

Original article

Knowledge, Attitude and Practices Regarding Antibiotics usages among Medical Students at Zawia University

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ARTICLE INFO

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Received: 28-07-2024

Accepted: 20-09-2024

Published: 29-09-2024

Keywords. Knowledge, Antibiotics, Medical Student, Zawia

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ABSTRACT

Antimicrobial resistance (AMR) is a serious threat to global public health. It increases morbidity and mortality, and is associated with high economic costs due to its health care burden. Medical students are particularly important since they will be the future leaders in clinic practice, responsible for antibiotic prescription and communication about antibiotic use with their patients. In this study we aimed to understand knowledge, attitude, and practice (KAP) with respect to antibiotic use among medical students in faculty of medicine, Zawia University. This is a cross-sectional design; it was undertaken in Faculty of Medicine during October and November: 2023. The questionnaire was administered to students in (III 3rd and IV 4th grades). All data were analyzed using Statistical Package for Minitab program. Majority of the respondents were female with ages of 22 years. Higher percentage of 4th-grade students (95.5%) correctly accepting the need to stop antibiotic use compared to 3rd-grade students (27.9%, $p < 0.001$). On other hand with a higher percentage of 4th-grade students reporting using non-prescribed antibiotics rarely compared to 3rd-grade students (46.3% for 4th grade and 69.8% for 3rd grade, $p = 0.003$). this study exposed an important awareness concerning the separate between medical students' knowledge about antimicrobial resistance, and appalling attitudes and practices towards antibiotics use. We need for the re-evaluation of the educational curricula especially, teaching of clinical pharmacology courses in clinical years.

Cite this article. Almadah R, Alazraq H, Khetresh M, Gazeti S. Knowledge, Attitude and Practices Regarding Antibiotics usages among Medical Students at Zawia University. *Alq J Med App Sci.* 2024;7(4):916-926. <https://doi.org/10.54361/ajmas.247404>

INTRODUCTION

Antimicrobial resistance (AMR) is a serious threat to global public health. It increases morbidity and mortality, and is associated with high economic costs due to its health care burden [1]. Antibiotic resistance is one of the world's most fatal health issues with attributed mortality rate is 700,000 [2]. AMR has led to adverse consequences, including severe illnesses, more prolonged admission to hospital, increased healthcare costs, an overburdened public health system, treatment failure, increased costs in second-line-drugs, and even increased mortality rates. Without prompt action, the yearly death toll could reach 10 million by 2050, which is more than deaths resulting from cancer, measles, cholera, and traffic accidents combined [3].

Annually about 33,000 people will die in the European Union and European Economic Area (EU/EEA) due to an infection with a resistant bacterial strain by 2050 [4]. The hospital stays for patients with AMR averages around 13 days, causing an additional 8 million hospital days annually, with cost up to US \$29,000 per patient [5]. In recent decades, the development of new antibiotics has declined sharply, where only three new antibiotics received FDA approval in the last 30 years [6]. The lack of antibiotic development requires the conservation of existing ones. The misuse of

antibiotics has been linked to both patients and/ or physicians who irresponsibly prescribe these medications, the unreasonable prescribing of antibiotics is a vital public health problem, this includes antibiotics consumed for self-recognized symptoms or un-official medical consultation. Misutilization of antibiotics includes failure to complete the course duration, missing doses, self-medicating, and using inappropriate type of antibiotics. Other factors affecting antibiotic therapy misuse are the patient's knowledge of antibiotics, expectation of therapy, physician's experience and pharmaceutical marketing [7] and a study in Saudi Arabia has shown that community pharmacies non-prescribed sale of antibiotics ranged from 63-82% [8]. A systematic review of Chinese patients with upper respiratory infections showed that more than 80% prescribed antibiotics [9]. 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 [10].

