Antibiotic Misuse among Medical Students in Sohag University

[1]Nesreen A. Mohammed and [2]Youssria Elsayed Yousef

[1]Public health and community medicine, Faculty of Medicine, [2]Pediatric nursing, Faculty of Nursing, Sohag University, Sohag, Egypt.

Abstract

Background: Antibiotics are commonly used for self-medication due to their rapid effect in alleviating symptoms resulting in serious adverse effects. Medical students are more prone to self-medicate by virtue of their study of medical subjects and because the information needed for self-diagnosis and treatment are easily accessible. **Objective**: The study was conducted to investigate the pattern of antibiotics misuse among medical students in Sohag university and associated factors. **Method:** A cross sectional study was conducted among medical students of Sohag University during the academic year 2016-2017. Faculties of Medicine, Pharmacy and Nursing were chosen to be involved in the present study with a sample of 373 students in the fourth year in the selected faculties. A questionnaire was designed to obtain data about sociodemographic variables and antibiotic misuse pattern among the studied medical students. **Results:** Findings showed that 65.95% of the participants used antibiotics without doctor's prescription. About one third (32.5%) selected the antibiotics depending on their own experience. By asking about their opinion about using antibiotics for self-health care, 35.1% of the participants considered it acceptable and 5.9% considered it a good practice. None of the studied variables was significantly associated with antibiotics misuse among the participants. **Conclusion:** Among the medical students in Sohag University, 65.95% reported that they self-medicate with antibiotics. It is necessary to focus on increasing the awareness about the problem and its adverse effects, with implementing strict measures to prevent dispensing of drugs, especially antibiotics, without doctor's prescription.

Keywords: *antibiotics, misuse, medical students.*
Corresponding author: Nesreen Ali Mohammed, nesreenhammad180@yahoo.com

Introduction

Self-medication was defined as the selection and use of drugs to treat self-recognized illnesses or symptoms.[1] Medications used for self-medication are often known as 'non-prescription' or 'over the counter' and are provided through pharmacies without doctors' prescription.[2]

Antibiotics are among the medications commonly used for self-medication due to their rapid effect in alleviating symptoms. However, antibiotics misuse results in deleterious effects to both the individual and the community outweighing the predicted benefits.[3] Among these effects, antimicrobial resistance which is a great concern for public health with its impact on increasing health care costs globally.[4]

Studies showed that antibiotics misuse is facilitated by easy access to antibiotics, unawareness about antibiotics and the serious effects of their misuse, poverty, the high cost of medical care, and previous use of antibiotics.[5]

Nevertheless, antibiotics misuse has been reported in general population in both developing and developed countries.[6] Furthermore, several studies have revealed that the problem is highly prevalent among university students.[7-9] They are particularly exposed to the Internet and media therefore, they are

susceptible to a larger threat of pharmaceuticals advertising.[6]

Furthermore, self-medication was shown to be prevalent among medical students and the incidence was high in medical faculties of many countries e.g. South India, Karachi and Egypt.[10-12]

Medical students are more prone to self-medicate by virtue of their study of medical subjects and because the information needed for self-diagnosis and treatment are easily accessible from drug indices, books, and other medical students. Furthermore, medical students can easily access the drug itself through samples provided by pharmaceutical company's representatives and from pharmacies.[10] However, during the undergraduate years, medical students are not allowed to prescribe medicines despite their study of the pathophysiology and pharmacology. The problem of self-medication and antibiotic misuse is of a special importance among medical students as they are the future health care workers so they should be adequately aware about the serious adverse effects of these practices duo to the major role they are supposed to play in educating the patients and the community about antibiotics misuse disadvantages.[13]

Therefore, the present study is conducted to investigate the pattern of antibiotics misuse among medical students in Sohag university and associated factors.

Method

Study design: The current study is a cross sectional study conducted in two months (October and November) duration during the academic year 2016\2017 among medical students of Sohag University.

Setting: Sohag University is an independent University located in Sohag governorate on the Eastern Nile bank. The University includes fourteen faculties and faculties of Medicine, Pharmacy and Nursing were chosen to be involved in the current study.

