KNOWLEDGE, ATTITUDE, AND BEHAVIORS TOWARD ANTIBIOTICS OF NON-MEDICAL STUDENTS JOUF UNIVERSITY, SAUDI ARABIA

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ABSTRACT

Objective: The objective of the study was to investigate the knowledge and attitude of non-medical students, Jouf University toward antibiotic.

Methods: Data were collected from male and female students using a self-prepared questionnaire then tabulated and analyzed using SPSS program.

Results: This study included 1035 students; 573 (55.3%) male and 462 (44.6%) female, aged (21.5±2.2) years. About 533 (51.5%) used antibiotic during the year 2015. 705 (68.12%) of the student display wrong answer regarding the uses of the antibiotic. 53.5% depending on the previous prescription on self-medicated antibiotic (SAM), followed by their experience (14.5%) and pharmacy advice (11.3%). 45.9% did not have any idea about the antibiotic name they used. Majority of the students (62.6%) stop antibiotic once improvement is achieved, whereas (28.1%) complete the course till the end of the last dose. 75.4% of the studied populations saving at least one antibiotic at home while 62.7% sharing antibiotic with others. 35.3% of the studied population did not experienced antibiotic-related side effects, while 19.3% experience nausea. About 57.6% believed that broad spectrum is better than narrow-spectrum antibiotic, 70.4% deny that higher doses enhance recovery, (57.3%) believes that low dose decrease side effect. 51.9% depend on their good medical knowledge for SMA, while 20.3% was to save time, 18.8% dependent on pharmacy expert where only 9% was to save money cost.

Conclusion: The majority of the sample had a fair level of knowledge in relation to antibiotics. Initiation of national program and campaigns toward antibiotic uses to raise the public awareness about the hazardous of antibiotic misuse/abuse is essential to decrease the gap between antibiotic use and attitude.

Keywords: Antibiotic, Attitude, Behavior, Non-medical student, Jouf University.

INTRODUCTION

It has been estimated worldwide that more than 50% of the antibiotics are sold without a medical prescription [1]. Antibiotic misuse increases the risk of appearing resistant bacteria which make the antibiotic prescription choices so difficult by physicians [2]. This phenomenon is not limited to the developing countries, but it is also reported in many European countries as Spain, Greece, Portugal as well as Mexico, and Brazil [3-7] indicating the worldwide spread of this problem. The dispensing without a prescription is a serious problem in most of the Arab countries as Egypt, Syria, Jordan, as well as Saudi Arabia [8-10].

Previous studies conducted in Saudi Arabia showed that antibiotic dispense is reported by 78% of surveyed community pharmacies in Riyadh and 98% community pharmacies in Jeddah [11]. This antibiotic dispense not only without prescription but also without an evidence-based indication [12].

Few studies are dealing with population attitudes toward misuse of antibiotics, up to our knowledge no study was done among non-medical student, Jouf University.

METHODS

This was a questionnaire-based descriptive cross-sectional study conducted among non-medical students, Jouf University, Kingdom of Saudi Arabia. This study was conducted in College of Humanities and Administrative Sciences, Community College, College of Engineering, College of Education, College of Law, College of Science, and College of Science and Arts. Data collection questionnaire of the present study was conducted in Arabic language and translated later into English.

Inclusion and exclusion criteria

Male and female students enrolled in undergraduate or postgraduate programs of all academic years were invited for participation in this study. Participation was voluntary and without any compensation. Medical, pharmacy and paramedical students were excluded from the study.

Data collection procedure

Students were approached during teaching hours at classrooms of different colleges, Jouf University. The self-administered questionnaire filling was considered as informed consent from a student who agrees to participate. After filling the questionnaire by the students, it returned back for data collections and manipulation.

Ethical consideration

The study was approved by the Ethical Committee, College of Medicine, Jouf University. Returning the completed survey was accepted as the consent of participation by the participating students.

Statistical analysis

Data collected, tabulated and subjected to analysis using SPSS version 19 Chi-square test was used for descriptive data.

RESULTS

Demoic data for students included in the study are presented in Table 1; showed that 1035 students enrolled in the study aged 21.5±2.2; there were 573(55.3%) male students, 462 (44.6%) female students. 75% of the total student having monthly income more than 5000 Saudi Riyal. 533 (51.5%) had a strong concept that they used antibiotic during 2015.