In Zawia, taking antibiotic without prescription was found to be alarming and the health issues will rise as a result of antibiotic misuse and focusing on the experiences of medical students with antibiotics use showed that about 40% of participants (pharmacy students) had antibiotics without a prescription, also, about 40.0% of the students reported that they bought antibiotics from pharmacy without a physicians' prescription as reported in Fathi M. Sherif survey and his college's [11]. In addition, a prevalent prescribing (misuse and overuse) of antibiotics by more than 25% of the patients had been reported in Libya [12-13]. Medical students are particularly important since they will be the future leaders in clinic practice, responsible for antibiotic prescription and communication about antibiotic use with their patients. To promote judicious use of antibiotics, adequate training should be provided to undergraduate medical students regarding proper prescribing, dispensing and use of antibiotics. Self-medication has not been well studied among health students in Africa. This study was undertaken among third- and fourth-year medical students at University of Zawia, faculty of medicine, Libya to assess their Knowledge, Attitude and Practices (KAP) regarding antibiotics used and resistance's. Objective: Inappropriate antibiotic use leads to antibiotic resistance. This has become a serious global crisis, with more multi-drug resistant infections and fewer effective antibiotics available. This study aims to understand knowledge, attitude, and practice (KAP) with respect to antibiotic use for self-limiting illnesses among medical students in faculty of medicine Zawia University.

METHODS

Study design

This study was carried out using a cross-sectional design; a pretested, pre-validated structured questionnaire was administered to a sample of 110 after obtaining verbal informed consent to participate in the study. This study was undertaken in Faculty of Medicine, University of Zawia, Zawia, Libya during October and November, 2023. The respondents were the students in (III 3rd and IV 4th grades) with in academic year.

Study questionnaire

The questionnaire was developed by reviewing available questionnaires in the literature [16] and reported items influencing individual choice of using and misusing antibiotic therapy. The respondents completed a self-administered questionnaire. Assistance was provided by the interviewer whenever requested. Comparability with those surveys and the validity of the instrument were important factors in determining which questions to be included in this survey. Every effort was made during the literature review to ensure content validity. Moreover, various drafts of the questionnaire were evaluated individually by two clinical pharmacists in order to ensure face validity and to be applicable.

A preliminary test was applied on representative sample (around 18.18% of the target sample) (n= 20) to address any ambiguity in the questions and to determine whether the data would provide reliable information (change some terms for more clarification). Data collected during this pilot part of the study were excluded from the final data analysis.

The questionnaire questions divided into four sections: The first section covered participant's demographic data such as sex and age. The second section involved students' knowledge on the purpose of using antibiotics, such as can antibiotics be used to cure viral infections? The third and fourth section enclosed attitude and practice of respondents on antibiotics as: Do you prefer to use antibiotics when you: runny nose, common cold?. Questions on the duration over which the antibiotic was taken, source of the antibiotic supply, etc., were also incorporated.

Statistical analysis

All data obtained by questionnaire were coded, entered, and analyzed using Statistical Package for Minitab program version 13 for Windows, developed by Minitab Inc. The analysis of answers for other questions involved descriptive quantitative statistics, for example, frequency and percentage. The differences in the participants' responses were analyzed with Chi-square test. The 0.05 level of significance was used as a cutoff for statistical significance.

RESULTS

Socio-demographic characteristics of respondents

A total of 110 (85.9%) of the 128 medical students who were participated in this study. As shown in table 1, majority of the respondents were female, comprising of 79 (71.8%) students, the majority of the respondents (46, 41.8%) were ages of 22 years and 1 participant (0.9%) were 27 years old, Majority of the respondents 67 (60.9%) were in the grade four (clinical classes), were 43(39.1%) in grade three (premedical classes). A total of student's 56(50.9%) where had information about antibiotics uses from Health professional compare with (13.9% & 10.9) had information from others and relative respectively.

Table 1. Demographic Characteristics of Participants(n=110)

Variables	N	%
Sex		
Male	31	28.2
Female	79	71.8
Age		
21	6	5.5
22	46	41.8
23	44	40.0
24	4	3.6
25	7	6.4
26	2	1.8
27	1	0.9
Residence		
Rural	53	48.2
Urban	57	51.8
Marital status		
Single	106	96.4
Married	4	3.6
Graduation level		
3 rd grade	43	39.1
4 th grade	67	60.9
Family income		
< 1000	16	14.5
1000-3000	62	56.4
> 3000	32	29.1
Source of information		
Relatives	12	10.9
Friends	11	10.0
Society	10	9.1
Health professional	56	50.9
Radio/TV (Mass media)	6	5.5
Others	15	13.6
Total	110	100.0

