



**IBEROAMERICAN
JOURNAL OF
MEDICINE**

iberoamericanjm

Journal homepage: www.iberoamericanjm.tk

Original article

Knowledge, attitude and pattern of antibiotic utilization among Libyan University students in Zawia

Hana Smeda^a, Amera Murghem^a, Aya Khapoli^a, Sana Gaunos^a, Rabab Alahrish^a, Fathi M. Sherif^{b,*}, Shukri M. Alsharif^c

^aDepartment of Pharmacology and Biochemistry, Faculty of Pharmacy, University of Zawia, Zawia, Libya

^bDepartment of Pharmacology and Clinical Pharmacy, Faculty of Pharmacy, University of Tripoli, Tripoli, Libya

^cDepartment of Pharmaceutilcal Chemistry and Pharmacognosy, Faculty of Pharmacy, University of Zawia, Zawia, Libya

ARTICLE INFO

Article history:

Received 6 April 2020

Received in revised

form 8 April 2020

Accepted 9 April 2020

Keywords:

Antibiotics

Bacteria

Community

Health education

Libya

Utilization

Students

ABSTRACT

Introduction: The antimicrobial agents have saved human from several infectious disease. However, bacteria have capability to develop to become resistant to antibiotics and incorrect use of antibiotics is the main determinants of development of antimicrobial resistance which is a public health issue. Attention on medical students and community people should be emphasized by both education and promotion. Thus, this study was aimed to assess the present knowledge, attitude and behavior of Libyan university students regarding antibiotic use and misuse.

Methods: Sample size of 150 students attending faculty of pharmacy of university of Zawia, Libya was participated. The procedure was divided into five groups according to their grades. All the involved participants completed a health questionnaire about their utilization and mal utilization of antibiotics. Data was collected over a period of two months during July and August 2019.

Results: The evaluated data was from 150 students; 132 were females and 18 were males (7.3 : 1.0). 88.0% use antibiotics to cure bacterial infection while 15.3% use it to cure viral infection. 38.0% never use antibiotics to treat respiratory tract infections such as common cold, 34.0% sometimes and 26.0% always. In addition, 61.0% stopped using antibiotic based on physician's instruction while 8.0% when symptoms decreased. Regarding their attitude toward antibiotic misuse, 82.0% agreed that it is necessary to get more education and promotion about pattern of antibiotic use and 73.0% agreed to establish courses on antibiotic rationale use.

Conclusion: Students at medical university of Zawia have a considerable knowledge and a great perspective on antibiotics utilization. However, there is still a need for more additional educational programs on antibiotic utilization and mal utilization targeted university students and community people in Libya.

© 2020 The Authors. Published by Iberoamerican Journal of Medicine. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).

1. INTRODUCTION

Antibiotic mal utilization is one of the biggest worldwide challenges to health care. Following use of non-prescribed

antibiotics to treat various infections, the world saw an increase of microbial resistance over the past three decades [1]. While the antibiotic resistance may increase as long as antibiotics are in use, its clinical significance has not been clearly studied [2]. Many antibiotic therapies have become

* Corresponding author.

E-mail address: Fmosherif@yahoo.com

© 2020 The Authors. Published by Iberoamerican Journal of Medicine. This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by/4.0/>).

<http://doi.org/10.5281/zenodo.3746060>

useless due to the increase in antibiotic-resistant microorganisms such as VRSA and superbugs. So, antibiotic resistance has become a global public health problem due to the continued overuse and misuse of antibiotics [3].

Mal utilization of antibiotic therapy includes failure to complete therapy, skipping dosages, self-medication and use of left-over antibiotics as well as prescribing errors [4, 5]. Consequently, this behavior also leads to economic loss, increase in treatment failure, and need to revisit physicians [6]. Other factors affecting antibiotic therapy misuse are the patient's knowledge of antibiotics, expectation of therapy, physician's experience and pharmaceutical marketing [1, 7, 8]. For example, a previous study conducted by medical students in the United States showed that university students tend to misuse antibiotics and emphasized the need for further education and feedback on antibiotic prescribing to help control antimicrobial overuse and misuse [9, 10]. Also, a Chinese study shows widespread prescriptions of unnecessary antibiotics particularly parentally used agents [11]. In addition, a prevalent prescribing (misuse and overuse) of antibiotics by more than 25% of the patients has recently been reported in Libya [12, 13].

