African Journal of Advanced Pure and Applied Sciences (AJAPAS)
Online ISSN: 2957-644X
Volume 4, Issue 1, January - March 2025
Page No: 431-440
Website: https://aaasjournals.com/index.php/ajapas/index
ISI 2024: 0.877 **SJIFactor 2024: 6.752** **معامل التأثير العربي: 1.62**

Evaluating the Awareness, Perceptions, and Behaviors Relating to Antibiotic Use and Resistance among Students at Sebha University

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تقييم الوعي والتصورات والسلوكيات المتعلقة باستخدام المضادات الحيوية ومقاومتها لدى طلاب جامعة سبها

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Received: January 09, 2025	Accepted: March 12, 2025	Published: March 18, 2025

Abstract:
In Libya, too many antibiotics is a growing problem. This is one of the main reasons why bacteria are becoming resistant to them. We need to teach students more about antibiotic use and resistance. This study looked at how much medical and non-medical students know about antibiotics, what they think about them, and how they use them. At Sebha University, we did a study where we asked people from different fields about their knowledge, attitudes, and practices. 80.0% of the 560 completed and returned questionnaires out of the 700 that were distributed were from medical students. Men made up 18.4% of the respondents, while women made up the majority (81.6%). According to the findings, 58% of the students agreed that taking antibiotic courses was essential, 20% thought that antibiotics could be stopped once improvement was seen, and 22% weren't sure. Of the students, 57.7% agreed, 16.3% disagreed, and 26.1% were not sure that antibiotics speed up recovery from a cold. The statement that "All antibiotics do not cause side effects" was also accepted by 72% of the students. Interestingly, 27.1% of the students compared aspirin and paracetamol (Panadol) with antibiotics. Additionally, only 65.2% of the students acknowledged that antibiotic resistance might pose a serious threat in Libya. Overall, it was found that students' attitudes, knowledge, and practices around antibiotics were mainly lacking, with few positive answers regarding particular practices. This shows that it is very important to teach people about how to use antibiotics properly and the dangers of misusing them.

Keywords: Libya, Antimicrobial resistance, Antibiotics misuse, Students.

الملخص
إن إساءة استخدام المضادات الحيوية تشكل مصدر قلق متزايد في ليبيا، مما يساهم في ارتفاع مقاومة المضادات الحيوية. ومن الأهمية بالإمكان معالجة هذه المشكلة من خلال تعزيز المعرفة الكافية والمواقف والممارسات فيما يتعلق باستخدام المضادات الحيوية ومقاومتها بين الطلاب. كان الهدف من هذه الدراسة تقييم المعرفة والمواقف والممارسات بين الطلاب

في الكليات الطبية و غير الطبية فيما يتعلق بالمضادات الحيوية. وقد أجريت دراسة مقطعية قائمة على الاستبيان في جامعة سبها، شملت طلاب الكليات الطبية و غير الطبية. ومن بين 700 استبيان تم توزيعه، تم إرجاع 560 استبيان، وقد بلغ معدل الاستجابة 80 ٪. وكانت غالبية المستجيبين من الإناث (81.6٪)، في حين شكل الذكور 18.4٪. و أظهرت النتائج أن 58٪ من الطلاب كانوا على دراية بضرورة إكمال دورات المضادات الحيوية، بينما اعتقد 20٪ أنه يمكن إيقاف المضادات الحيوية بمجرد أن يظهر المرضى تحسنًا، وكان 22٪ غير متأكدين. وفيما يتعلق بالاعتقاد بأن المضادات الحيوية تسرع الشفاء من نزلات البرد، فقد وافق 57.7% من الطلاب على ذلك، وعارضه 16.3%، وكان 26.1% غير متأكدين. وعلاوة على ذلك،وافق 72% من الطلاب على العبارة القائلة بأن "جميع المضادات الحيوية لا تسبب آثارًا جانبية". والمثير للدهشة أن 27.1% من المشاركين يعتقدون أن المضادات الحيوية تشبه الأدوية المستخدمة لتسكين الألم والحمى. وعلاوة على ذلك، أقر 65.2% فقط من الطلاب بأن مقاومة المضادات الحيوية قد تصبح مشكلة في ليبيا. وبشكل عام، كان مستوى المعرفة والمواقف والممارسات المتعلقة بالمضادات الحيوية بين الطلاب غير مرضٍ بشكل عام، مع وجود استجابات إيجابية قليلة بشأن ممارسات محددة. وتؤكد هذه النتائج على الحاجة الملحة للتثقيف الصحي بشأن الاستخدام السليم للمضادات الحيوية وعواقب إساءة استخدامها.

