



Assessment of the Knowledge and Self-medication Practices towards Antibiotics among Future Healthcare Professionals in Ajman, United Arab Emirates

**Mariam Aboulilah¹, Sara Ahmed¹, Razan Jarjouma¹,
Razan Sabri¹ and Subish Palaian^{2*}**

¹College of Pharmacy, Gulf Medical University, Ajman, United Arab Emirates.

²Department of Clinical Sciences, College of Pharmacy and Health Sciences, Ajman University, Ajman, United Arab Emirates.

Authors' contributions

This work was carried out in collaboration among all authors. Authors MA, SA, RJ and RS designed the study under supervision of author SP. Authors MA and SA performed the data analysis, wrote the protocol and author MA in consultation with author SP wrote the first draft of the manuscript. Authors RJ and RS managed the analyses of the study. Authors SA, RJ, RS and SP managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2020/v32i930479

Editor(s):

(1) Dr. Mohamed Fathy, Assiut University, Egypt.

Reviewers:

(1) Camilo Torres-Serna, Universidad Santiago de Cali, Colombia.

(2) Anonymous, Nigeria.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/57354>

Original Research Article

Received 24 March 2020

Accepted 29 May 2020

Published 09 June 2020

ABSTRACT

Objectives: The aim of the study is to assess the knowledge and self-medication behavior among health professions students regarding antibiotic usage.

Methods: A cross-sectional study was performed using a self-administrated questionnaire. A sample of 424 questionnaires was distributed randomly among health science students of a medical university in Ajman, UAE. The questionnaire is categorized into three sections which are Socio-demographic details of the participant, knowledge and self-medication practice of antibiotic. The data was entered in MS Excel spread sheet and analyzed as per the study objectives.

*Corresponding author: E-mail: subishpalaian@gmail.com;

*This work was done while the corresponding author was working at affiliation 1.

Key Findings: Upon assessing the knowledge of respondents, authors found 85.8% of the students were familiar with the term 'antibiotic resistance'. Half of the students agreed that antibiotics treat common cold quickly. Regarding the self-medication practices, 55.6% (n= 236) of students reported that they always take antibiotic without prescription. Cold and flu was the common reason for using antibiotics. Augmentin (amoxicillin and clavulanic acid) was the common medication used among the students. Nearly one third of the respondents (32.78%; n=139) saved the antibiotics in case of reinfection.

Conclusions: In conclusion, antibiotic usage was common among study respondents. Preventive strategies, antibiotic stewardship programs, training, education programs and more restriction towards antibiotic dispensing should be implemented to avoid the misuse and antibiotic resistance.

Keywords: Anti-bacterial agents; antimicrobial resistance; self-medication; health professions students; United Arab Emirates.

1. INTRODUCTION

Infectious diseases are a common cause of morbidity and mortality worldwide [1]. Advices from friends or family members, advertisements, expensive healthcare systems and lack of time has led people to self-medicate themselves. Self-medication is the selection and use of medicines by individuals to treat self-recognized illnesses or symptoms. Self-Medication with antimicrobials is a common problem recognized worldwide and is known to cause side effects, increase antimicrobial resistance, and leads to wastage of economic resources [2,3,4]. The World Health organization has proposed interventions and strategies to minimize irrational use and self-medication of antimicrobials [5].

Healthcare professionals has a huge role to play in containing antimicrobial resistance. But at times irrational prescribing of antimicrobials is witnessed in many parts of the world [6,7]. A warning regarding dispensing of antibiotics without prescription is issued from the Ministry of Health and prevention and they also intensified supervision and inspections for most of the pharmacies available all over the country. They also raised an advisory to the doctors for rationalizing the prescription of antibiotics to the patients [8].

A high prevalence of self-medication among students can be seen with other types of drugs such as painkillers, vitamins and antihistamines and that was reported in Egypt, [9] Jordan [10] and Palestine [11]. Usually, people are confused between the symptoms of bacterial and viral infection especially in the case of respiratory infections. At least 30% unnecessary antibiotics are used in respiratory conditions such as bronchitis, cold and flu, sinus and some are used in ear infections. Inappropriate

antibiotic use includes inappropriate selection, dosing, and duration, in about 50% of all antibiotics given in the outpatient setting [12].

Consequences of antibiotic resistance include economic burden on patients (more physician visits and longer hospital stays), less availability of effective drugs, more illness and lastly cause death [13]. The highest rates of antibiotic resistance are seen in children and old adults [12]. As antibiotics become less effective due to the spread in the resistance globally, some infections become difficult to treat such as pneumonia, gonorrhoea, food borne diseases and tuberculosis.