Drug-resistant microbes of all types can transfer among individuals and animals as well as from one country to another without a notice. Bacterial resistance to antimicrobial medications is threatening our ability to treat some infectious diseases [9], leading to prolonged sickness, disability and death. There are several ways of how bacteria can resist antibiotics by changing cell entry, efflux pumps and antibiotic degrading enzymes activities which modify the structure of the antibiotic that will not work against the bacteria. Furthermore, physical changes to antibiotic targets; thus, bacteria are able to change their structures so they still function exactly as before but the antibiotic does not recognize them [7]. Antibiotic resistance mechanisms occur when the bacteria are inside humans, animals or even in the environment [2]. This is why utilizing antibiotics in the farming industry is also an issue. Besides, bacteria can become antibiotic-resistant within the animals and then they can pass into the environment through things like manure [3]. Thus, it is essential to guard the current antibiotics by appropriately using and to invest time and money in developing new antibiotics [14]. Unfortunately, the bacteria that already killed by certain antibiotics have become resistant. This change can occur by genetic mutation where the bacterial DNA that stores the bacteria's information and codes for its traits, randomly changes or mutates. If this modification, that could be resistance to antibiotics, helps the mutated bacteria survive and reproduce then it will thrive and outgrow the unchanged bacteria. Random mutation could happen with or without antibiotic overuse. However, the resistant changes solely stay in the bacterial population if the antibiotic is permanently present in the bacteria's environment. Thus, an overuse of antibiotics leads to propagation and maintenance of these changes [2,

7]. In Zawia, taking antibiotic without prescription was found to be alarming and the health issues will rise as a result of antibiotic misuse. Accordingly, this study aimed to examine antibiotic pattern use among pharmacy students of university of Zawia to evaluate the prevalence of antibiotic use and to examine individual characters connected to antibiotic use

2. MATERIALS AND METHODS

2.1. STUDY DESIGN

This study adopted survey questionnaire designed to assess the use and misuse of antibiotics among university students (Table 1). This study was undertaken in Faculty of Pharmacy, University of Zawia, Zawia, Libya during July and August, 2019. Number of participants was the students involved in pharmacy (1st to 4th grades, n = 150).

2.2. STUDY QUESTIONNAIRE

A questionnaire was developed based on the literature review and reported items influencing individual choice of using and misusing antibiotic therapy. The questionnaire was written in both language (English and Arabic) and included different parts; demographic information and utilization and mal utilization of antibiotic therapy.

2.3. ANALYSIS OF DATA

The response of participants for each question was assessed by calculating the frequency and percentage and were performed by using Microsoft Excel 2010.

3. RESULTS

3.1. DEMOGRAPHIC CHARACTERISTICS

In table 2, a total of 150 students completed the questionnaire. The students represented all academic years at Faculty of Pharmacy of University of Zawia, Zawia (2nd large city in the west of Libya). The majority of the participants were female students 88.0% (n = 132) while the male students represented only 12.0% (n = 18) of the sample population. The range of age of the students was between 18 and 26 years (Table 2).

3.2. ANTIBIOTIC USE KNOWLEDGE

In Table 3, the majority of students responded correctly about using antibiotics to cure bacterial infection (n = 132, 88.0%) while only 23 students thought that antibiotics cure viral infection ((15.3%). Students also reported that they usually use antibiotics when they had symptoms such as cough with fever (90.0%); cough lasting two weeks or

more (91.0%) and sometimes they used to treat common cold (34.6%) and never take antibiotic in case of congested nose with headache (Table 4). With regard to antibiotic

time course, high proportion of students stopped using antibiotic based on the physician's instruction (61.3%), only 8.0% when the symptoms decreased and 11.3% on