الكلمات المفتاحية: ليبيا، مقاومة مضادات الميكروبات، سوء استخدام المضادات الحيوية، الطلاب.

Introduction

Antibiotics are pharmaceuticals that can be used to either eradicate or inhibit the growth of bacteria. Their extensive use in the prevention and treatment of human and animal infectious diseases is well-documented [1, 2]. The ten main classes of antibiotics include macrolides, β-lactams, quinolones, tetracyclines, and sulfonamides. The most frequently prescribed antibiotics are β-lactams, fluoroquinolones, tetracyclines, macrolides, and sulfonamides [3]. Antibiotics can function in two distinct ways: either bactericidally, resulting in the eradication of bacteria, or bacteriostatically, impeding their proliferation. These medications target various components of bacterial cells, including the cell wall, membrane, ribosomes, nucleic acids, metabolism, and enzymes. A plethora of mechanisms, encompassing the inhibition of cell wall synthesis, the disruption of cell membrane function, the suppression of protein synthesis, the interference with nucleic acid synthesis, and the action as antimetabolites, are employed by distinct antibiotic groups to impede bacterial proliferation [4].

The phenomenon whereby microorganisms, including bacteria, viruses, fungi and parasites, develop a resilience to medications that were previously efficacious against them is termed antimicrobial resistance (AMR) [5]. This phenomenon poses a grave threat to public health systems worldwide, including those in developing countries [6]. The future of healthcare is uncertain due to the increase in infections that are resistant to antibiotics. These infections are known to cause severe illnesses, prolonged hospitalisation, increased medical expenses, the necessity for more expensive second-line medications, and treatment failures [7, 8].

The repercussions of AMR on morbidity and mortality are profound, with drug-resistant infections contributing to approximately 700,000 deaths annually on a global scale [5, 8]. The phenomenon of antibiotic resistance can be attributed to two primary factors: human and bacterial. The innate capacity of bacteria to alter their genetic composition, thereby rendering them resistant to antibiotics, is an example of bacterial factors. The development of biological activity that renders the antibiotics ineffective is how this resistance is accomplished [9, 10]. This bacterial component is an inevitable and intrinsic process. Conversely, the misuse of antibiotics is a significant human factor that contributes to the development of antibiotic resistance [11]. The misuse of antibiotics creates a selective pressure that kills vulnerable bacteria while allowing resistant bacteria to thrive and proliferate [12]. Human activity is the cause of this selective antibiotic pressure, which can be avoided by using antibiotics responsibly. Antimicrobial resistance represents a grave and growing threat to public health, with implications for the effective treatment of infectious diseases around the globe. Numerous studies conducted around the globe have demonstrated a strong correlation between antimicrobial use and resistance, both in individual cases and within communities [14]. A significant contributing factor to this phenomenon is the pervasive utilisation of antimicrobial agents. It is disconcerting to note that research findings suggest that between 30% and 50% of all antimicrobial use is inappropriate [15].

