indicator found to predict the knowledge of information sources. Male students tended to have less knowledge than female students with regard to correct information sources for antibiotic use.

Table 1: Demographic Characteristics		
Age (n = 1158)	Mean ± SD:	20.8±2.1
	Range:	17-45
Gender(n = 1186)	Males:	469 (39.5%)
	Females:	717 (60.5%)
Nationality(n = 1177)	Jordanian:	1089 (92.5%)
	Arab nationalities:	88 (7.5%)
University (n = 1186)	Mutah University:	399 (33.6)
	University of Jordan:	398 (33.6)
	Jordan University of Science and Technology:	389 (32.8)
Academic year (n = 1153)	2 nd year:	586 (50.8%)
	3 rd year:	302 (26.2%)
	4 th year and more:	265(23.0%)
Faculty (n = 1186)	Scientific:	693 (58.4%)
	Humanities:	493 (41.6%)

	Strongly agree\agree	Neutral	Strongly disagree\disagree	Don't know
There is a misuse of current antibiotics by people in Jordan (n = 1169)	911 (77.9%)	144 (12.3%)	39 (3.3%)	75 (6.4%)
Antibiotic resistance can negatively affect my health and the health of my family(n = 1176)	782 (66.5%)	170 (14.5%)	71 (6.0%)	153 (13.0%)
Antibiotics misuse is the main reason for antibiotic resistance(n = 1159)	634 (54.7%)	178 (15.4%)	90 (7.8%)	257 (22.2%)
There is a misuse of current antibiotics by pharmacists in Jordan(n = 1166)	551 (47.3%)	308 (26.4%)	164 (14.1%)	143 (12.3%)
There is a misuse of current antibiotics by doctors in Jordan(n = 1164)	517 (44.4%)	337 (29.0%)	159 (13.7%)	151 (13.0%)
Antibiotic resistance is a problem in Jordan(n = 1154)	475 (41.2%)	278 (24.1%)	84 (7.3%)	317 (27.5%)
Antibiotics should be allowed to bought in pharmacies without interference of a doctor(n = 1177)	344 (29.2%)	208 (17.7%)	595 (50.6%)	30 (2.5%)

	Always/often	Rarely/sometimes	Never
Have you ever used antibiotics without a doctor prescription? (n = 1178)	598 (50.8%)	435 (36.9%)	145 (12.3%)
Has a pharmacist ever sold you antibiotics without a doctor prescription? (n = 1177)	652 (55.4%)	359 (30.5%)	166 (14.1%)
Have you ever used antibiotics as a prevention so that you do not become sick? (n = 1153)	294 (25.5%)	411 (35.6%)	448 (38.9%)
Have you ever used irregularly antibiotics prescribed by a doctor? (n = 1155)	477 (41.3%)	483 (41.8%)	195 (16.9%)
In certain cases, if the doctor did not prescribe antibiotics for you, will you ask him to do so? (n = 1160)	418 (36.0%)	508 (43.8%)	234 (20.2%)
If the doctors refused to prescribe antibiotics for you, will you insist on him to do so? (n = 1173)	284 (24.2%)	353 (30.1%)	536 (45.7%)
Has a doctor ever explained to you the correct use of antibiotics? (n = 1175)	558 (47.5%)	413 (35.1%)	204 (17.4%)