Table 1. Antibiotic utilization questionnaire

Demographic characteristics			
Age			
Gender			
Nationality			
Academic year			
Faculty			
Student's knowledge of using antibiotics			
	Yes	No	Do not know
- Can antibiotics be used to cure bacterial infections?			
Can antibiotic be used to cure viral infections?			
Do you think that frequent & unnecessary use of antibiotics has any negative consequences? If yes, specify			
Should antibiotics be used when the following respiratory symptoms are present?			
Time of stopping the antibiotics :(symptoms disappeared, symptoms decreased, based on the doctor's instructions)			
Perceptions of antibiotics			
	Agree	Disagree	Do not know
There is a mal utilization of current antibiotics by people in Libya			
Antibiotic resistance can negatively affect you and your family's health			
Antibiotics mal utilization is the main reason for antibiotic resistance			
There is abuse of current antibiotics by pharmacists in Libya			
There is abuse of current antibiotics by physicians in Libya			
Antibiotic resistance is a problem in Libya			
Student's experiences with antibiotics use			
	Always/Often	Rarely/Sometimes	Never
Have you ever used antibiotics without a doctor prescription?			
Has a pharmacist ever sold you antibiotics without a doctor prescription?			
Have you ever used antibiotics as a prevention so that you do not become sick?			
Have you ever used irregularly antibiotics prescribed by a doctor?			
In certain cases, if the physician did not prescribe antibiotics for you, will you ask him to do so?			
If doctors refused to prescribe antibiotics for you, will you insist on him to do so?			
Has a doctor ever explained to you the correct use of antibiotics?			
Student's attitude toward antibiotic use			
	Agree	Disagree	Do not know
Necessary to get more education about antibiotics.			
Need to establish course on 'rationale use of antibiotics' at university			
Need to establish course on 'rationale use of antibiotics' at university			

disappeared (Figure 1).

Table 2. Participants characteristics (n = 150)

Factors	Category	N (%)
Student grade	First year	14 (9.3%)
	Second year	50 (33.3%)
	Third year	37 (24.6%)
	Fourth year	49 (32.6%)
Gender	Male	18 (12%)
	Female	132 (88%)
Age (years)	18 - 19	12 (08%)
	20 - 21	50 (33.3%)
	22 - 23	59 (39.3%)
	24 - 26	29 (19.3%)

Table 3. Antibiotics use to cure infection

Type	Yes	No	Do not know
To cure bacterial infection	13 (8.6%)	5 (3.3%)	132 (88.0%)
To cure viral infection	14 (9.3%)	113 (75.5%)	23 (15.3%)

Table 4. Antibiotics use to treat symptoms of respiratory system

Respiratory tract infections	Always	Sometimes	Never
Common cold	40 (26.6%)	52 (34.6%)	58 (38.6%)
Coughing up yellow/green sputum	73 (48.6%)	42 (28.0%)	35 (23.5%)
Cough with fever	90 (60.0%)	37 (24.6%)	17 (11.3%)
Congested nose with headache	34 (22.6%)	27 (18.0%)	80 (53.3%)
Coughing up white sputum	52 (34.6%)	44 (29.3%)	46 (30.6%)
Cough lasting two weeks or more	91 (60.6%)	34 (22.6%)	20 (13.3%)

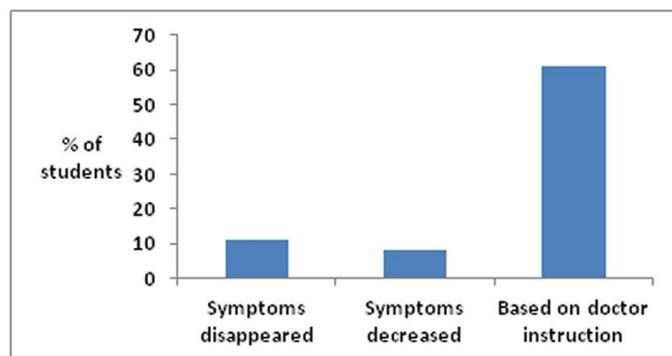


Figure 1: Time stopping antibiotic.