In comparison with infections caused by the same organisms that are not resistant to multiple antibiotics, infections caused by antibiotic-resistant organisms are associated with a higher mortality rate [16], and extended hospital stays place a significant burden on healthcare systems around the world [17]. According to a 2014 review on antimicrobial resistance, 700,000 deaths per year were attributed to AMR, and if nothing is done to curb the overuse of antibiotics, that figure could increase to 10 million by 2050 [18]. Antibiotic misuse exerts a detrimental effect on a number of fronts, including the escalation of treatment costs, the acceleration of antibiotic resistance, treatment failures, and elevated mortality rates [19]. Studies undertaken in a number of nations, including Palestine, Jordan, China, India, Nepal, and the United Arab Emirates, have demonstrated that students' improper use of antibiotics, stemming from a paucity of awareness, attitude, and appropriate practices, has contributed to the exacerbation of antibiotic resistance [20–24]. At Nepal's Kathmandu University, a pilot study was conducted

to assess medical and non-medical students' knowledge, attitudes, and practices surrounding the use of antibiotics. The study revealed that medical students and non-medical students, as well as students in their first and last years of study, exhibited substantial variations in their level of knowledge, perception, and behaviour regarding the use of antibiotics [23].

A previous study conducted at Chinese universities examined the knowledge, attitudes and practices of medical and non-medical students with regard to antibiotics. The investigation further examined how the utilisation of antibiotics by medical students is influenced by the Chinese medical curriculum. The study revealed that medical students exhibited a significantly higher level of knowledge regarding appropriate antibiotic usage in comparison to non-medical students ($p < 0.0001$). However, the study also found that medical students relied on antibiotics more than non-medical students when it came to actual antibiotic usage ($p < 0.0001$). It is noteworthy that while medical students' attitudes and knowledge regarding the use of antibiotics improved as their education progressed, the indiscriminate use of antibiotics increased concurrently [20]. A Portuguese survey revealed a concerning lack of knowledge and understanding of antibiotics and their appropriate use among Portuguese students. The study revealed a concerning lack of knowledge regarding antibiotics among the student population [25].

A cross-sectional multi-center survey of students in the UK revealed that the majority (95%) acknowledged antibiotic resistance as a potential issue for their future practice. However, a smaller proportion of students (69%) believed that this problem would be exacerbated by the antibiotics they would prescribe, administer, or dispense. Furthermore, only 5% of students expressed confidence in their understanding of antibiotic use to a level that would adequately prepare them for their future employment. The study's findings indicate that a significant proportion of UK healthcare students continue to hold misconceptions about antibiotic resistance, despite acknowledging its significance [26].

A cross-sectional study was conducted by researchers at six Sri Lankan universities that offer undergraduate pharmacy programmes. The study revealed that the majority of participants (76%) had previously consumed antibiotics within the preceding 12 months. Notably, more than half (57%) of junior pharmacy students held the erroneous belief that antibiotics were effective in treating symptoms associated with the common cold and influenza. In contrast, senior pharmacy students ($n = 206$) exhibited a statistically significant ($p < 0.05$) higher level of knowledge about antibiotics compared to junior pharmacy students ($n = 260$). The results of the study indicate that pharmacy students generally demonstrated a respectable grasp of antimicrobial resistance (AMR), with their knowledge levels rising as they advanced through the years of study in the pharmacy program [27]. A recent cross-sectional study was conducted among undergraduate students at University Brunei Darussalam. The mean total knowledge score was found to be 9/14, indicating that 51% ($n = 66$) of the students exhibited a satisfactory level of knowledge regarding antibiotics and antimicrobial resistance. However, it was disconcerting to note that 76% ($n = 99$) of the respondents held an erroneous belief that the body develops resistance to antibiotics. The study revealed that only 14% ($n = 18$) of the participants demonstrated an inadequate understanding of antibiotics and antimicrobial resistance. Furthermore, the study found that 41% ($n = 53$) of respondents held the erroneous belief that antibiotics are effective in treating viral illnesses such as the flu and the common cold [28]. A study of medical students in Rwanda revealed that, while the students demonstrated a strong understanding of antimicrobial resistance (AMR), they exhibited negative attitudes towards antimicrobial use and resistance [29].

In Libya, a significant proportion of pharmacies trade medications without the requirement of a prescription, a phenomenon that is prevalent in numerous developing nations. Consequently, the general public has easy access to antibiotics and potentially addictive medications. Moreover, a significant proportion of the population – approximately 24% – reported practicing self-medication. Alarmingly, the data indicates that nearly half of the Libyans surveyed expressed a willingness to use antibiotics for personal use without a prescription if deemed necessary [30]. A recent study revealed that 39.5% of Libyan adults who consumed antibiotics did so for self-medication purposes [31]. It is widely acknowledged that the primary cause of the global rise in antibiotic resistance is the misuse of antibiotics [32]. An earlier study carried out in Libya assessed people's attitudes and knowledge regarding the use of antimicrobial medications and antibiotics. It is important to note that the study's findings are based on a sample of medical students, which may limit the generalisability of the results[33].