Table 1: Demographic data for students included in the study

College (number) (percent)	Gender (%)		Age (±SD)	Monthly allowance (in Saudi thousand riyal) (%)				Antibiotic use during 2015 (%)				
	Male	Female		<5	5–10	10–20	>20	Yes	No	I don't remember	No answer	I don't care
College of Humanities and Administrative Sciences (276)	96 (34.8)	180 (65.2)	21.7 ± 2.9	41 (14.9)	151 (54.7)	57 (20.7)	27 (9.8)	150 (54.3)	63 (22.8)	60 (21.7)	0 (0)	3 (1.1)
Community College (87)	87 (100)	0 (0)	22.3 ± 1.7	39 (44.8)	39 (44.8)	6 (6.9)	3 (3.4)	39 (44.8)	36 (41.4)	9 (10.3)	0 (0)	3 (3.4)
College of Engineering (51)	51 (100)	0 (.0)	23.2 ± 1.5	15 (29.4)	30 (58.8)	0 (0)	6 (11.8)	28 (54.9)	16 (31.4)	7 (13.7)	0 (0)	0 (0)
College of Education (231)	138 (59.7)	93 (40.3)	20.5 ± 1.3	57 (24.7)	132 (57.1)	27 (11.7)	15 (6.5)	105 (45.5)	87 (37.7)	33 (14.3)	6 (2.6)	0 (0)
College of Law (96)	24 (25.0)	72 (75.0)	21.2 ± 1.3	21 (21.9)	54 (56.3)	21 (21.9)	0 (0.0)	45 (46.9)	27 (28.1)	15 (15.6)	6 (6.3)	3 (3.1)
College of Science (180)	138 (76.7)	42 (23.3)	21.5 ± 1.4	71 (39.4)	61 (33.9)	30 (16.7)	18 (10)	105 (58.3)	45 (25)	21 (11.7)	6 (3.3)	3 (1.7)
Science and Arts (114)	39 (34.2)	75 (65.8)	21.9 ± 2.5	21 (18.4)	54 (47.4)	27 (23.7)	12 (10.5)	61 (53.5)	44 (38.6)	9 (7.9)	0 (0)	0 (0)
Total count (1035)	573 (55.3)	462 (44.6)	21.5 ± 2.2	265 (25.6)	521 (50.3)	168 (16.2)	81 (7.8)	533 (51.5)	318 (30.7)	154 (14.9)	18 (1.7)	12 (1.2)

*Saudi Riyal = 0.27 US $

Among the students enrolled in the study; 705 (68.12%) of the student display wrong answer regarding the uses of the antibiotic, while the right answer was obtained from 225 (21.73%); Furthermore, 105 students (10.14%) did not know the reason for antibiotic intake (Table 2).

The bases of the antibiotic selection among non-medical students Jouf University were examined; 53.5% of students depend on the previous prescription, followed by their experience (14.5%) whereas pharmacy advice represents the third choice (11.3%) (Table 3).

Among antibiotics list included for the participants to choose their previously used one; 45.9% of the students included in the study did not have any idea about the antibiotic name they used, where amoxicillin, ampicillin, and augmentin were selected by 14.2%, 13.1%, and 11.4% of population sample, respectively (Table 4). Majority of the students (62.6%) stop antibiotic once improvement is achieved, whereas (28.1%) complete the course till the end of the last dose (Table 5).

In the present study, 75.4% of the studied populations saving at least one antibiotic at home for upcoming uses if needed while (62.7%) sharing antibiotic with others (Table 6).

About (35.3%) not experienced side effects, while 19.3% experience nausea as side effect, whereas 18.6% believed that they experience drug resistance which is displayed by ineffectiveness of the antibiotic used, followed by vomiting (9.5%), skin rash (9.5%), and diarrhea (7.8%) (Table 7).

Some concepts and attitude toward antibiotic uses were examined; about (57.6%) believed that broad is better than narrow-spectrum antibiotic, (70.4%) deny that higher doses enhance recovery, and (57.3%) believes that low dose decrease side with insignificant differences between male and female (p=0.658, 0.538, 0.613, and 0.9), respectively (Table 8).

The reason for which students included the study self-medicated antibiotic (SAM) are variables where 51.9% depend on their good medical knowledge, 20.3% was to save time, 18.8% depending on the advice of expert pharmacy where only 9% was to save money and decrease the cost (Table 9).

DISCUSSION

The SMA is a serious medical problem still receiving updates [13-15]. SMA rates have been reported as 24–90% in university students from different regions and countries [16-19]. SMA percent in the developing countries is much higher compared to the developed ones [20]. Our present study focused in particular on the non-medical students, Jouf University, KSA.