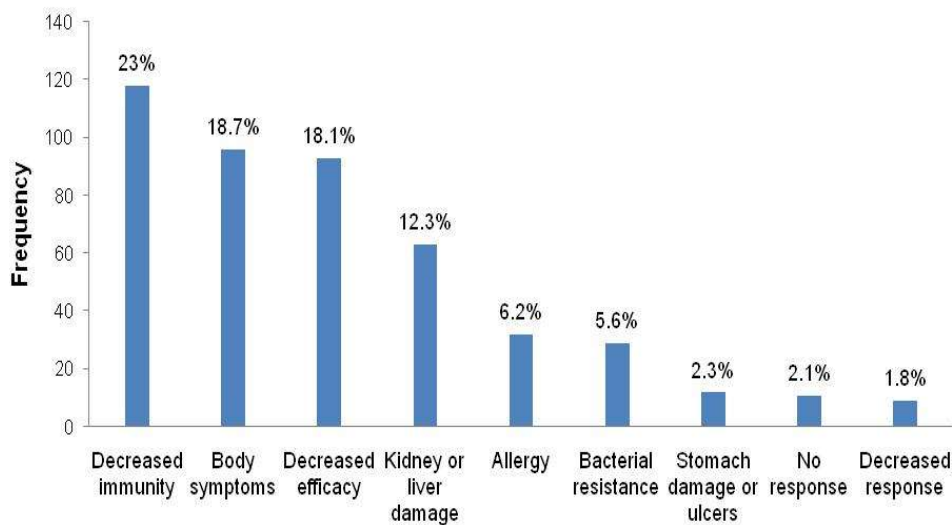


Figure 1: Reported consequences of the unnecessary and frequent use of antibiotics

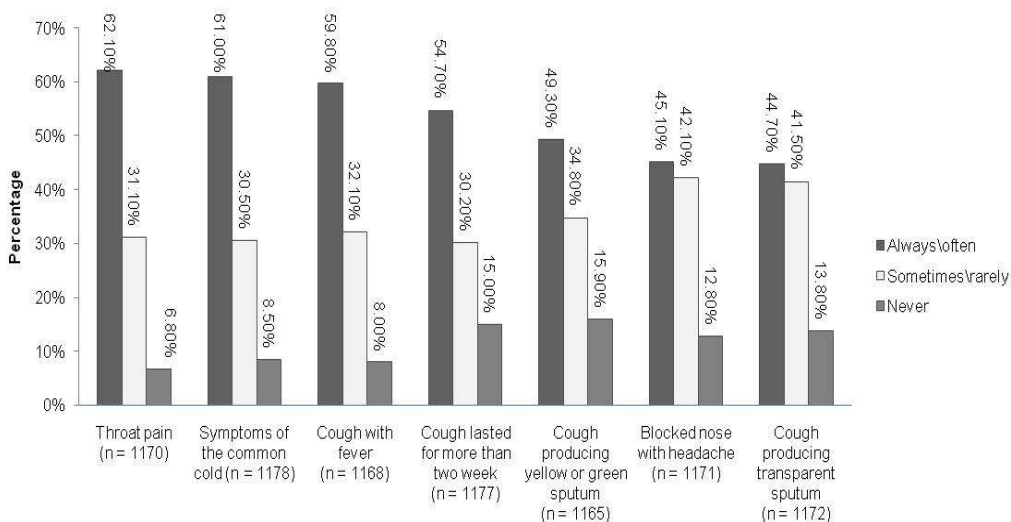


Figure 2: Summary statistics for the responses to the question "Should antibiotics be used when the following respiratory symptoms are present?"

DISCUSSION

This study shows that there is a very limited knowledge about antibiotic use and misuse among university students in Jordan. This large survey covered three of the largest Jordanian universities and

included 1,158 students; 58.4% of them from scientific faculties, while the remaining 41.6% were from humanities.

Around two-thirds of our sample provided wrong indications for antibiotics use (e.g. overcoming pain, fever reduction or management of weakness. This is consistent with previous studies (8, 14, 17). However, our results indicate poorer knowledge of students in Jordan when compared with students from Turkey. The Turkish study at Ege University included two groups of students: Group A was made up of students from the Faculty of Dentistry and Pharmacy and Group B from other faculties excluding medical students. For example, the aim of antibiotic use to decrease fever was reported by 18.8% of respondents in Group A and 33.4% of respondents in Group B ($P < 0.05$), while it was reported by 65.7% of participants in our study. (8)

Results from a Nigerian university also showed that university students had limited knowledge about antibiotics use and misuse. Results from Nigeria are also consistent with the above findings; headache and catarrh were reported as indications for antibiotic use by 25.7% and 17.5%, respectively. (17)

The misconceptions about the use of antibiotics for treatment of viral infection was evident in our study with 45.5% of the students thinking antibiotics could be used for this purpose, while one-third of them (33.2%) stated antibiotics could not be used for this purpose. These results are much worse than the results of a community-based survey in Jordan conducted in 2011 where only 6.9% of the sample reported that antibiotics are used for treatment of viral infections. (6) Health care professionals were not excluded from the community survey in Jordan and their proportion was not specific in the results. This might justify the differences observed between the two studies.