There is currently a paucity of evidence regarding the incidence and consequences of antibiotic resistance in Libya. The absence of official statistics or reports that explicitly measure the effect of antibiotic resistance on public health and healthcare in Libya is a matter of concern.

Research on the knowledge, attitudes, and behaviours of medical and non-medical students regarding antibiotics in the south-west region of Libya is lacking. Given the intellectual capacity of these students, it is imperative to ascertain the proportion of them who procure antibiotics without a prescription.

The objective of this study is, therefore, to ascertain the level of antibiotic-related knowledge, attitudes, and practices among students at Sebha University in the southwest region of Libya.

Material and methods

Study design and setting

A two-month observational cross-sectional study that was non-interventional was conducted between December 2019 and February 2020. A questionnaire was administered to a randomly selected sample of undergraduate students from Libya's Sebha University as part of the study.

Study population

The population of this study comprised both medical and non-medical students from Sebha University in Sebha, Libya. While the non-medical students were enrolled in the Science faculty, the medical students were selected from the faculties of Medicine, Dentistry, Pharmacy and Nursing. The study population included students from all academic years within these faculties.

Study design

The study utilised a questionnaire comprising five sections. The first section of the questionnaire sought information regarding the age, gender, and other demographic details of the students. The second section inquired about the frequency with which the students self-administered pharmaceuticals that are designed to destroy microbes. The third section of the questionnaire enquired about the students' understanding of antibiotics and their potential side effects. The fourth section inquired about the students' understanding of antibiotic resistance. Finally, the students' attitudes and behaviours towards antibiotic use were examined. The administration of the questionnaire occurred in class, towards the conclusion of the lecture, immediately preceding the examination. The first page of the questionnaire contained a description of the research and its objectives. Those who indicated their willingness to participate were required to sign a consent form prior to undertaking the questionnaire. They were at liberty to decide whether or not to participate. No financial compensation or other inducements were provided for participation. Participants who did not wish to partake or did not sign the form were excluded from the study. The participants' level of knowledge about antibiotic resistance was determined by dividing them into two groups based on their scores. Scores of 57% and above were classified as indicating good knowledge, while scores of 57% and below were considered to indicate poor knowledge of antibiotic resistance.

Statistical analysis

The statistical software SPSS version 25 was utilised for the coding and analysis of the gathered data (IBM Corp., New York, USA). Descriptive statistics were employed to present the categorical data as frequencies and percentages (%). A Chi-square test was then used to evaluate the relationship between the independent and dependent variables. Statistical significance was defined as a 95% confidence interval and a significance level of $p < 0.05$.

Results and discussion

Demographics and baseline characteristics

A total of 560 out of 700 questionnaires were returned, yielding an 80.0% response rate. The demographic composition of the study shows that female respondents constituted 81.6% of the total participants, whereas male respondents comprised 18.4%. A statistically significant gender disparity ($p<0.05$) was identified.

The distribution of participants according to their field of study is demonstrated in the data presented in Table 1. The data reveals that 71.25% of respondents were from non-medical disciplines, such as science, constituting the majority of the sample. Conversely, the proportion of participants from medical disciplines was lower. Specifically, 4.3% of participants were in the medical field, 3.8% were in dentistry, 9.5% were in pharmacy, and 11.3% were in nursing. The study's comprehensive sample size, encompassing a diverse range of participants from both medical and non-medical backgrounds, facilitated a comprehensive understanding of antibiotic-related knowledge, attitudes, and practices across multiple academic domains.

Table 1: The distribution of respondents from various faculties was analyzed.