Table (1): Distribution of the studied students according to sociodemographic criteria, faculty, and special habits (N.=373)

Characteristics	No. (%)
Gender	
Male	149 (39.9)
Female	224 (60.1)
Residence	
Urban	226 (60.6)
Rural	147 (39.4)
Faculty	
Medicine	134 (35.9)
Pharmacy	124 (33.2)
Nursing	115 (30.9)
Accommodation	
Not family related	100 (26.8)
Family related	273 (73.2)
Where did you spend most of your life?	225 (60.3)
Urban	148 (39.7)
Rural	
Parental education level	78 (20.9)
Basic	87 (23.3)
Secondary	208 (55.8)
University	
Personal habits	
Tobacco smoking	15 (4)
Alcohol	4 (1.1)
consumption	84 (22.5)
Physical activity	270 (72.4)
No	
How difficult is it to cover attendance at the university cost?	
I'm able to cover it without any problem	251 (67.3)
It is difficult to a moderate extent	89 (23.9)
It is extremely difficult	24 (6.4)
My living expenses are not met	9 (2.4)

The studied population was composed of students in the fourth year in the three selected medical faculties in Sohag University which covered 756 colleague students in the academic year 2016- 2017. The sample size was 373 students as calculated using OpenEpi program (Version 3.01, Open Source

Epidemiologic Statistics for Public Health, USA) based on the following assumptions: Prevalence of antibiotic misuse is 41.5% according to the results of a previous study conducted in Ain Shams University, Egypt among medical students[12], power as 80%, and confidence interval was set at 95%.

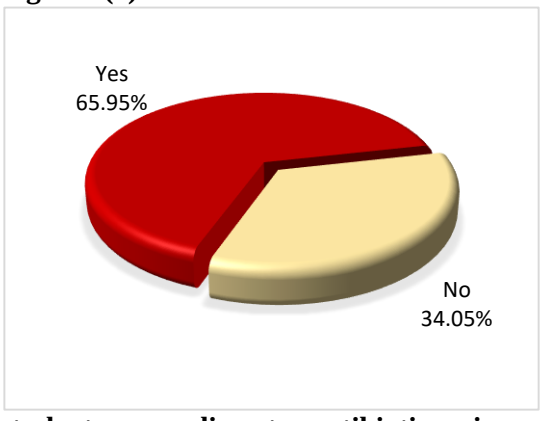
The number of participants from each faculty was chosen by proportional allocation. Accordingly, 134, 124 and 115 students from Medicine, Pharmacy, and Nursing faculties respectively were included and completed the questionnaires.

The sample was selected using clustered random sampling technique based on the classes in the fourth grade of the selected faculties where classes were selected randomly from a list that contains all classes in the fourth grade in each of the three faculties to complete the required number of the students. The total sample composed of all the gathered clustered random samples.

Data collection procedure: After explaining the study aim, questionnaires were distributed to the students who accept to participate in the study, and they were asked to fill them.

Study instrument: The questionnaire used for data collection was consisted of two sections. The first section was designed to collect data including sociodemographic data (age, gender, faculty, residence whether rural or urban and education of the parents). The second section of the questionnaire was based on a pretested validated questionnaire of a previous study[14], and included inquiries about antibiotic misuse among the studied medical students. A pilot study was conducted on 50 medical students in Faculty of Medicine that had not been included in the study group and the items which were not clearly understood by the students were revised and corrected.

Figure (1): distribution of the studied students according to antibiotic misuse (No.= 373)



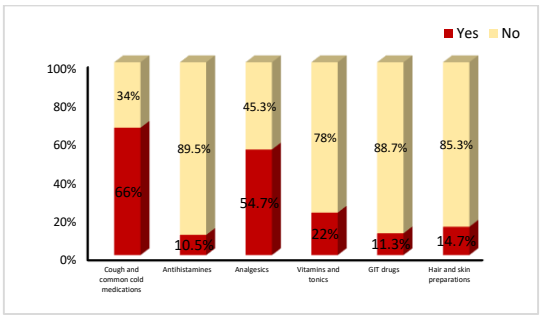


Figure (2): self-medication with other drugs

Statistical analysis

The statistical analysis was performed using IBM SPSS Statistics for Windows version 22 (IBM Corp., Armonk, NY, USA). Sample characteristics were summarized as numbers and percentage for categorical variables. Chi-Square test was used for comparison between qualitative variables. The associations between antibiotic misuse and the studied determinants were examined using binary logistic regression. A 5% level was chosen as a level of statistical significance in all statistical tests used in the study.