Comparing our results with those from China reveals that our results are close to those of non-medical students in a Chinese study in which 1,236 medical students (MS) were compared with 852 non-medical students (non-MS) in knowledge about antibiotics. As expected, 64.52% of the medical students reported that antibiotics cannot treat viral infections, compared to only 43.44% among the non-MS ($P < 0.0001$). The difference was significant when comparison was conducted between final year MS with non-MS, however this was not present when comparing students in the first year. (14) This highlights the effect of medical education on students' knowledge about antibiotics, although the reported figures for final year MS are still below expectations.

Although 75.8% of students thought that the frequent and unnecessary use of antibiotics has negative consequences, only 48.2% of them reported the correct answer to this open-ended question. A very small proportion of students (5.6%) reported that this would lead to bacterial resistance. This is still worse than reported in a previous community-based study from Jordan in which 60.7% of participants illustrated less than 50% correct answer about antibiotics resistance (6). Moreover, only one-quarter of the participants believed that antibiotics would not be effective in the future if taken very frequently and 36.0% did not agree that in appropriate use of antibiotics would lead to antibiotic resistance.

In the Turkish study, 96.7% in Group A and 98.0% in Group B of the students said that they thought frequent and inappropriate antibiotic use is dangerous ($P < 0.05$), although 44.1% of the respondents started self-medication when they became ill. (8)

Sources of antibiotics

The most commonly reported source was "pharmacy with doctor's prescription" (56.8%). "Pharmacy without doctor's prescription" was reported by 32.0% of the students. Results from the Nigerian university were close to ours. (17) The antibiotics were usually obtained on doctor's prescription (273; 68.3%), pharmacist's recommendation (44; 11.0%), nurse's recommendation (24; 6.0%), traditional-medical practitioner's recommendation (5; 1.3%). Friends and relatives were reported as sources of antibiotics by 6.3% of the participants in the Nigerian study and 6.6% of this study. Results from Turkey revealed that 20.6% of the students received antibiotics based on pharmacists' advice. (8)

Self-medication with antibiotics includes obtaining and self-administration of antibiotics for infection. (18) This malpractice is present in both the developing and developed countries. (18-20) In our study 50.8% of students reported they always used antibiotics without a doctor's prescription while 36.9% reported that they rarely did so. These figures are much higher than reported in some European countries (19.8% in Romania, 15.2% in Spain, and 21.0% in Lithuania). (21) Previous studies from Jordan are consistent with our results. (20, 22) although it is illegal to sell antibiotics without prescription in Jordan,

Results of the community-based survey from Jordan showed that almost half (49.0%, CI 46.1–51.9) of respondents reported using left-over antibiotics without physician consultation and nearly the same proportion (52.0%) used antibiotics based on a relative's advice. (6) Results from Ege University in Turkey showed that 44.1% of students started antibiotics by themselves when they got ill and there is no statistical difference between the pharmacy and dentistry students when compared with students from other faculties. (8)

Another study from Jordan assessed the dispensing of antibiotics in community pharmacies. The drugs were dispensed according to prescriptions from general practitioners (GPs) or specialists (53.7%), through self-medication (23.2%) and following pharmacist recommendation (23.1%). Regarding self-medication with antibiotics, 60% were based on a recent prescription for the same signs and symptoms and 40% were based on advice from a friend family member or other person.