Non-medical	Frequency	%	Medical	Frequency	%
Science	399	71.25	Medicine	24	4.3
			Dentistry	21	3.8
			Pharmacy	53	9.5
			Nursing	63	11.3

Knowledge regarding antibiotics

The study incorporated questions designed to assess the participants' familiarity with the utilisation of antibiotics. The frequency and proportion of participants who answered each question about their knowledge, attitudes, and practices surrounding the use of antibiotics correctly, incorrectly, or with uncertainty are displayed in Figure 1.

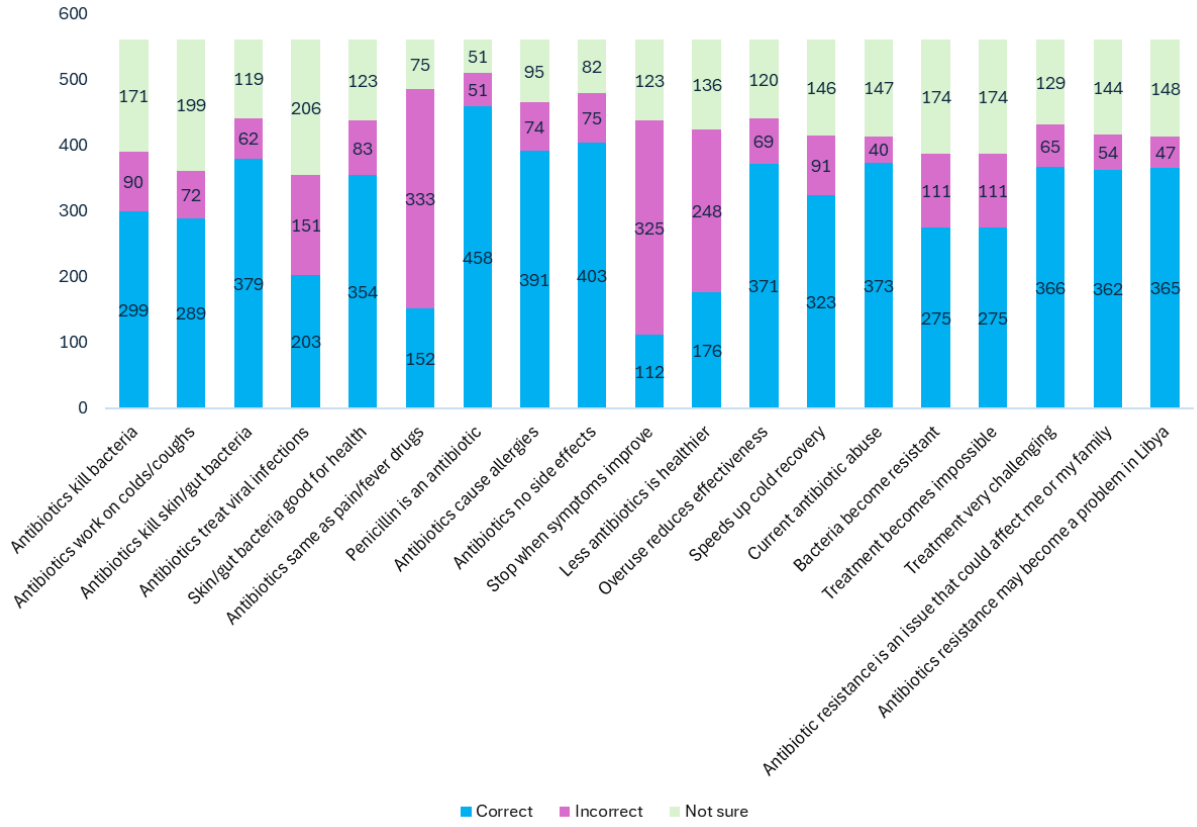

Figure 1: Knowledge regarding antibiotics use.

The results pertaining to participants' awareness of antibiotic resistance are shown in Table 2. The questions in the table have been meticulously crafted to assess the respondents' knowledge of antibiotic resistance. The table presents the number and percentage of participants who gave a correct, incorrect, or unsure response to each question.

Table 2: Knowledge about antibiotics resistance.