Ethical consideration

Ethical approval was secured from Scientific Research Ethics Committee of the Faculty of Medicine, Sohag University. In addition, official approval was secured from the deans of the selected faculties. Informed consent was obtained from each participant after explanation of

Table (2): pattern of antibiotic misuse among students ever treated themselves with antibiotics (No.= 246)

Questions	No. (%)
What were the reasons of self-medication with antibiotics?	
Poor economic status or cost saving	20 (8.1)
Previous experience	73 (29.7)
Simple availability of drugs or convenience	17 (6.9)
Mild diseases	94 (38.2)
Good results of treatment by antibiotics	3 (1.2)
Lack of time	39 (15.9)
In the past 6 months, for how long did you keep using self-medication with antibiotics if symptoms had not improved?	
One week or less	119 (48.4)
More than one week	32 (13)
I don't know.	95 (38.6)
For which of the following complaints did you used antibiotics?	
Runny nose	9 (3.7)
Nasal congestion	19 (7.7)
Cough	46 (18.7)
Sore throat	87 (35.3)
Fever	32 (13)
Vomiting	2 (0.8)
Diarrhea	11 (4.5)
Skin wounds	24 (9.8)
Pain	16 (6.5)
Your selection of antibiotics was based on	
Recommendation by a pharmacist	66 (26.8)
Opinion of family members	33 (13.4)
Opinion of friends	9 (3.7)
My own experience	80 (32.5)
Previous doctor's prescription	57 (23.2)
The advertisement	1 (0.4)
What did you consider when selecting antibiotics?	
Type of antibiotics	92 (37.4)
Brand of antibiotics	2 (0.8)
Price of antibiotics	11 (4.5)
Indications for use	126 (51.2)
Adverse reactions	15 (6.1)
How did you know the dosage of antibiotics?	
By reading the package insert	89 (36.2)
By consulting a doctor	3 (1.2)
By consulting a pharmacist	77 (31.3)
By consulting family members/friends	10 (4.1)
From the Internet	7 (2.8)
From my previous experience	58 (23.6)
By guessing the dosage by myself	2 (0.8)
Did you ever change the dosage of antibiotics deliberately during the course of self-treatment?	
Always	31 (12.6)
Sometimes	103 (41.9)
Never	112 (45.5)
Did you ever switch antibiotics during the course of self-treatment?	
Always	19 (7.7)
Sometimes	118 (48)
Never	109 (44.3)
Did you ever check the instructions come with the package insert of antibiotics for self-treatment?	
Always	122 (49.6)
Sometimes	103 (41.9)
Never	21 (8.5)
When did you normally stop taking antibiotics?	
After a few days regardless of the outcome	24 (9.8)
After symptoms disappeared	96 (39)
A few days after the recovery	38 (15.5)
After antibiotics ran out	22 (8.9)
At the completion of the course	63 (25.6)
After consulting a doctor/pharmacist	3 (1.2)

Table (3): opinion towards self-medication using antibiotics among the participants (No.= 373)

Questions	No. (%)

What do you think about self-medication with antibiotics for self-health care?	
Good practice	22 (5.9)
Acceptable practice	131 (35.1)
Not acceptable practice	220 (59)
Do you think you can treat common infectious diseases with antibiotics successfully by yourself?	
Yes, I can	91 (24.4)
Not sure	204 (54.7)
No, I cannot	78 (20.9)
In your opinion what are the factors that can prevent antibiotic self-medication:	
Fear of complications.	160 (42.9)
Advices from the professors, family members, friends about the possibility of complications.	21 (5.6)
Recommendation of television and radio programs, Internet and related media about the potential complications of drugs.	75 (20.1)
Student discounts at university hospitals	18 (4.8)
Provision of health insurance	20 (5.4)
Provision of Sufficient information about serious outcome	79 (21.2)

Table (4): comparison between the students in the three studied faculties regarding self-medication with antibiotics (No.= 373)

Questions	Faculty			P-value
	Medicine (N= 134)	Pharmacy (N= 124)	Nursing (N= 115)	
Have you ever treated yourself with antibiotics?				
Yes	90 (67.2%)	84 (67.7%)	72 (62.6%)	0.658
No	44 (32.8%)	40 (32.3%)	43 (37.4%)	
What do you think about self-medication with antibiotics for self-health care?				
Good practice	6 (4.5%)	7 (5.6%)	9 (7.8%)	0.846
Acceptable practice	47 (35.1%)	43 (34.7%)	41 (35.7%)	
Not acceptable practice	81 (60.4%)	74 (59.7%)	65 (56.5%)	
Do you think you can treat common infectious diseases with antibiotics successfully by yourself?				
Yes, I can	45 (33.5%)	31 (25%)	15 (13%)	**0.003***
Not sure	66 (49.3%)	70 (56.5%)	68 (59.1%)	
No, I cannot	23 (17.2%)	23 (18.5%)	32 (27.9%)	

*P- value was calculated by Chi-square test * Statistically significant*

the study purpose. The questionnaires used were anonymous.