Knowledge, attitudes and practice of student on antibiotic uses

As showed in table 2, to assess the knowledge of antibiotic uses among the respondents, a total of Nine questions were asked in this study, the highest number of participants (97.3%) were responded to the statement that antibiotics are useful in fighting bacterial infections correctly, while only 23 students thought that antibiotics cure viral infection (20.9%). Additionally, a significant proportion recognized the importance of completing a full course of antibiotics (86.4%) and the potential negative consequences of frequent and unnecessary antibiotic use (94.5%). Furthermore, a large majority acknowledged the impact of improper antibiotic use on future antibiotic effectiveness (82.7%) and the increased difficulty of treating bacterial infections with frequent antibiotic use (91.8%). However, there were some misconceptions, as a small proportion of respondents incorrectly believed that antibiotics have the same effects as anti-

inflammatory drugs (8.2%). The overwhelming majority of respondents expressed a desire for more education on antimicrobial use and resistance (96.4%).

Table 2. Statements used to assess antibiotic Knowledge among Participants.

Statements	Answer	N	%
Can antibiotics be used to cure bacterial infections?	Yes	107	97.3
	No	3	2.7
Can antibiotic be used to cure viral infections?	Yes	23	20.9
	No	87	79.1
Once the symptoms are relieved, one should immediately stop using antibiotics	Yes	15	13.6
	No	95	86.4
Do you think that frequent & unnecessary use of antibiotics has any negative consequences?	Yes	104	94.5
	No	6	5.5
We will have few antibiotics to use in the future if we do not use antibiotics properly	Yes	91	82.7
	No	19	17.3
The more frequently people use antibiotics, the more difficult it will be to treat bacterial infections	Yes	101	91.8
	No	9	8.2
Antibiotics have the same effects as anti- inflammatory drugs	Yes	9	8.2
	No	101	91.8
Would like more education on antimicrobial use and resistance	Yes	106	96.4
	No	4	3.6

Regarding to attitude of student on antibiotics in table 3, the majority of respondents recognized antibiotic overuse as a serious problem in Libya (94.5%). However, there were predilections for antibiotic use in certain situations, with a significant proportion expressing a preference for antibiotics when experiencing symptoms such as sore throat (61.8%), fever (34.5%), and diarrhea (31.8%). Particularly, there were also instances where respondents showed a more appropriate attitude, with a majority expressing a preference against antibiotic use for symptoms like cough (70.0%), runny nose (77.3%), and common cold (55.5%).

Table 3. Statements used to assess antibiotic attitude among Participants.

Statements	Answer	N	%
Do you think antibiotic overuse is a serious problem in Libya?	Yes	104	94.5
	No	2	1.8
	Unknown	4	3.6
Do you prefer to use antibiotics when you have sore throat?	Yes	68	61.8
	No	33	30.0
	Unknown	9	8.2
Do you prefer to use antibiotics when you have a cough?	Yes	17	15.5
	No	77	70.0
	Unknown	16	14.5
Do you prefer to use antibiotics when you have a runny nose?	Yes	11	10.0
	No	85	77.3
	Unknown	14	12.7
Do you prefer to use antibiotics when you have a common cold?	Yes	33	30.0
	No	61	55.5
	Unknown	16	14.5
Do you prefer to use antibiotics when you have a fever?	Yes	38	34.5
	No	58	52.7
	Unknown	14	12.7
Do you prefer to use antibiotics when you have diarrhea?	Yes	35	31.8
	No	57	51.8
	Unknown	18	16.4

Understandings into the practices of respondents regarding antibiotics as in table 4 shows a significant proportion of respondents reported taking antibiotics for respiratory issues (34.5%) and urinary tract symptoms (35.5%) in the last few months. Additionally, a substantial number of respondents obtained antibiotics directly from a pharmacy (44.5%) without a prescription, indicating potential misuse. Furthermore, the majority of respondents did not discontinue antibiotic therapy once their symptoms subsided (71.8%), and a considerable number admitted to keeping leftover antibiotics for future use (42.7%). This behavior can contribute to inappropriate antibiotic use and the development of antimicrobial resistance.

Table 4. Statements used to assess antibiotic practice among Participants.