3.3. PERCEPTIONS ABOUT ANTIBIOTICS

In table 5, overall, participants had a good awareness of antibiotic misuse with about 70.0% of the students reported that there is a current misuse of antibiotics in Libya. About two-thirds of the students agreed that the antibiotic resistance had a negative effect on their health (70.0%). High proportion (88.0%) adopted that antibiotic misuse is the leading cause of antibiotic resistance and about 70.0% of them agreed that antibiotic resistance is a public health issue in Libya. Noteworthy, about 60.0% of the students agreed that there is antibiotics a significant misuse by pharmacists and 60% reported misuse by physicians.

Table 5. Perception of antibiotics

Parameters	Agree	Disagree	Do not know
There is a current mal utilization of antibiotics by people in Libya	106 (70.6%)	12 (8%)	28 (18.6%)
Antibiotic resistance can negatively affect you and your family's health	105 (70.0%)	15 (10%)	26 (17.3%)
Antibiotics misuse is the main reason for antibiotic resistance	132 (88.0%)	9.0 (6.0%)	4.0 (2.6%)
There is abuse of current antibiotics by pharmacists in Libya	91 (60.6%)	28 (18.6%)	23 (15.3%)
There is abuse of current antibiotics by doctors in Libya	90 (60.0%)	26 (17.3%)	27 (18%)
Antibiotic resistance is a problem in Libya	107 (71.3%)	9.0 (6.0%)	34 (22.6%)

3.4. STUDENTS EXPERIENCES WITH ANTIBIOTICS USE

In Table 6, the personal experiences of students with antibiotics indicated that about 40.0% of the students often/always used antibiotics without a physician's prescription. Also, about 40.0% of the students reported that they bought antibiotics from pharmacy without a physicians' prescription. About 45.0% reported that a physician ever explained to them the correct use of antibiotics. Unexpectedly, 25% of the students stated that if the physician did not prescribe antibiotics for them, they would ask him to do so and if he/she refused, few of them (14.6%) reported they would insist to do so (Table 6).

3.5. STUDENT'S ATTITUDE TOWARD ANTIBIOTICS MISUSE

In Table 7, a high proportion of the students responded positively about attitude toward antibiotic misuse. Thus, 82.0% of students confirmed that they need to be more educated about antibiotics and about 75.0% agreed to establish a course on rationale use of antibiotic at some level of undergraduate.

Table 6. Students experiences with antibiotic use

Variable	Always/ Often	Rarely/Sometimes	Never
Have you ever used antibiotics without a doctor prescription?	62 (41.3%)	59 (39.3%)	24 (16.0%)
Has a pharmacist ever sold you antibiotics without a doctor prescription?	24 (16.0%)	59 (39.3%)	27 (18.0%)
Have you ever used antibiotics as prevention so that you do not become sick?	23 (15.3%)	34 (22.6%)	78 (52.0%)
In certain cases, if the doctor did not prescribe antibiotics for you, would you ask him to do so?	37 (24.6%)	50 (33.3%)	57 (38.0%)
If the doctors refused to prescribe antibiotics for you, would you insist to do so?	22 (14.6%)	39 (26.0%)	80 (53.3%)
Has a doctor ever explained to you the correct use of antibiotics?	65 (43.3%)	50 (33.3%)	34 (22.6%)

Table 7. Students attitude toward antibiotic misuse

Variable	Agree	Disagree	Do not know
Necessary to get more education about antibiotic	123 (82.0%)	0 (0.0%)	10 (6.6%)
Need to establish a course on rationale use of antibiotic at university	110 (73.3%)	14 (9.3%)	10 (6.6%)

4. DISCUSSION

In this study, we aimed to assess several issues including student knowledge and perception of using antibiotic, students' experiences with antibiotics use and students' attitude toward antibiotics abuse in the West of Libya. Thus, the findings revealed that there is a good knowledge about antibiotic utilization and mal utilization among university pharmacy students in Zawia (west part of Libya) compared with university students in other areas as Libya (Benghazi, east part of Libya) and Jordan [15, 16]. High proportion of participants reported that antibiotics are used for bacterial infection (88.0%) and about 75.0% of the students stated that antibiotics could not be used for viral infection. In contrast, only few students thought that