Results

The current study included 373 students of whom 134 (35.9%) were from faculty of Medicine, 124 (33.2%) and 115 (30.9%) were from faculties of Pharmacy and Nursing respectively. Regarding gender, 39.9% of the participants were males and females represented 60.1%. Those who resided in urban areas were 60.6% and 73.2% inhabited family related accommodation. More than half (55.8%) of students' parents had university education and 67.3% reported that they could able to cover the cost of attendance at the university easily (table 1).

When asked about antibiotics misuse, about two thirds (65.95%) of the participants reported the use of antibiotics without doctor's prescription (Figure 1), and by asking them about self-medication with other drugs in the past six months, 66% and 54.7% reported self-medication with

Table (5): Univariate Binary logistic regression analysis about predictors of antibiotics misuse

Characteristics	OR (CI 95%)	P - value

Gender		
Male	1	
Female	1.01 (0.66 – 1.57)	0.952
Residence		
Urban	1	
Rural	1.11 (0.71 – 1.72)	0.647
Faculty		
Medicine	1	
Pharmacy	1.03 (0.61 – 1.73)	0.921
Nursing	0.82 (0.49 – 1.38)	0.452
Accommodation		
Not family related	1.13 (0.69 – 1.85)	0.614
Family related	1	
Where did you spend most of your life?		
Urban	1	
Rural	1.19 (0.76 -1.84)	0.449
Parental education level		
Primary	1	
Secondary	1.12 (0.59 -2.13)	0.718
University	1.22 (0.71-2.09)	0.476
Personal habits		
No	1	
Tobacco smoking	2.17 (0.59- 7.89)	0.239
Alcohol consumption	0.54 (0.08 – 3.92)	0.545
Physical activity	1.15 (0.68 – 1.931)	0.609
How difficult is it to cover attendance at the university cost?		
I'm able to cover it without any problem	1	
It is difficult to a moderate extent	1.31 (0.77 - 2.21)	0 .316
It is extremely difficult	0.64 (0.27 – 1.48)	0 .297
My living expenses are not met	1.89 (0.38 – 9.29)	0 .434

cough & common cold medications and analgesics respectively. More than one fifth (22%) reported the use of vitamins and tonics without prescription, 14.7% used hair and skin preparations, 11.3% used GIT medications, 10.5% used antihistamines without doctor consultation (Figure 2).

When asked about the reasons, 38.2% of the students who practiced self-medication with antibiotics reported that they considered the disease was mild and 15.9% said that they didn't have time for visiting a doctor. More than one third (35.3%) and 18.7% used antibiotics for sore throat and cough respectively. About one third (32.5%) said that the selection of antibiotics they used was based on their own experience and 26.8% selected the antibiotics according to a pharmacist recommendation. More than one half of them (51.2%) and 37.4% considered indications of use and type when selecting antibiotics respectively and only 6.1% thought about the adverse reactions. More than thirty six percent reported that they knew the dosage of the antibiotics they used by checking the package insert and 31.3% knew it by consulting a pharmacist.

More than fifty four percent reported that they intended to change the dosage of the antibiotics they used and when asked about the reasons, 46.3% changed the dose as the condition worsened, 35.3% changed it duo to improved symptoms, 9.6% changed it to reduce adverse reactions and 8.8% said that the drug was insufficient for completing the treatment. More than fifty five percent reported that they switched antibiotics during the course of self-treatment and most of them (74.5%) reported that the former antibiotics did not work as a reason, 10.9% wanted to reduce adverse reactions, 10.2% said that the

former antibiotics ran out and 6.6% reported that the latter one was cheaper. The majority (91.5%) reported that they checked the instructions come with the package insert of antibiotics for self-treatment of whom 64% said that they fully understood them and 39% reported that they stop taking antibiotics after symptoms disappearance and 25.6% at the completion of the course (table 2).

By asking about their opinion about using antibiotics for self-health care, 59% of the participants considered it a non-acceptable practice, 35.1% considered it acceptable and 5.9% considered it a good practice. More than half of them reported that they weren't sure if they could treat common infectious diseases with antibiotics successfully by themselves while 24.4% of them said that they could (table 3). More than one third (33.5%) of students of faculty of medicine reported that they are sure of their ability to treat common infectious diseases with antibiotics successfully compared to 25% of students of faculty of pharmacy and 13% of nursing students. This difference was statistically significant (P-value = 0.003) (table 4).