Statements	Answer	N	%
For what health problem you took the antibiotic(s) in the last few months?	Cough	13	11.8
	Diarrhea	11	10.0
	Fever	21	19.1
	Respiratory	38	34.5
	Injury/Wound	13	11.8
	Urinary tract symptoms	39	35.5
	Headache	7	6.4
	Colic	5	4.5
	Other	28	25.5
Where did you get the antibiotic(s)?	Examined/consult healthcare professional and prescribed by him/her	58	52.7
	Directly bought from pharmacy	49	44.5
	Lend from other family member, neighbor	1	0.9
	Bought from non-pharmacy source	2	1.8
Did you discontinue therapy once your symptoms subside?	Yes	31	28.2
	No	79	71.8
Do you keep leftovers antibiotics for future use?	Yes	47	42.7
	No	63	57.3
How often do you use non-prescribed antibiotics?	Never	35	31.8
	Rarely	61	55.5
	Often	12	10.9
	Very often	2	1.8

Relation between participants' characteristics and knowledge, attitude and practices about antibiotic use

The results in table 5 compared the knowledge about antibiotics between sex and the results in table 6 compared the knowledge about antibiotics between student grade. In general, both males and females demonstrated a strong awareness that antibiotics can be used to cure bacterial infections, with no significant difference between the genders ($p = 0.271$). However, there were distinguished differences in responses to other questions. For instance, a significantly higher percentage of males knew that antibiotics cannot be used to cure viral infections compared to females ($p = 0.019$). Similarly, there were significant differences in responses regarding the belief that antibiotics have the same effects as anti-inflammatory drugs ($p = 0.007$). Nevertheless, there were significant differences in the understanding of when to stop using antibiotics once symptoms are relieved, with a notably higher percentage of 4th grade students (95.5%) correctly accepting the need to stop antibiotic use compared to 3rd grade students (27.9%, $p < 0.001$). Finally, while there was a trend towards more 4th grade students expressing a desire for more education on antimicrobial use and resistance compared to 3rd-grade students, this difference was not statistically significant ($p = 0.077$).

Table 5. Comparison between male and females in terms of their knowledge about antibiotics

Variables	Answer	Male		Female		P-value
		Count	%	Count	%	
Can antibiotics be used to cure bacterial infections?	Yes	31	100.0	76	96.2	0.271
	No	-	-	3	3.8	
Can antibiotic be used to cure viral infections?	Yes	11	35.5	12	15.2	0.019
	No	20	64.5	67	84.8	

Once the symptoms are relieved, one should immediately stop using antibiotics	Yes	2	6.5	13	16.5	0.169
	No	29	93.5	66	83.5	
Do you think that frequent & unnecessary use of antibiotics has any negative consequences?	Yes	31	100.0	73	92.4	0.252
	No	-	-	6	7.6	
We will have few antibiotics to use in the future if we do not use antibiotics properly	Yes	23	74.2	68	86.1	0.115
	No	8	25.8	11	13.9	
The more frequently people use antibiotics, the more difficult it will be to treat bacterial infections	Yes	25	80.6	76	96.2	0.138
	No	6	19.4	3	3.8	
Antibiotics have the same effects as anti-inflammatory drugs	Yes	5	16.1	4	5.1	0.007
	No	26	83.9	75	94.9	
Would like more education on antimicrobial use and resistance	Yes	29	93.5	77	97.5	0.057
	No	2	6.5	2	2.5	

Table 6. Comparison between 3rd grade and 4th grade in terms of their knowledge about antibiotics

Variables	Answer	3rd grade		4th grade		P-value
		Count	%	Count	%	
Can antibiotics be used to cure bacterial infections?	Yes	42	97.7	65	97.0	0.836
	No	1	2.3	2	3.0	
Can antibiotic be used to cure viral infections?	Yes	9	20.9	14	20.9	0.997
	No	34	79.1	53	79.1	
Once the symptoms are relieved, one should immediately stop using antibiotics	Yes	12	27.9	3	4.5	<0.001
	No	31	72.1	64	95.5	
Do you think that frequent & unnecessary use of antibiotics has any negative consequences?	Yes	41	95.3	63	94.0	0.141
	No	2	4.7	4	6.0	
We will have few antibiotics to use in the future if we do not use antibiotics properly	Yes	36	83.7	55	82.1	0.766
	No	7	16.3	12	17.9	
The more frequently people use antibiotics, the more difficult it will be to treat bacterial infections	Yes	39	90.7	62	92.5	0.825
	No	4	9.3	5	7.5	
Antibiotics have the same effects as anti-inflammatory drugs	Yes	6	14.0	3	4.5	0.731
	No	37	86.0	64	95.5	
Would like more education on antimicrobial use and resistance	Yes	41	95.3	65	97.0	0.077