The contribution of the source of the dispensed antibacterial drug to 'inappropriate treatment' was 29.9% for prescription and 34% for non-prescribed drugs.(20)

Sources of information about antibiotics

Doctors, pharmacists, medication leaflets, Internet, "people around me" were the most commonly reported sources of information about antibiotics. Only 22.8% of the students reported having ever attended a lecture or read a pamphlet in the university about antibiotics. A previous study from Jordan showed that antibiotics leaflets, advice from relatives or friends, and physicians were the most common sources of information.(20)Results from the three universities in northeastern China showed that the difference in knowledge about antibiotics between first year MS and non-MS were not statistically significant in the first year; however, the difference was substantial and statistically significant between final year-students from both of these groups. This highlights the important of education on antibiotic use and misuse.(14)

Personal use of antibiotics for respiratory symptoms

Another major area for antibiotic misuse is their inappropriate use for respiratory symptoms. In our study students stated that antibiotics should always/often be used for throat pain (62.1%), common cold symptoms (61.0%), and cough with fever (59.8%).These results are consistent with those for students from Nigeria or China and with previous community-based surveys in Jordan.(6, 14, 17)The previous community study in Jordan revealed that 51.1% of the respondents reported using antibiotics for treatment of common cold, cough, and nasal congestion.(6)Results from Ege in Turkey showed that more than 83.1% of the students aimed to use antibiotics in the treatment of common cold with no difference between students from pharmacy and nursing students group and students from other faculties.(8) Alarming figures came from China where 23.3% and 27.4% of MS and non-MSreportedthat antibiotics will speed recovery of cold and cough. Moreover, 30.0% of final-year MS compared with 20.7% of non-MS agreed withthis statement ($P = 0.022$). In the same study, 13.6% and 8.5% of students in these two groups reported that antibiotics should always/often be used for treatment of common cold ($P < 0.001$). (14)

Perceptions about antibiotics

Although there is a high rate of limited knowledge and misuse of antibiotics amongst university students in Jordan, a high proportion (77.9%) of participants were aware of the issue of antibiotic misuse in Jordan. This is similar to survey results from Chinese universities where 74.5% of the total sample reported awareness of antibiotic resistance issues in China.(14) On the other hand, 29.2% of the Jordanian students agreed/strongly agreed that antibiotics should be allowed to be bought in pharmacies without intervention of a doctor. The survey from Ege University, Turkey, revealed that 97% of the students reported they were aware of the danger of frequent and inappropriate use, although 44.1% of the respondents started self-medication when they became ill.(8)

Results of the community survey revealed that there are misconceptions about antibiotic use in Jordan. Around one-quarter (26.4%) of the participants reported that antibiotics would always be effective in the treatment of the same infection. Interestingly, 26% of participants agreed with the statement that antibiotic resistance is due to using antibiotics when they are not necessary. The same proportion of students reported using antibiotics without physician's prescription as a reason for resistance.(6)

Student's personal experience with antibiotics

Several previous studies have reported that patient pressure was the most frequently reported reason for physicians' discomfort in prescribing antibiotics. This was also detected in our study; 36% of students reported that if the doctor did not prescribe antibiotics for them, they would ask him to do so. If the doctor refused, 24.2% of them reported that they would then insist. In the community-based survey from Jordan, one-third of respondents reported requesting antibiotic prescriptions from physicians; one in every four (22.9%) physicians prescribed an antibiotic over the phone without examination.(6)

Low SEI and high educational level have been identified as the main predictors for self-medication practice in many countries around the world.(18, 19, 23-25)In our study, predictors of the use of antibiotics without a doctor's prescription were: students were advanced in their studies; male Jordanian students; and low SEI. Results of a population-based survey identified several predictors for self-medication with antibiotics: age ($P < 0.001$), income ($P = 0.037$), and educational level ($P < 0.001$), but not by gender ($P = 0.528$). (20)

CONCLUSIONS AND RECOMMENDATIONS

Students at Jordanian universities have limited knowledge and poor perspective on antibiotics use and misuse and practice wrong behaviors in antibiotics use. Our results were worse than those of a previous community-based survey and results from universities outside Jordan. There is an urgent need for educational programs about antibiotic use and misuse in Jordan targeted at university students, specifically, and to the community in Jordan, in general.

CONFLICT OF INTEREST STATEMENT

The authors do not report any conflict of interest.

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