On univariate logistic regression analysis about predictor variables of antibiotics misuse, none of the studied variables was significantly associated with antibiotics misuse among the participants (table 5)

Discussion

Worldwide, self-medication is considered as an essential part of self-care.[15] Many people with various characteristics practice self-medication[16] and among those who practice self-medication, doctors and medical students, also self- medicate, where many studies showed that medical students self-medicate[12,17-21], and this may be explained by their pharmacological background and their knowledge about diseases and drugs.

With lack of awareness about the deleterious effects of self-medication with drugs especially antibiotics[22], the ease of accessibility to antibiotics which are commonly dispensed as an over the counter drug, and the spread of the practice among university students and considering that the present medical students will be the future health care workers who are required to inform and educate the public about these risky behaviors and their deleterious consequences, the present study aimed at exploring self-medication with antibiotics among medical students of Sohag university.

The current study revealed that 65.95% of the participants reported the use of antibiotics without doctor's prescription which is similar to the finding of Jacqueline et al,[23] who revealed that 65.1% of the studied students started antibiotics by their selves. These findings are higher than the findings of Lv et al,[24], El Ezz et al,[12] and Naveed et al,[25] who found that 40.2%, 41.5% and 23% of the studied students respectively had self-medicated with antibiotics. In contrast, the results of the current study were lower than those of Núñez et al,[5] where 70 % of the studied university students reported antibiotics self-medication.

Sore throat and cough were the most common complaints for which the participants used antibiotics which is in line with the findings of many studies[7, 26,27] which found that common cold, sore throat and cough were the main complaints the students used antimicrobial agent for.

About one third (32.5%) said that the selection of antibiotics they used was based on their own experience and 26.8% selected the antibiotics according to a pharmacist recommendation. In the study conducted by Afolabi et al[26], 75% selected the antibiotic based on a previous experience , 30.2% based their selection on an advice from doctor, pharmacist or nurse, without a written prescription.

More than fifty four percent of the participants in the current study reported that they intended to change the dosage of the antibiotics they used, more than 55 % reported that they switched antibiotics

during the course of self-treatment and 91.5% reported that they checked the instructions come with the package insert of antibiotics for self-treatment and these finding are near those of Lv et al,[24] who found that 44.5% of the students changed antibiotic dosage, 36.5% switched to another antibiotic and 81.3% of students read the package insert carefully before taking antibiotics, In another study performed by Okyay et al,[28] 93.6% reported that they checked the instructions come with the package insert of antibiotics which is in agreement with the results of the present study.

According to the present study findings, 39% reported that they stop taking antibiotics after symptoms disappearance and 25.6% at the completion of the course. In the study of Okyay et al,[28] 31.6% completed the treatment course and 49.3% stopped treatment after the symptoms had disappeared and the study conducted by Naveed et al,[25] showed that 83% of the students reported that they complete the course.

By asking about their opinion about self-medication with antibiotics for self-health care, 59% of the participants considered it a non-acceptable practice which is lower than the findings of Jacqueline et al,[23] where 83.3% thought that frequent and inappropriate antibiotic use is a serious problem. While, in line with the current study results, Naveed et al,[25] found that 59% considered antibiotics misuse a harmful practice.

None of the studied variables was significantly associated with antibiotics misuse among the participants which is in line with the findings of Lv et al,[24] who found that most of the studied factors were not significantly related to the practices of antibiotic self-medication. Another study was done by Eticha et al[29], gender and age were not associated with antibiotics misuse while residence and monthly pocket money were significantly related to this practice and a study was performed by Wang et al[4] showed that residence had significant effect on antibiotic misuse while age, sex and education had no association

Conclusion

This study highlights that the problem of antibiotics misuse is prevalent among the medical students in Sohag University as 65.95% of the participants reported that they used antibiotics without doctor's prescription. As the problem of self-medication especially with antibiotics exerts deleterious impacts, for example but not limited to microbial resistance, and as the present medical students will be the future health care workers who are assigned to combat such harmful behaviors and must be aware of the risks of such practices and educate the public about their serious consequences, it is necessary to focus on increasing their awareness about the problem, its consequences and adverse effects and focusing on their role in guiding patients and directing them to the correct and safe ways to deal with disease conditions. Furthermore, implementing strict measures to prevent dispensing of drugs, especially antibiotics, without doctor's prescription is mandatory. None of the studied variables was significantly associated with antibiotics misuse among the participants.

Study limitations

The most important limitation is the reliance on self-reporting of the surveyed students which may result in under-estimation of the real problem size as they may intend not to declare such data.

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