

# Prevalence of self-medication phenomenon with antibiotics among university pharmacy students

Ghada L. Elkbuli\* , Rogaia A. Draid

Department of Pharmacy, High Institute of Medicinal Sciences, Sabratha, Libya



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\*Corresponding Author

ghadalf@yahoo.com

## Abstract

Self-medication with antibiotics is becoming a trend that threatens the health systems worldwide through developing bacterial resistance which is associated with high health care costs and increased rate of morbidity and mortality. The main objective of this study is to assess antibiotic self-medication practice among Libyan university pharmacy students. This is a cross-sectional study conducted among pharmacy students at Sabratha University in the western region of Libya. A validated questionnaire was used to collect relevant data which were statistically analyzed. A total of 170 undergraduate Pharmacy students participated in the study during spring 2021. About 80% of the participants reported the use of antibiotics without consulting a physician. The major reason for using antibiotics was to get a quick relief of emergency conditions which was reported by 35% of the students. About 25% of the students used antibiotics to relieve their pains and aches. The most commonly used antibiotic was amoxicillin (55%). Most antibiotics were obtained over the counter from community pharmacies (85%). Half of the participants were not sure if they can advise patients to use antibiotics without a prescription, although 60% of them believed that it was good practice. In conclusion, prevalence of antibiotic self-medication among university pharmacy undergraduate students is high. Thus, serious interventions are required to ensure safe and effective use of antibiotics among the population in Libya.

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**Keywords:** Antibiotic, bacterial resistance, Libya, self-medication, university student

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## Introduction

Self-care is a broad concept that has previously been introduced by the World Health Organization (WHO) as actions taken by people to establish and maintain their health, prevent and deal with illnesses [1]. It covers many aspects including hygiene, nutrition, lifestyle, environmental and socioeconomic factors and self-medication [2]. Self-medication as an integral part of self-care [3], is defined as the selection and consumption of medicines, herbs or any other substances for the treatment of self-diagnosed or recurrent physical or psychological ailments without consulting a physician or a professional supervision [2]. Medicines that are allowed to be used for self-medication are known as over the counter (OTC)

drugs, as patients can use them without the need for a prescription. On the other hand, prescription only medicines (PoM) are those drugs that should not be used without a physician's prescription [4].

Responsible self-medication can be advantageous in lowering treatment cost, reducing waiting times at clinics and involving community pharmacists in self-care practice [5]. In contrast, improper self-medication can result in serious health risks such as over or sub-therapeutic dosing, masking disease underlying causes, drug interactions, drug addiction, fetus toxicity, bacterial resistance and drug accumulation in renal and liver diseases [6, 7]. Though self-medication with PoM is not recommended, it is becoming a common global practice especially in developing countries which do not have

strict regulations over the sale of medicines in addition to the easy access to antibiotics, low income and the high cost of medical consultation [8]. Studies show that rates of self-medication with antibiotics are 50% in Africa, 40% in the Middle East, 75% in Asia and 29% in South America, compared to the developed countries in Europe (10%), [9]. The irrational use of antibiotics has fueled the evolution of multidrug-resistant bacteria which have led to an increased mortality, morbidity, health care cost and hospital stay [10].

In 2014, the WHO published a warning that the world is heading towards a post-antibiotic era [see 11, for details] or in other words, a pre-penicillin period where minor infections can be major killers once again [10]. However, this threat can invade the whole world with no consideration to any geopolitical borders [12]. For instance, every year "Methicillin-Resistant *Staphylococcus aureus* (MRSA)" kills more people than many other diseases do [13, 14]. This situation can be worsened by the irrational use of antibiotics through the self-medication practice which is influenced by many factors such as relatives, advertisements, previous experience and education [15]. Self-medication with antibiotics is found to be a common practice among university students [7, 16] including pharmacy students who are expected to be well informed about such practice and its consequences [15]. Studies exploring the extent of self-medication with antibiotics among undergraduate pharmacy students in Libya have not been clearly available in the published literature. Thus, the present study evaluates this practice phenomenon among university pharmacy students at Sabratha, Libya. It also assesses the influence of the students' knowledge about medicines and diseases on such practice.

## Materials and methods

**Study design and setting:** This cross-sectional questionnaire based study was conducted at Faculty of Pharmacy at Sabratha University which is located in the western region of Libya during May 2021. The study population involved a random sample size of 170 students of all enrolled students.