The prevalence of SMA may reach burden percent; it is up to 47.8% in Southern China, 79.5% in Sudan, and 48% in Iran [16,19,21].

In the present study, the majority (68.12%) of the student enrolled in the present study display the wrong answer regarding the uses of the antibiotic; right answer was obtained from 21.73% of the studied population.

The results demonstrated the prevalence of misunderstandings about antibiotic use that may result in unnecessary risk of antibiotic-resistant infection. It may increase the health-care system cost and antibiotic-related side effect; the relationship between patient knowledge and antibiotics use attitude is highly linked [20,22-25]

Our result differs from the previous study on medical Saudi students showed only 18.1% of the responders believe that antibiotic is anti-viral [26]. This difference is expected due to medical knowledge and background of differences between students in both groups.

Shehadeh *et al.* [27] showed 67.1% of Jordanian population included in the study believed that antibiotics treat common cold and cough, while Zhu *et al.* [28] in another study showed that 43.5% believed that antibiotic was sui for viral infections.

Our results are less than results of Oh *et al.* [29] and Lim *et al.* [30] who showed 86.6% and 83 % of the population included in their study belief that antibiotic is used into treat viral infections, respectively. McNulty *et al.*,[31] showed that 53% of the population included in his study believed that the antibiotic act as antiviral.

The present results could be explained by the inadequacy of knowledge in this area that may be due to using the term "germ," which was normally used during medical counseling rather than the microbiological terms "bacteria" or "virus" [29].

In the present results, 53.5% of students depend on the previous prescription for SMA, followed by their experience (14.5%) whereas pharmacy advice representing the third choice (11.3%).

This present result is an alarming notice for a society lacking appropriate public medical education. More restriction for SMA should be applied.

Zhu *et al.* [28] showed 64.8% depend on the own their experience for SMA while 31.1% due to community pharmacist advice. Among Jordanian population, 51.8% of the studied population, using antibiotics based on relative advice [27].

Among antibiotics list included for the participants to choose their previously used one; (45.9%) of the students included in the study did not have any idea about the antibiotic name, where amoxicillin, ampicillin, and augmentin were selected by 14.2%, 13.1%, and 11.4%, respectively.

These results could be explained as the patients are not getting enough information from health-care professionals concerning the drugs they use.

Majority of the students (62.6%) stop antibiotic once improvement is achieved, whereas (28.1%) complete the course till the end of the last dose.

A similar result was published by Rao *et al.* [32] showed 65.55% of the population included will stop taking a full course of antibiotics if their symptoms are improved.

Our results are higher than a study done by Mouhieddine *et al.* [33] on Lebanese population who showed that only 38.6% stop antibiotic once improving symptoms are achieved.

This high percentage of people who stop their antibiotic course once improvement is achieved may be a major contributor to the rapid increase in resistant bacterial infections. The misconception carries the risk of infection relapse, bacterial colonization, and complicated disease outcomes [34,35].

The incompletion of the antibiotic course will lead to antibiotic sub-inhibitory concentrations inside the body that will result in the development of resistant pathogen [36].

In the present study, 75.4% of the studied populations saving at least one antibiotic at home for upcoming uses if needed. Among all non-medical student enrolled in the present study, (62.7%) sharing antibiotic with others.

Mouhieddine *et al.* [33] showed in Lebanese population 52.1% usually keep antibiotic stocks at home and 26.5% usually give our antibiotics to a sick family member, Lim *et al.* [30] showed that 17% keep antibiotic stock at home for the emergency purpose. Oh *et al.* showed nearly the same percent (19.9%) [29].

In tertiary-care, keeping antibiotic stocks at home in case of emergency are believed by 48.33% of the population, while sharing antibiotics with a family member if they are sick are accepted by only 31.11% [32]. Shehadeh [27], in Jordanian population survey, showed 28.5% kept antibiotics at home for emergency use.

In the current work, 35.3% of the studied population not experienced antibiotic-related side effects, while nausea is the first most common experiencing side effect (19.3%), whereas (18.6%(believed that they experience drug resistance which is displayed by ineffectiveness of the antibiotic used, followed by vomiting (9.5%), skin rash (9.5%), and diarrhea (7.8%).

In previous study Lim *et al.* [30] showed that 52% did not experience antibiotic-associated side effects.