For the assessment of attitude of student in relation to sex, the findings indicate that there are some differences in attitudes toward antibiotic use between males and females. For instance, a higher percentage of females expressed a belief that antibiotic overuse is a serious problem in Libya compared to males, although the difference was not statistically significant ($p = 0.080$). Additionally, there were differences in preferences for antibiotic use when experiencing symptoms such as sore throat, cough, runny nose, common cold, fever, and diarrhea, although many of these differences were not statistically significant. These results suggest that while there are some differences in attitudes toward antibiotic use between males and females, many of these differences were not statistically significant that explained in table 7.

The results show that there were significant differences in the attitudes of 3rd & 4th grade students regarding the use of antibiotics for various common symptoms. Specifically, as showed in table 8, 4th grade students expressed a stronger preference for using antibiotics when they have a sore throat, a runny nose, a common cold, and a fever compared to 3rd grade students. These differences were statistically significant, with p -values less than 0.05 for each of these symptoms.

Table 7. Comparison between male and females in terms of their attitude about antibiotics

Questions	Answer	Male		Female		P-value
		Count	%	Count	%	
Do you think antibiotic overuse is a serious problem in Libya?	Yes	27	87.1	77	97.5	0.080
	No	1	3.2	1	1.3	
	Unknown	3	9.7	1	1.3	
Do you prefer to use antibiotics when you have sore throat?	Yes	23	74.2	45	57.0	0.138
	No	5	6.1	28	35.4	
	Unknown	3	9.7	6	7.6	
Do you prefer to use antibiotics when you have a cough?	Yes	8	25.8	9	11.4	0.170
	No	19	61.3	58	73.4	
	Unknown	4	12.9	12	15.2	
Do you prefer to use antibiotics when you have a runny nose?	Yes	6	19.4	5	6.3	0.076
	No	23	74.2	62	78.5	
	Unknown	2	6.5	12	15.2	
Do you prefer to use antibiotics when you have a common cold?	Yes	9	29.0	24	30.4	0.665
	No	16	51.6	45	57.0	
	Unknown	6	19.4	10	12.7	
Do you prefer to use antibiotics when you have a fever?	Yes	14	45.2	24	30.4	0.182
	No	12	38.7	46	58.2	
	Unknown	5	16.1	9	11.4	
Do you prefer to use antibiotics when you have diarrhea?	Yes	9	29.0	26	32.9	0.843
	No	16	51.6	41	51.9	
	Unknown	6	19.4	12	15.2	

Table 8. Comparison between 3rd grade and 4th grade in terms of their attitude about antibiotics:

Questions	Answer	3rd grade		4th grade		P-value
		Count	%	Count	%	
Do you think antibiotic overuse is a serious problem in Libya?	Yes	38	88.4	66	98.5	0.062
	No	2	4.7	-	-	
	Unknown	3	7.0	1	1.5	
Do you prefer to use antibiotics when you have sore throat?	Yes	20	46.5	48	71.6	<0.001
	No	14	32.6	19	28.4	
	Unknown	9	20.9	-	-	
Do you prefer to use antibiotics when you have a cough?	Yes	8	18.6	9	13.5	0.062
	No	25	58.1	52	77.5	
	Unknown	10	23.3	6	9.0	
Do you prefer to use antibiotics when you have a runny nose?	Yes	7	16.3	4	6.0	0.003
	No	26	60.5	59	88.0	
	Unknown	10	23.3	4	6.0	
Do you prefer to use antibiotics when you have a common cold?	Yes	16	37.2	17	25.4	0.017
	No	17	39.5	44	65.6	
	Unknown	10	23.3	6	9.0	
Do you prefer to use antibiotics when you have a fever?	Yes	19	44.2	19	28.4	0.030
	No	16	37.2	42	62.6	
	Unknown	8	18.6	6	9.0	
Do you prefer to use antibiotics when you have diarrhea?	Yes	14	32.6	21	31.3	0.081
	No	18	41.9	39	58.2	
	Unknown	11	25.5	7	10.5	