antibiotics could be used for this purpose (15.3%). These findings are much better than those obtained from a survey conducted in Jordan in 2015 among student's university where about 50% of the participants stated that antibiotics are used for viral infection treatment [16]. The inappropriate use of antibiotics to treat respiratory tract infections (RT symptoms) is another aspect of antibiotic misuse. In the present study, students stated that antibiotics should always/often be used for common cold symptoms (26.6%) and cough with fever (60.0%). Compared to study conducted in Jordan, the respondents reported using antibiotics for treatment of common cold (61.0%) and cough with fever (59.8%) [9]. A similar study was conducted in Nigeria showed that about 35.0% of Nigerian students use antibiotics to treat cold [17]. Results from study in Benghazi University (east part of Libya) included 180 medical students showed about 45.0% of them used antibiotics for treatment of flu or runny nose illnesses [15]. Regarding the course of treatment, high proportion of students stopped using antibiotic based on the physician's instruction (61.0%) while only 8.0% stopped when the symptoms decreased. Similar results were recorded in Jordan where 65% of participants did not complete their treatment course. Only 6.5 % of them stopped on physician request whereas 60.0% stopped when they felt better [18]. Focusing on the experiences of students with antibiotics use showed that about 40% of participants had antibiotics without a prescription. This attitude has also been reported in study in Jordan and Nigeria whereas 51.0% and 98.5% of the participants used antibiotics without a prescription, respectively [17, 19]. Comparable numbers have also been reported in several studies in Europe among general populations where rates ranged from 10 - 45% in Britain and Greece, respectively [20]. About 25.0% of participants said if the physician did not prescribe antibiotic, they would ask him to do so. If physician refused, 15% of them reported that they would insist. This behavior was also observed in Jordan and other studies [16].

The findings about perceptions of antibiotics revealed a very good knowledge among our students. Around two third of participants agreed that there is a current misuse of antibiotics by pharmacists and physicians in Libya. Moreover, about 70.0% of students thought that the frequent and unnecessary use of antibiotics have negative consequences. Also, a very large proportion of students stated that this would cause bacterial resistance (88.0%). This is still much better than that reported in Jordan, in which 60% of participants illustrated less than 50.0% correct answer about antibiotics resistance [16]. Although high percent of pharmacy students in university of Zawia demonstrated a good knowledge about antibiotics utilization and mal utilization, however, majority of students confirmed that they need to be more educated about antibiotics use (80.0%) and about 75.0% agreed to establish a course on rationale use of antibiotic in university and community.

5. CONCLUSION

This study indicates that university students have good knowledge and huge perspective on antibiotics utilization and mal utilization as well as practice right attitude in antibiotics use. This points a satisfactory curriculum of teaching for pharmacy students in Zawia for antimicrobial knowledge than other universities. However, a need for more educational programs about antibiotic utilization and drug rationale use in Libya targeted both university medical students and community people. More attention is also required to controlled use of antibiotics, not only the non-prescribed but also the prescribed ones through increasing consciousness of physician on prescribing and re-prescribing antibiotics.

6. ACKNOWLEDGEMENTS

We would like to thank all volunteer students who participated in this study.