In the present study, 57.6% believed that broad-spectrum antibiotic is better than narrow-spectrum (70.4%) deny that higher doses enhance recovery, 57.3% believed that low dose decrease side effects while

Table 2: Concepts of the antibiotic uses among students included in the study

Answer*	Correct answer (antimicrobial) (%)	Wrong answer (%)			I do not know (%)
Number of students (1035)	225 (21.73)	705 (68.12)			105 (10.14)
		Analgesic 537 (76.17)	Antipyretic 75 (10.64)	Colic 93 (13.19)	

*Sig. distribution differences

Table 3: Bases of the anti-biotic selection among non-medical students Jouf University

Gender	Previous prescription (%)	Nurse a devise (%)	Pharmacy a device (%)	Own experience (%)	Relatives (%)
Total (%)	554 (53.5)	115 (11.1)	117 (11.3)	150 (14.5)	99 (9.6)
Male	338 (59)	61 (10.6)	45 (7.9)	72 (12.6)	57 (9.9)
Female	216 (46.8)	54 (11.7)	72 (15.6)	78 (16.9)	42 (9.1)

Table 4: Types of antibiotic commonly used among non-medical students Jouf University

Gender	Ampicillin (%)	Amoxicillin (%)	Augmentin (%)	Other (%)	I do not know (%)
Total (%)	136 (13.1)	147 (14.2)	118 (11.4)	159 (15.4)	475 (45.9)
Male	70 (12.2)	84 (14.7)	40 (7)	93 (16.2)	286 (49.9)
Female	66 (14.3%	63 (13.6)	78 (16.9)	66 (14.3)	189 (40.9)

57% believed that switching antibiotic enhance drugs effects. The prevalence of inappropriate attitudes was higher compared to previous work [29,31,37].

In the present work, the reason for which students included the study SAM are variables; where 51.9% depend on their good medical knowledge, while 20.3% was to save time, whereas who depend on pharmacy expert was 18.8% where only 9% was to save money and decrease the cost.

In Saudi community, all populations are covered by health insurance; this explained why the cost factor is the last one for SMA.

Antibiotic carry several risks, especially when used without a physician prescription. The exact burden of this problem is not known [38].

Many recommendations should be applied to raise the awareness toward self-medication; drugs that are available without the need for prescription by a physician or trained medical personnel should only be the ones which are safe to use. The government should also ensure that users are educated properly about not only the use of

the drug but also the correct dosages, duration of use and potential side effects associated with them as antibiotics are tailored not only according to the disease but also according to the individual patient profile.

Effective doctor-patient communication and patient empowerment have been shown to reduce antibiotic prescribing for coughs and colds in the primary care setting [39]. Besides the knowledge, instilling the right attitude should also be a priority as simply increasing public knowledge on antibiotics has been shown to cause higher incidences of self-medication [31].

Unfortunately, the damage caused by the misuse of antibiotics goes beyond the damage caused by the drug itself. The damage includes killing the beneficial bacteria in our body (e.g., in the gastrointestinal tract), disruption of the immune system's normal functioning, and many other side effects.

The WHO has become concerned about the rising levels of resistant bacteria around the world. To provide global coordination, the WHO issued its Global Strategy for Containment of Antimicrobial Resistance, a document aimed at policy-makers that urge governments to take action.

South Korea created the National Antimicrobial Resistance Experts Committee in 2003, which, in turn, has implemented a number of national educational campaigns on the appropriate use of antibiotics in various ways targeted to the general public [40]. The results of this study show that the need to implement a similar campaign or else face the consequences associated with the misuse of antibiotics.

Table 5: Complete drug used

Gender	End of the dose (%)	Improvement (%)	Change every time (%)
Number (%)	291 (28.1)	648 (62.6)	96 (9.3)
Male	132 (23.0)	363 (63.4)	78 (13.6)
Female	159 (34.4)	285 (61.7)	18 (3.9%)

Table 6: Saving antibiotic at home for use

Gender	Saving antibiotic at home (%)		Incomplete drug course (%)				Share antibiotic with others (%)		
	Yes	No	Improvement	Side effect	Bad taste	Ineffective	Yes always	Never	Occasionally
Count (%)	780 (75.4)	255 (24.6)	546 (52.8)	165 (15.9)	309 (29.9)	15 (1.4)	649 (62.7)	298 (28.8)	88 (8.5)
Male	450 (78.5)	123 (21.5)	330 (57.6)	78 (13.6)	153 (26.7)	12 (2.1)	304 (53.1)	202 (35.3)	67 (11.7)
Female	330 (71.4)	132 (28.6)	216 (46.8)	87 (18.8)	156 (33.8)	3 (0.6)	345 (74.7)	96 (20.8)	21 (4.5)