**Questionnaire:** The required information was gathered using a semi-structured pre-validated questionnaire with open and closed ended questions that was derived from questionnaires used in the previous published studies [6, 11, 16]. However, it was modified to suit the purpose of the present study. The questionnaire was in English as it is the language of instruction at Faculty of Pharmacy. Any ambiguous questions were clarified to the participated students. The questionnaire involved questions about demographic data (age, gender and monthly income). It also included questions regarding the practice of antibiotic self-medication during the past year (the name

of antibiotic taken, its source and the reasons for its intake). The questionnaire also explored the impact of the students' pharmaceutical knowledge on their self-medication practice.

**Ethical considerations:** The study was approved by the Research and Ethics Committee at Sabratha University, Sabratha, Libya (2/2021).

**Statistical analysis:** Data were collected and analyzed by using Microsoft Excel 2010. Descriptive analyses in form of frequency and percentage were presented.

## Results

A total of 170 undergraduate university pharmacy students participated in the study by completing the questionnaire properly. Their age ranged between 18 to 24 years.

**Demographic and socioeconomic characteristics:** In **Table 1**, among the 170 participants, there were 51 (30%) male and 119 (70%) female students. About 65% (n = 112) of the students and/or their families had a monthly income of 450 - 1000 Libyan Dinars ( $\approx$  100 - 200 \$). None of the participants was covered by health insurance in the past year. According to the level of their study, 80 (47%) of the participants were junior students (< 3<sup>rd</sup> year) whereas 90 (53%) of them are considered to be senior students (**Table 2**).

**Table 1:** Demographic and socioeconomic characteristics of the participants (n=170)

Factor	Frequency (%)
<b>Gender</b>	
Male	51 (30%)
Female	119 (70%)
<b>Monthly income (LD)</b>	
≤ 450	10 (5.8%)
450 - 1000	112 (65.8%)
1001 - 2000	28 (16.4%)
> 2000	20 (11.7%)
<b>Health insurance in past year</b>	
Yes	0 (0%)
No	170 (100%)
<b>Level of study</b>	
> 3 <sup>rd</sup> year	80 (47%)
≥ 3 <sup>rd</sup> year	90 (53%)

**Prevalence of antibiotics self-medication practice:** In **Table 2**, 80% (n = 136) of the participants admitted to use antibiotics without a prescription in the past year, 51.4% (n = 70 out of 136) of them were junior students ( $\leq$  3<sup>rd</sup> year). However, this practice was more common between female (73.5%, n = 100) than between male students (26.4%, n = 36).

**Antibiotics, their sources and doses:** In **Table 3**, the most commonly used antibiotic is amoxicillin which was used by 54.4% (n = 74) of the students, followed by amoxicillin and clavulenic acid in combination which was used by 13.9% (n = 19) of the students. Azithromycin and cefixime were used equally by 11.7% (n = 16) of the students each. The majority of the students (87.5%, n = 119) had purchased antibiotics from community

pharmacies, whereas 8% (n = 11) used left-over antibiotics and 4.37% (n = 6) obtained them from different sources such as friends, herbal shops, hospitals and others (**Table 4**).

In order to take the proper dose, 35.29% (n = 48) of the participants consulted community pharmacists, 5.14% (n = 7) checked the drugs' leaflets whereas 19.11% (n = 26) guessed the dose by themselves (**Table 5**).

**Table 2:** Prevalence of antibiotic self-medication

Self-medicated		Not self-medicated	
<b>by gender</b>			
Male	36 (26.4%)	Male	15 (44.11%)
Female	100 (73.5%)	Female	19 (55.88)
	136		34
<b>by level of study</b>			
Junior students	70 (51.4%)	Junior students	10 (29.4%)
Senior students	66 (48.5%)	Senior students	24 (70.5%)
	136		34

**Table 3:** Most commonly used antibiotics for self-medication

Antibiotic	Frequency (%)
Amoxicillin	74 (54.4%)
Amoxicillin/clavulanic acid	19 (13.9%)
Azithromycin	16 (11.7%)
Cefixime	16 (11.7%)
Ciprofloxacin	11 (8.08%)

**Table 4:** Sources of antibiotics

Source of antibiotics	Frequency (%)
Community pharmacy	119 (87.5%)
Leftover antibiotics	11 (8%)
Friends	02 (1.47%)
Not mentioned	04 (2.9%)

**Table 5:** Sources of antibiotics' doses

Source of the dose	Frequency (%)
Checking the leaflet	07 (5.14%)
Consulting a doctor	14 (10.29%)
Consulting a pharmacist	48 (35.29%)
Consulting family members/friends	20 (14.70%)
Books and/or magazines	07 (05.14%)
Previous experience	14 (10.29%)
Guessing the dose	26 (19.11%)

**Health problems associated with antibiotics use:** In **Table 6**, it is found that students used antibiotics for the alleviation of many symptoms such as fever, cough, nasal congestion and diarrhea. However, about quarter of the students (n = 34) used antibiotics to relieve their aches, fifth of them (n = 27) used antibiotics to reduce cough, while 5.1% (n = 7) had antibiotics to stop vomiting.