Questions on Knowledge about Antibiotic resistance	Correct N (%)	Incorrect N (%)	Not sure N (%)	p
Antibiotic resistance is only a problem for people who take antibiotics regularly	118 (21.1)	244 (43.6)	198 (35.4)	<0.05
Bacteria which are resistant to antibiotics can be spread from person to person	245 (43.8)	131 (23.4)	184 (32.9)	<0.05
Antibiotic-resistant infections may significantly increase the risk of medical procedures such as organ transplants, surgery, and cancer treatment.	257 (45.9)	116 (20.7)	187 (33.4)	<0.05
The primary factor causing bacterial resistance is now antibiotic abuse.	341 (60.9)	79 (14.1)	140 (25)	<0.05
Antibiotic resistance affects you and your family's health	405 (72.3)	56 (10)	99 (17.7)	<0.05
Necessary to get more education about antibiotics	423 (75.5)	31 (5.5)	106 (18.9)	<0.05
Need to establish course on 'rational use of antibiotics' at university	445 (79.5)	23 (4.1)	92 (16.4)	<0.05
Necessary to carry out large-scale 'antibiotics campaign' promotion	336 (60)	78 (13.9)	146 (26.1)	<0.05

In accordance with the inquiries presented in Table 3, the data has been collated in order to provide an overview of the antibiotic practices of the participants. The number and percentage of participants who answered each question about antibiotic use correctly or incorrectly are shown in the table.

Table 3: Antibiotics practice.

Questions on knowledge about antibiotic practice	Correct N (%)	Incorrect N (%)	p
Use antibiotics when having fever (temperature lower than 38.5°)	Yes 167 (29.8)	No 393 (70.2)	<0.05
Common cold	Always 175 (31.3)	Often 385 (68.8)	<0.05
Acute bronchitis	Always 184 (32.9)	Often376 (67.1)	<0.05
Coughing up yellow/green sputum	Always 309 (55.2)	Often 251 (44.8)	<0.05
Sore throat	Always 193 (34.5)	Often 367 (65.5)	<0.05
Cough with fever	Always 221 (39.5)	Often 339 (60.5)	<0.05
Congested nose with headache	Always 221 (39.5)	Often 339 (60.5)	<0.05
Coughing up white sputum	Always 222 (39.6)	Often 338 (60.4)	<0.05
Cough lasting 2 weeks or more	Always 231 (41.3)	Often 329 (58.8)	<0.05
Asked doctors to prescribe antibiotics when you catch a common cold	Yes 163 (29.1)	No 397 (70.9)	<0.05

The faculty of science registered the highest rate of participation (71.25%), followed by the faculties of nursing (11.3%), pharmacy (9.5%), medicine (4.3%), and dentistry (3.8%).

Knowledge of antibiotic use and resistance

Figure 1, Table 2 and 3 present the frequency and percentage of participants who provided correct, incorrect or uncertain responses to each question related to knowledge, attitude and practices concerning antibiotic use. Furthermore, statistical analysis (Chi-squared) indicated a significant difference between all measures ($p < 0.05$) (see Figure 1, Tables 2 and 3).

In the present study, 53.4% of students correctly identified the use of antibiotics in treating bacterial infections. Conversely, 36.3% of students (203) responded that viral infections could also be treated with antibiotics. This finding aligns with those reported in other studies that reached similar conclusions [34-37].

A parallel response was observed in a Chinese study [20], where 35.5% of respondents lacked awareness that antibiotics are ineffective against viral infections.

This concurrence with the utilisation of antibiotics in treating viral infections could be attributed to a lack of instruction on this subject in courses such as pharmacology, particularly among respondents from the faculty of science.

The present study found that more than half of the students surveyed (57.7%) believed that antibiotics accelerated the recovery process from a cold, while 16.3% expressed disagreement and 26.1% indicated uncertainty.

The present study thus revealed a general lack of understanding regarding antibiotic use and resistance. This finding was consistent with the outcomes of other studies, which reported that the majority of students possessed moderate to poor knowledge [22, 24, 38, 39].