The table 9 presents a comparison between males and females in terms of their practices regarding antibiotics. For the first question regarding the health problems for which antibiotics were taken, there are significant differences in the percentages of males and females reporting cough as the reason for antibiotic use (22.6% for males and 7.6% for females, $p = 0.028$). However, for other health problems, the differences were not statistically significant. Regarding the source

of antibiotics, there were no statistically significant differences between males and females in terms of obtaining antibiotics from healthcare professionals, pharmacies, or other sources. There were significant differences in the frequency of non-prescribed antibiotic use, with a notably higher percentage of females reporting never using non-prescribed antibiotics compared to males (40.5% for females and 9.7% for males, $p < 0.001$).

Table 9. Comparison between male and females in terms of their practice about antibiotics

Questions	Answer	Male		Female		P-value
		Count	%	Count	%	
For what health problem you took the antibiotic(s) in the last few months?	Cough	7	22.6	6	7.6	0.028
	Diarrhea	5	16.1	6	7.6	0.180
	Fever	9	29.0	12	15.2	0.097
	Respiratory	8	25.8	30	38.0	0.227
	Injury/Wound	3	9.7	10	12.7	0.663
	Urinary tract symptoms	8	25.8	31	39.2	0.185
	Headache	2	6.5	5	6.3	0.981
	Colic	3	9.7	2	2.5	0.106
	Other	8	25.8	20	25.3	0.958
Where did you get the antibiotic(s)?	Examined/consult healthcare professional and prescribed by him/her	14	45.2	44	55.7	0.304
	Directly bought from pharmacy	15	48.4	34	43.0	
	Lend from other family member, neighbor	1	3.2	-	-	
	Bought from non-pharmacy source	1	3.2	1	1.3	
Did you discontinue therapy once your symptoms subside?	Yes	10	32.3	21	26.6	0.552
	No	21	67.7	58	73.4	
Do you keep leftovers antibiotics for future use?	Yes	12	38.7	35	44.3	0.594
	No	19	61.3	44	55.7	
How often do you use non-prescribed antibiotics?	Never	3	9.7	32	40.5	<0.001
	Rarely	27	87.1	34	43.0	
	Often	1	3.2	11	13.9	
	Very often	-	-	2	2.5	

In compares the practices related to antibiotics between 3rd & 4th grade students, the results show table [10], that there were several significant differences in the practices of 3rd & 4th grade students regarding antibiotic use. Specifically, 4th grade students were more likely to keep leftover antibiotics for future use compared to 3rd grade students (52.2% for 4th grade and 27.9% for 3rd grade, $p = 0.012$). Moreover, there were significant differences in the frequency of non-prescribed antibiotic use, with a higher percentage of 4th grade students reporting using non-prescribed antibiotics rarely compared to 3rd grade students (46.3% for 4th grade and 69.8% for 3rd grade, $p = 0.003$).

Table 10. Comparison between 3rd grade and 4th grade in terms of their practice about antibiotics.

Questions	Answer	3rd grade		4th grade		P-value
		Count	%	Count	%	
For what health problem you took the antibiotic(s) in the last few months?	Cough	8	18.6	5	7.5	0.077
	Diarrhea	3	7.0	8	11.9	0.397
	Fever	11	25.6	10	14.9	0.165
	Respiratory	13	30.2	25	37.3	0.446
	Injury/Wound	3	7.0	10	14.9	0.208
	Urinary tract symptoms	11	25.6	28	41.8	0.083
	Headache	4	9.3	3	4.5	0.312
	Colic	2	4.7	3	4.5	0.966
	Other	8	18.6	20	29.9	0.186
Where did you get the antibiotic(s)?	Examined/consult healthcare professional and prescribed by him/her	21	48.8	37	55.2	0.589
	Directly bought from pharmacy	20	46.5	29	43.3	
	Lend from other family member, neighbor	1	2.3	-	-	