Table 7: Experience side effects

Gender	Nausea (%)	Vomiting (%)	Diarrhea (%)	Skin rash (%)	Drug resistance (%)	No side effects (%)
Total (%)	200 (19.3)	98 (9.5)	81 (7.8)	99 (9.5)	192 (18.6)	365 (35.3)
Male	110 (19.2)	58 (10.1)	51 (8.9)	75 (13.1)	105 (18.3)	174 (30.4)
Female	90 (19.5)	40 (8.7)	30 (6.5)	24 (5.2)	87 (18.8)	191 (41.3)

Table 8: Some concepts and attitude toward antibiotic uses

Gender	Broad is better than narrow## (%)		Higher doses enhance recovery### (%)		Low dose decrease side effects#### (%)		Switching antibiotic enhance drugs effects##### (%)	
	Yes	No	Yes	No	Yes	No	Yes	No
Total (%)	596 (57.6)	439 (42.4)	306 (29.6)	729 (70.4)	593 (57.3)	442 (42.7)	# 445 (43.0)	590 (57.0)
Male	326 (56.9)	247 (43.1)	174 (30.4)	399 (69.6)	324 (56.5)	249 (43.5)	245 (42.8)	328 (57.2)
Female	270 (58.4)	192 (41.6)	132 (28.6)	330 (71.4)	269 (58.2)	193 (41.8)	200 (43.3)	262 (56.7)

#p = 0.065, ##p = 0.658 (male vs. Female), ####p = 0.538 (male vs. Female), ####p = 0.613 (male vs. female), #####p = 0.900 (male vs. Female)

Table 9: Cause of self-medication

Gender	Cause of self-medication			
	Good medical knowledge	The decrease of the cost	No time available	Pharmacy expert
Total (%)	537 (51.9)	93 (9.0)	210 (20.3)	195 (18.8)
Male	333 (58.1)	33 (5.8)	96 (16.8)	111 (19.4)
Female	204 (44.2)	60 (13.0)	114 (24.7)	84 (18.2)

Interventions are usually aimed at specific populations and risk factors [41]; however, reported SMA risk factors are varied and inconsistent across the studies [16,17,19,42,43]. One of the most important and effective way to decrease the incidence and hazardous of SMA is initiating an educational program for the public and antibiotic sales/use restriction by law and regulation implementation [41]. An interesting example for this is Chile interventions which included strict restriction on over-the-counter sales of antibiotics and public education campaign which results in a significant decrease in antibiotic use [41,44]; on the other hand, South Korea followed another national policy in the form of banning doctors who dispense drugs that result in significantly reduced the use of generic antibiotics and improved the quality of antibiotic prescriptions, especially for viral infections [45].

The misuse of antibiotics by health-care practitioners and patients can be targeted by developing prescription guidelines, informing the public more thoroughly, regulating the use of antibiotics more strictly, investing more resources in developing new antibiotics, urging physicians to continue going through medical education programs, and promoting the use of alternatives (vaccination, general hygiene, and healthy lifestyles). Vaccination reduces the need, and thus the use, of antibiotics by preventing or reducing infections. General hygiene plays an important role in preventing the dissemination of resistant bacteria. Moreover, healthy diet and exercise enhances physical strength and immunity, and thus reduces the need for antibiotics.

CONCLUSION

The majority of the sample had a fair level of knowledge in relation to antibiotics. Unfortunately, many people were using antibiotics for the wrong reasons and in the wrong way. Design of national antibiotic awareness campaigns to raise the public awareness towards antibiotic misuse/abuse. More restriction should be applied regarding antibiotic usage as an over-the-counter drugs.

LIMITATION

- We did a written questionnaire-based survey instead face to face questionnaire.
- Girl locations were unreachable due to the organization and religious reasons; we got help from girl students to carry on this survey.
- Finally, we should consider that not all answers were given honestly due to respondent bias.

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AUTHORS' CONTRIBUTIONS

Conception, designing of the study, data collection, data analysis, and interpretation, drafting the article, critical revision of the article, final approval of the study to be published are carried out by Dr. Gomaa. Data collection in the form of questionnaire distribution and collection with done by a number of boy and girl students.

CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest.

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