The majority of students (81.8%) correctly identified penicillin as an antibiotic. Furthermore, the majority of students (50.6%) responded in the affirmative to the question, "Do antibiotics work on most colds and coughs?" This perception was also reported by participants in other studies [40, 41].

However, a Chinese study [20] conducted among 2,500 students demonstrated that the majority of respondents held the belief that antibiotics could accelerate the recovery process for common cold, cough, and other related infections arising from viral infection.

While a substantial proportion of the student population, specifically 72%, concurred with the statement, "All antibiotics do not cause side effects", further analysis is necessary to ascertain the extent to which this perception is influenced by external factors. This erroneous perception has the potential to lead to an escalated utilisation of antibiotics, which, in turn, can precipitate an augmentation in antibiotic resistance.

A particularly alarming finding related to antibiotic overuse pertained to the utilisation of antibiotics for various symptoms associated with respiratory tract infections among students. For instance, more than a third of the students surveyed reported using antibiotics more frequently for acute bronchitis, pneumonia, coughing up yellow/green sputum, cough, fever, congested nose with headache and cough lasting two weeks or more. This phenomenon was consistent with a Nigerian study, which also reported a high rate of antibiotic consumption among university undergraduates [20]. The study also revealed that 39.6% of students exhibited high frequency of antibiotic usage when coughing up white sputum, and nearly a third (29.1%) of them had requested a doctor's prescription for antibiotics in the presence of common colds. It is widely acknowledged that antibiotic prescriptions for minor upper respiratory infections and acute bronchitis are significant contributors to the increasing antibiotic resistance observed worldwide.

The necessity for further education on the subject of antibiotics and antibiotic resistance was endorsed by 75.5% of the study's participants.

Furthermore, a substantial majority of 79.5% of the study participants underscored the paramount importance of education that fosters judicious antibiotic usage.

It is imperative that medical students receive comprehensive education during their undergraduate training on the subjects of antimicrobial resistance and appropriate prescribing. This is a crucial juncture in their education, at which the gravity of these issues must be emphasised. Once these students have qualified, it is challenging to change their deeply entrenched views and behaviours [42]. It is therefore strongly recommended that adequate training be provided for medical, dental [20, 23], pharmacy, nursing and other allied health science students on proper prescribing, dispensing and the utilisation of antibiotics, respectively, to enhance sensible use of antibiotics[38].

Furthermore, within medical faculties, pharmacology instruction on antimicrobial prescriptions should be integrated with microbiology instruction on infection control [43].

The proportion of students who believed that antibiotics should be withdrawn as soon as symptoms disappear was found to be 20%.

As demonstrated in Figure 1, a significant proportion of respondents, specifically 61.5%, erroneously equated antibiotics with anti-inflammatory medications. Moreover, 46.7% of participants expressed their agreement that the excessive use of antibiotics can lead to an elevated risk of antimicrobial resistance (AMR). Furthermore, less than half of the respondents (32.5%) agreed that antibiotics can effectively treat infections caused by viruses.

It is noteworthy that a considerable proportion of the study's participants (27.1%) held the misconception that antibiotics were synonymous with analgesics and antipyretics, such as aspirin and paracetamol (Panadol). This misapprehension has the potential to result in an inability to differentiate between common pain relievers and non-steroidal anti-inflammatory drugs (NSAIDs). The majority of respondents indicated that they do not request antibiotics from doctors for the treatment of the common cold, with a small percentage of students (29.1%) reporting a different behaviour.

Furthermore, only 13.2% of respondents expressed the belief that antibiotics might not result in allergic reactions. Furthermore, only 44.3% of respondents correctly answered the question of whether taking fewer antibiotics than prescribed is healthier than taking the entire prescribed course. However, a significant proportion of respondents (66.3%) demonstrated an understanding of the long-term consequences of antibiotic overuse, namely the potential reduction in their effectiveness.

The findings of this study may be explained by the dearth of easily accessible antimicrobial education materials, with the disparities in attitudes and knowledge being exacerbated by the lack of stringent and enforced laws and regulations pertaining to the prescription and dispensing of antibiotics in Libyan retail pharmacies. The study revealed that 29.8% of students reported using antibiotics to treat fever, indicating attitudes and perceptions regarding antimicrobial use and resistance. These results are consistent with earlier research on the topic [29, 44].