	Bought from non-pharmacy source	1	2,3	1	1,5	
Did you discontinue therapy once your symptoms subside?	Yes	15	34.9	16	23.9	0.211
	No	28	65.1	51	76.1	
Do you keep leftovers antibiotics for future use?	Yes	12	27.9	35	52.2	0.012
	No	31	72.1	32	47.8	
How often do you use non-prescribed antibiotics?	Never	11	25.6	24	35.8	0.003
	Rarely	30	69.8	31	46.3	
	Often	-	-	12	17.9	
	Very often	2	4.7	-	-	

DISCUSSION

Prescribers' understanding of antibiotic use is crucial since antibiotic misuse is a major contributor to antimicrobial resistance, a global health concern. This is the first study to examine medical students' beliefs, knowledge, and behaviors around the use of antibiotics and antibiotics resistance. This study was the first to look into Zawia University medical students' knowledge, attitudes, and practices about the use of antibiotics.

In our study high proportion of participants (97%) reported that antibiotics are used for bacterial infections, only 20 % of them thought that antibiotic used for viral infection, this results coincides with result of other study done in Zawia University (pharmacy college), where the respondent were alert to that antibiotics are used for bacterial infection [11] and are much better than those obtained from a survey conducted in Jordan among adult Jordanians where only 32.9% agreed that antibiotics are effective only against bacteria [14]. Similar result was observed in a study done in Ethiopia; the highest number of participants (59.9%) were responded to the statement that antibiotics are useful in fighting bacterial infections correctly [15]. However, a sizable portion of participants indicated that they preferred to use antibiotics when they had symptoms like fever (34.5%), diarrhea (31.8%), or sore throat (61.8%). These findings are in line with previous research done by (Shahpawee NS) and their group, that revealed a number of misconceptions about the use of antibiotics for viral infections [16].

The common cold is a virus-related disease that in most situation the etiology can be Rhinovirus. Bacterial co-infections are very rare. Antibiotic treatment is not necessary in otherwise healthy young adults with common colds. In the present study, students' behavior with regards to antibiotic use were found to be satisfactory and were aware of the misuse of antibiotics, in spite of all these wrong belief and practices among few participants.

Regarding the evaluation of students' attitudes concerning sex, the results show that opinions toward the use of antibiotics differ somewhat between boys and girls, however many of these variations were not statistically significant. Our results are consistent with those of Shehadeh et al.'s [14], study on the Jordanian community, which found that there was no statistically significant difference in the overall scores between male and female participants roughly 50% of male and female participants had fewer than 50% of right responses. However, our results showed significant differences in the frequency of non-prescribed antibiotic use, with a notably higher percentage of females reporting never using non-prescribed antibiotics compared to males (40.5% for females and 9.7% for males, $p < 0.001$). Which in line with Ghaieth, et al study on antibiotics Self-medication in Benghazi City [17], and are contradictory to Kumar et al. results, in which they have shown more than 80% of self-medication was contributed by females [18]. Strikingly, the findings that, there were significant differences in the attitudes of 3rd & 4th grade students regarding the use of antibiotics for various common symptoms. 4th grade students stated a greater preference for using antibiotics when they have a sore throat, a runny nose, a common cold, and a fever compared to 3rd grade students. These differences were statistically significant, with p-values less than 0.05 for each of these symptoms.

When examining the antibiotic practices of third- and fourth-graders, the results indicate that there are a number of important distinctions between the two groups of students. Specifically, fourth-graders were more likely than third-graders to save any leftover antibiotics for later use ($p = 0.012$; 52.2% of fourth-graders and 27.9% of third-graders). Moreover, there were significant differences in the rate of non-prescribed antibiotic use, with a higher percentage of 4th-grade students writing using non-prescribed antibiotics rarely compared to 3rd-grade students (46.3% for 4th grade and 69.8% for 3rd grade, $p = 0.003$). This result consistent with Benghazi city study between medical & non-medical students, where medical students who enrolled in higher classes practice antibiotics self-medication more than their colleagues in lower classes [17]. Also, our finding is in accordance with the results reported by Osemene and Lamikanra, where a proportional relation between self-medication and students' class level in the university was reported [19].

The use of leftover antibiotics and antibiotic sharing by the respondents showed the non-compliance with antibiotic therapy and showed that the knowledge on antibiotic use is still lacking. Accordingly, it is important for healthcare providers to highlight the importance of taking antibiotics for the full course and advise patients not to stop taking

antibiotics when the condition is better and the principle causes of the emergence and the dissemination of resistant organisms is failure to implement policies and programs in preventing infections as well failure to follow the antimicrobial usage guidelines strictly. Interactive learning between pharmacology and microbiology helps in coherent antimicrobial prescribing actions with infection control.