**Reasons for antibiotics self-medication:** **Table 7** shows that 35.2% (n = 48) of the students used antibiotics to get a quick relief in emergency situations whereas 21.3% (n = 29) had a previous successful treatment experience for similar symptoms. 10.2% (n = 14) used antibiotics to protect themselves from infections (prophylaxis).

**Students' opinions about the self-medication practice:** In **Table 8**, 58.08% (n = 79) of the participants reported that using antibiotics without professional consultation is a good practice while only 9.5% (n = 13) thought that it was a not an acceptable practice. However, half of the participants (n = 68) were not sure if they can advise patients to use antibiotics without consulting a physician, while 12.5% (n = 17) reported that they can do that.

**Table 6:** Health problems associated with self-medication with antibiotics

Health problem	Frequency (%)
Runny nose	14 (10.2%)
Nasal congestion	20 (14.7%)
Cough	27 (19.8%)
Sore throat	20 (14.7%)
Fever	14 (10.2%)
Aches and pains	34 (25%)
Vomiting	07 (5.1%)

**Table 7:** Reasons for self-medication with antibiotics

Reason for self-medication	Frequency (%)
Convenience	20 (14.7%)
Lack of trust in prescribing doctor	25 (18.3%)
Successful previous experience	29 (21.3%)
Emergency use to get quick relief	48 (35.2%)
Protection	14 (10.2%)

**Table 8:** Students' opinion about self-medication with antibiotics (n = 136)

Opinion	Frequency (%)
<b>Idea of self-medication</b>	
Good practice	79 (58.1%)
Acceptable practice	44 (32.4%)
Not acceptable practice	13 (09.5%)
<b>Future advice to patients</b>	
Yes	17 (12.5%)
Not sure	68 (50.0%)
No	51 (37.5%)

## Discussion

Patients prefer to use antibiotics without prescription as they think that such practice could save time and money. However, self-medication with antibiotics can lead to serious health risks and high costs for patient and health system. Thus, this study displays a high prevalence of self-medication with antibiotics among undergraduate university pharmacy students. Libyan medical students at University of Tripoli showed a similar rate of prevalence [17]. More, this finding is comparable with the findings of the previous studies conducted in Peru, Ghana, Uganda and Pakistan [10, 18, 19]. However, pharmacy undergraduate students in Jordan and Northern Nigeria reported higher rates [6, 15, 18, 20]. Such findings can be attributed to the similarities in socioeconomic and demographic characteristics of the participants, as limited law enforcement and weak regulations regarding use of antibiotics of the countries. In contrast, developed countries showed lower rates of antibiotic self-medication as China and European countries [21, 22]. Though, in a study conducted in Benghazi of Libya, 45% of undergraduate medical students reported self-medication with antibiotics [16]. This can be attributed to involvement of medical students who could be more aware of complication of this practice. The study shows that female students tend to self-medicate themselves with antibiotics more than males by three-fold. This agrees with the previous findings in Libya, Ghana, Rwanda, Peru and UK [7, 10, 17, 20, 23]. The present finding may be attributed to high number of female participants in comparison with low number of males. Another reason is hormonal changes during the period cycle that make females reluctant to visit the doctor and as a consequence they try to relieve their aches and cramps by antibiotics without a medical prescription. This is seen in Nigerian study where about 25% of the participated women used antibiotics to reduce menstrual cramps [7]. However, gender self-medication relationship was not assessed in

this study. Presently, the main reasons behind the OTC use of antibiotics were the belief of students that they can get a quick relief in emergency situations (such as toothache), similar to the Northern Nigerian study [18]. The other reason was having a successful past treatment for similar symptoms. Also, this is observed in previous studies from Ethiopia and Bahrain with similar prevalence [24, 25]. Followed by having a successful past treatment for similar symptoms. In other study, convenience, the limited time to visit a physician and the perception of having a minor ailment were the main causes for the practice [11]. The idea of taking antibiotics to avoid illnesses (prophylaxis) was shared between 10% of the participants.