As demonstrated in Figure 2, more than 81.8% of respondents correctly identified penicillin as an antibiotic, indicating a satisfactory level of knowledge regarding its identification. Furthermore, the responses obtained when participants were asked about the impact of antibiotic resistance on their health and that of their family members were noteworthy and encouraging (see Table 2). The findings of the current study demonstrated that a significant majority of the respondents, constituting 72.3%, expressed awareness of the issue at hand. However, the results also revealed a discrepancy in the level of agreement among students concerning the potential emergence of antibiotic resistance as a problem in Libya. While 65.2% of the students concurred with this statement, the remaining 34.8% did not, suggesting a potential gap in understanding or awareness regarding the issue. This discrepancy could be attributed to a lack of information or education concerning antimicrobial use among the student population. The current study found that 60% of participants expressed support for the implementation of a large-scale antibiotics campaign for promotional purposes, a finding that aligns with the conclusions of previous studies indicating a prevalent belief among students concerning the importance of conducting extensive publicity campaigns to enhance public understanding of antibiotics.

In relation to the behaviour of participants in relation to seeking antibiotics from physicians for the common cold, 29.1% indicated that they would request them, while 70.9% did not. A similar study revealed that approximately 73.5% of students disagreed with the notion of asking doctors for antibiotics in the case of a common cold, with only 17.3% in agreement [45]. In the present study, it was determined that 66.3% of students correctly recognised that the overuse of antibiotics can lead to antibiotic resistance and reduced effectiveness of treatments. These findings are consistent with the findings of various studies that have identified the inappropriate use of antibiotics as a significant factor contributing to the rise of antibiotic resistance [23, 26, 46, 47]. A salient finding from the present study is that a significant proportion of respondents erroneously believed that antibiotics could be discontinued after only two or three doses once they felt better. This finding is consistent with earlier research, including a study within the Serbian population, which found that 43% of participants held a similar misconception [48]. In order to combat the development of antibiotic resistance and ensure proper usage, it is essential to follow the prescribed antibiotic regimen for the recommended duration, which is typically 5-7 days or as directed [49].

Conclusion

The results of the study indicate a paucity of knowledge and awareness among student participants with regard to the use of antibiotics and the issue of resistance. It is imperative that further qualitative and quantitative research be conducted to identify the factors that shape attitudes, behaviours, and motivations contributing to the inappropriate use of antibiotics. Furthermore, it is essential for the government to establish regulations and prescription policies, as well as to implement controls over the prescription of antibiotic medications within the healthcare framework. The role of pharmacists in enhancing public understanding of antibiotic use and the escalating problem of antibiotic resistance cannot be overstated. Additionally, public health initiatives, including educational programs, should be designed to address specific aspects of antibiotic usage and to identify populations at risk of improper consumption. The study presents several limitations. Firstly, the cross-sectional design of the study renders the findings dependent on the accuracy of the participants' responses, which may be subject to respondent bias, as individuals might not provide truthful accounts of their behaviours in response to certain inquiries. Secondly, the research was conducted solely at Sebha University, which may restrict the applicability of the findings to other academic institutions. Lastly, being a cross-sectional analysis, this study does not facilitate the assessment of the effects of any interventions on the outcomes investigated.

The findings of the study are of considerable significance, as they serve to broaden the existing understanding of knowledge, attitudes, and practices (KAP) concerning antibiotic usage in Libya. The information collected from university students provides critical insights into the existing KAP related to antibiotic use and resistance. This data can be utilised to enhance the comprehension of the issue and support the creation of effective educational initiatives aimed at enhancing KAP among university students regarding antibiotic use. Furthermore, it facilitates the identification of challenges through academic inquiry and the formulation of evidence-based policy recommendations to encourage the rational use of antibiotics in Libya. The findings may also serve as a valuable asset for future research and can be presented to policymakers at both national and international forums, thereby influencing policy decisions and advocating for the responsible use of antibiotics.

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