7. REFERENCES

1. Azevedo MM, Pinheiro C, Yaphe J, Baltazar F. Assessing the impact of the school intervention to promote students' knowledge and practices on correct antibiotic use. *Int J Environ Res Public Health*. 2013;10(7):2920-31. doi: 10.3390/ijerph10072920.
2. Allison D, Hughs S. Antibiotic resistance awareness: spreading the word, not the worry. *Perspect Public Health*. 2015;135(6):284-5. doi: 10.1177/1757913915060664.
3. Khachatourians GG. Agricultural use of antibiotics and the evolution and transfer of antibiotic-resistant bacteria. *CMAJ* 1998;159(9):1129-36.
4. Al-Azzam SI, AL-Husein BA, Alzoubi F, Masadeh MM, AL-Horani MA. Self-medication with antibiotics in Jordanian population. *Int J Occup Med Environ Health*. 2007;20(4):373-80. doi: 10.2478/v10001-007-0038-9.
5. André M, Vernby Å, Berg J, Lundborg CS. A survey of public knowledge and awareness related to antibiotic use and resistance in Sweden. *J Antimicrob Chemother*. 2010;65(6):1292-6. doi: 10.1093/jac/dkq104.
6. Kamala T, Yves K, Bibi B, Jean-Pierre A, Hugo D, Christel Van G, et al. Antibiotic prescribing in DR Congo: a knowledge, attitude and practice survey among medical doctors and students. *PloS One*. 2013;8(2):e55495. doi: 10.1371/journal.pone.0055495.
7. Senka D, Jagoda S, Blazenska K. Antibiotic resistance mechanism in bacteria: biochemical and genetic aspects. *Food Technol. Biotechnol*. 2008;46(1):11-21.
8. Richman PB, Garra G, Eskin B, Nashed AH, Cody R. Oral antibiotic use without consulting a physician: a survey of ED patients. *Am J Emerg Med*. 2001;19(1):57-60. doi: 10.1053/ajem.2001.20035.
9. Ivanovska V, Zdravkovska M, Bosevska G, Angelovska B. Antibiotics for upper respiratory infections: Public knowledge, beliefs and self-medication in the Republic of Macedonia. *Pril (Makedon Akad Nauk Umet Odd Med Nauki)*. 2013;34(2):59-70.
10. Poole K. Mechanisms of bacterial biocide and antibiotic resistance. *J Appl Microbiol*. 2002;92S:55-64.
11. Lee CR, Cho IH, Jeong BC, Lee SH. Strategies to minimize antibiotic resistance. *Int J Environ Res Public Health*. 2013;10(9):4274-305. doi: 10.3390/ijerph10094274.
12. Sherif FM. An evaluation of the prescribing patterns of drugs in Libya. *Jam Med J*. 2008;8(3):203-6.
13. Atia A. Physician trends of drug prescription in Libya: a pharmacological study. *Pharmacophore*. 2019;10(3):33-8. doi: 10.1007/s15010-008-8060-9.
14. Umgelter A, Reindl W, Miedaner M, Schmid RM, Huber W. Failure of current Antibiotic first-line regimens and mortality in hospitalized patients with spontaneous bacterial peritonitis. *Infection*. 2009;37(1): 2-8. doi: 10.1007/s15010-008-8060-9.
15. Ghaieth F, Elhag SRM, Hussien ME, Konozy EH. Antibiotics self-medication among medical and nonmedical students at two prominent Universities in Benghazi city, Libya. *J Pharm Bioallied Sci*. 2015;7(2):109-15. doi: 10.4103/0975-7406.154432.
16. Shehadeh M, Suaifan G, Darwish RM, Wazaify M, Zaru L, Alja'fari S. Knowledge, attitudes and behavior regarding antibiotics use and misuse among adults in the community of Jordan. A pilot study. *Saudi Pharm J*. 2012;20(2):125-33. doi: 10.1016/j.jsps.2011.11.005.
17. Ayepola OO, Onile-ere OA, Shodeko OE, Akinsiku FA, Ani PE, Egwari LO. Knowledge, Attitude and Pattern of Antibiotic Usage among Students of a Nigerian University. *J Microbiol Infect Diseases*. 2019;9(1):10-5. doi: 10.5799/jmid.537133.
18. Ghadeer ARY, Shehadeh SM, Darwish DA, Al-Ijel H, Yousef AM, Darwish RM. A cross-sectional study on knowledge, attitude and behavior related to antibiotic use and resistance among medical and non-medical university students in Jordan. *African J Pharmacy Pharmacol*. 2012;6(10):763-70. doi: 10.5897/AJPP12.080.
19. Awad A, Eltayeb I, Matowe L, Thalib L. Self-medication with antibiotics and antimalarials in the community of Khartoum State, Sudan. *J Pharm Pharm Sci*. 2005;8(2):326-31.
20. Napolitano F, Izzo MT, Di Giuseppe G, Angelillo IF. Public knowledge, attitudes, and experience regarding the use of antibiotics in Italy. *PLoS One*. 2013;8(12):e0084177. doi: 10.1371/journal.pone.0084177.