Further, the majority of students in current study used amoxicillin antibiotic. This is consistent with published studies performed in Libya, Ghana, Northern Nigeria and North India [18, 20, 26, 27]. Although participants were not asked to report the cause of using any antibiotic, it is suggested that the causes behind amoxicillin use include its good absorption characteristics, availability, relative low price and its effectiveness against a wide range of bacteria [27]. This finding is consistent with the relatively low monthly income of the students and/or their families. The main health problems alleviated by antibiotics' self-medication in this study were aches and pains. This agrees with findings in Jordanian study, where 60% of the participants used antibiotics to relieve headache [6]. However, antibiotics were used to treat other health problems such as cough, nasal congestion and sore throat, runny nose and fever and vomiting. In general, these are the same health problems mentioned in other studies exploring the same topic [7, 11, 18]. More than half of the students used antibiotics for the treatment of respiratory diseases that are usually of a viral rather than a bacterial origin [16, 27] and this might prolong the duration of the antibiotic intake as no improvement can be readily seen (wrong medicine) [11]. The correct dosage of the antibiotics was obtained by the participants through consulting a community pharmacist. This is consistent with Malaysian study findings that 40% of the participants trusted pharmacists regarding the correct dosage [11]. This might be the result of the easy access to community pharmacies if compared to the relatively expensive and time-consuming doctors' visit. In a Saudi study, most undergraduate pharmacy students obtained their drug-related information from pharmacists because they were taught by pharmacists and that promoted the confidence in obtaining drugs' related information from pharmacists [8]. However, low number of the participants tried to guess the proper antibiotic dose. Such finding might reflect the influence of education and knowledge of medications on self-medication practices. However, self-

medication practices were less common among senior students which could be due to their better understanding of the consequences of irrational use of antibiotics found. However, according to a study conducted in Benghazi, Libya [16], senior medical students practiced antibiotic self-medication more than their junior peers. This might be due to the overestimation of their knowledge and feelings that there is no need for medical consultation. According to the study, about 85% of the respondents obtained antibiotics from community pharmacies. This agrees with the results of other studies carried out in Libya (Tripoli and Benghazi), Malaysia, North Nigeria, Saudi Arabia, Rwanda and others [7, 8, 11, 16 - 18]. Such a finding increases the concerns about the contribution community pharmacists have on antibiotic self-medication. It indicates a lack of control measures over the dispensing practice of antibiotics which could also be related to weak law enforcement and absence of strict dispensing guidelines. However, in Chile, implementing strict laws and enforcing fines on community pharmacies who sell antibiotics without prescriptions resulted a decrease in antibiotic utilization in outpatient settings [28]. The practice of self-medication with antibiotics was described as a good practice by 60% of the students, although half of the participants were not sure if they can advise patients to use antibiotics without prescription. This is consistent with the findings of Libyan and Malaysian studies that showed an increased tendency of pharmacy and medicine students to self-medicate themselves with antibiotics, despite their understanding of the health risks associated with antibiotics irrational use [11, 16]. However, this issue requires more efforts from academic and health authorities in order to improve the awareness of the public in general and pharmacy students in particular towards the rational use of antibiotics. This study is the first to assess the antibiotic self-medication practices among pharmacy university students in the western region of Libya. Although the findings might not be representative to all pharmacy students in Libya, they can have a positive impact on understanding the self-medication behavior of pharmacy students and taking actions to improve it.

## Conclusion

Self-medication with antibiotics is one of the global new trends that might results in increasing the burden on health systems mainly due to the development of bacterial resistance. The findings indicate that the use of antibiotics for the treatment of self-diagnosed symptoms among pharmacy students in Libya is alarmingly high especially that this group of students is supposed to be relatively informed and educated about this issue and its risks.

However, it highlights the need for well-designed prospective studies to be conducted on larger population in order to confirm the practice, and to inform the educational and health authorities about prevalence of this issue that might require educational campaigns to increase the awareness of university students and public about disadvantages and possible complications of using antibiotics without professional consultation. Further strategies are required to ensure a proper implementation of law and regulation regarding antibiotics dispensing guidelines to reduce risk of medicines misuse and increase benefits of using antibiotics as a therapeutic tool.

## Author's contribution

Both authors contributed equally and approved the final manuscript.

## Ethical issues

Including plagiarism, Informed Consent, data fabrication or falsification and double publication or submission have completely been observed by authors.

## Conflict of interest

The authors have declared no competing interest.

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