Since antibiotic resistance among pathogenic microorganisms is a matter of worldwide concern, the prescribers should know the microorganism sensitivity pattern before prescribing it. Exercises in small groups that help students practice patient education techniques and appropriate antibiotic usage have to be a significant component of the students' education curriculum, which should also aim to change the behaviour and to improve the patient outcomes along with the knowledge [20]. Outcome-based education for educating the students about antibiotics, maximize their effective and efficient use and minimize the development of resistance as a prescriber [21]. The principles of the protocol development for antibiotic use in health care facilities should form an integral part of the undergraduate teaching [22].

CONCLUSION

Antibiotic use among medical students is common, and reproduces antibiotic misapplication or abusive behavior in the public. This study exposed an important awareness concerning the separate between medical students' knowledge about antimicrobial resistance, and appalling attitudes and practices towards antibiotics use. Students wanted further education on antibiotic use and antimicrobial resistance. Antibiotics resistance can be reduced to a greater extent by providing medical students with knowledge occasions including antimicrobial prescribing and the ethics of antimicrobial management. The medical education strategies should attempt to provide adequate training on the rational use of antibiotics and not only to increase the knowledge but also to change the behaviors and practices among medical students regarding antibiotics use. Most importantly, there is a need to integrate curriculum on abuse of antibiotics and the impairment of such practice on short and long course in pre-clinical years and we need for the re-evaluation of the educational curricula especially, teaching of clinical pharmacology courses in clinical years.

Acknowledgments

The authors are thankful for all volunteer students who participated in this study.

Conflict of interest. Nil

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المعرفة والمواقف والممارسات المتعلقة باستخدام المضادات الحيوية بين طلاب بكالوريوس الطب بكلية الطب بجامعة الزاوية

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المستخلص

تعد مقاومة المضادات الحيوية تهديداً كبيراً للصحة العامة على مستوى العالم، حيث تؤدي إلى زيادة في معدلات الإصابة بالأمراض والوفيات، كما أنها تفرض تكاليف اقتصادية مرتفعة نتيجة الأعباء التي تلقىها على أنظمة الرعاية الصحية. يلعب طلاب الطب دوراً حيوياً في مواجهة هذا التحدي، إذ سيكونون مستقبلاً المسؤولين عن وصف المضادات الحيوية والتوعية باستخدامها لدى المرضى. هدفت هذه الدراسة إلى تقييم مستوى المعرفة والمواقف والممارسات المتعلقة باستخدام المضادات الحيوية بين طلاب كلية الطب بجامعة الزاوية. تم استخدام تصميم مقطعي لإجراء الدراسة، والتي تم تنفيذها في شهري أكتوبر ونوفمبر 2023. شملت الدراسة توزيع استبيان على طلاب الصفين الثالث والرابع في الكلية. تم تحليل البيانات باستخدام برنامج "Minitab" الإحصائي. أظهرت النتائج أن غالبية المشاركين من الإناث، بمتوسط عمر 22 عاماً. وأفاد 95.5% من طلاب السنة الرابعة بأنهم يتفوقون على ضرورة التوقف عن استخدام المضادات الحيوية عند الحاجة، مقارنة بنسبة 27.9% من طلاب السنة الثالثة. (بالإضافة إلى ذلك، أفاد طلاب السنة الرابعة بأنهم نادراً ما يستخدمون المضادات الحيوية دون وصفة طبية بنسبة 46.3%، مقارنة بنسبة 69.8% بين طلاب السنة الثالثة. (p = 0.003) كشفت الدراسة عن فجوة واضحة بين معرفة طلاب الطب بمشكلة مقاومة المضادات الحيوية، وبين مواقفهم وممارساتهم الفعلية تجاه استخدامها. وتبرز الحاجة إلى إعادة تقييم المناهج الدراسية، خاصة فيما يتعلق بتدريس علم الأدوية السريري خلال السنوات السريرية.

الكلمات المفتاحية: المعرفة، المضادات الحيوية، طلاب الطب، جامعة الزاوية، كلية الطب.