Students in the medical disciplines are more vulnerable to self-medicate themselves with antibiotics as some of them depend on their knowledge [14]. Two studies were done in UAE regarding the use of antibiotics among healthcare students. One of them assessed the factors leading to self-medication [15] and the other one reported the prevalence of antibiotic usage with or without prescriptions [16]. Other studies show a high prevalence of self-medication practices among students in the medical disciplines in KSA [17] Turkey [18] Ghana [19] and North India [20].

At this point it is crucial to study their self-medication practices as this can even influence their prescription practices, as in case of Physician and dispensing practices in case of pharmacists, and so on. Hence it is worthwhile exploring the self-medication practices and behavior of health professional students on antibiotic usage. Therefore, this study was conducted to evaluate the knowledge and self-medication practices of health science students towards antibiotics.

2. MATERIALS AND METHODS

2.1 Study Design

A cross-sectional study was conducted to assess the knowledge and self-medication practice of health science students.

2.2 Study Site

This research was conducted at Gulf Medical University (GMU), a medical university in Ajman, UAE, offering Medical and Health Professional Education in the field of Medicine, Dentistry, Pharmacy, Physiotherapy, Nursing, Medical Laboratory Sciences, Anesthesia & Surgical Technology and Medical Imaging Sciences.

2.3 Sample Size Calculation

The sample size for this study was 424 students studying in various programs. This sample size was calculated as below: [21]

$$\text{Formula for sample size calculation} = \frac{Z_{\alpha} * (p) * (1 - p)}{c^2}$$

$$= \frac{(1.96)^2 * (0.5) * (1-0.5)}{(0.05)^2} = 385$$

A 10% correction was added ($38.5 \approx 39$)

$$385 + 39 = 424$$

Thus, the sample size calculated was 424 students.

2.4 Study Subjects

According to the total number of students in each College we distributed the questionnaire to the following: MBBS [n=123;29%], DMD [n=88; 20.7%], PharmD [n=52;12.2%],BPT [n=36;8.4%], BBMS [n=32;7.5%], ADPCS [n=23; 5.4%], BSN [n=27;6.3%], AST [n=10;2.3%], MIS [n=18;4.2%] and MLS [n=14;3.3%].

The questionnaire is distributed randomly among all males and females. It was also randomized regarding different years in each program depend on the availability of the students.

2.5 Study Tool

The questionnaire was developed from extensive review of the literature and surveys. Then we gathered the commonly asked questions in the

literature [16] and the rest were developed based on the study objectives.

The Questionnaire had 3 parts

- Socio–demographic details of participants:
- Knowledge about antibiotics
- Self-medication practice of antibiotic

The demographic details, section had the age, gender, nationality, program and year of study (Table 1).

2.5.1 Validity, reliability and feasibility tool

The self-developed questionnaire was sent to experts for content validation. A pilot study was conducted among small sample of students before the main study to confirm the validity and other feasibility issues.

2.5.2 Method of data collection

Data was collected through a self- administered questionnaire. The 4 researchers distributed the questionnaire randomly throughout 5 days. Each researcher participated in the clarification and validation of the distributed questionnaire. It took about 5-10 minutes to complete the questions.

2.6 Data Analysis

The data were entered into MS Excel software for analysis. The variables or parameters in the analysis included age, gender, nationality, different programs, gender. The percentage of student that were familiar with the term antibiotic resistance, consequences of misused antibiotics, practices of self-medication, the condition they used the antibiotic for, the most common used antibiotic, factors affecting choice of antibiotics and the satisfaction behind their practice, were analyzed.

2.7 Pilot Testing

A pilot study was conducted with 10% of the study sample size. It was done by distributing 42 questionnaires among different programs in GMU. The time taken to complete the questionnaire was 10 minutes. Based on the pilot study findings, changes have been made to the main study, such as 2-3 questions were omitted, brand names were added. A modification was done for some questions.

3. RESULTS

3.1 Socio-demographic Characteristics of the Participants

A total of 424 students participated in the study, most of them were females (69.33%). Out of 5 Colleges, College of Medicine was found to be the highest of approximately 42% (n= 178). Most of the respondents were Non-Arab of about 54.2 % (n= 230) and Arab were about 45% (n=194). The mean age \pm SD of the respondents was 19.84 \pm 1.99 years. Out of all participants' first year students were the highest of about 30% (n=128) (Table 2).

3.2 Knowledge about Antibiotics

Upon assessing the knowledge of the respondents, it was found that most of the students were familiar with the term antibiotic resistance 85.8% (n= 364). The majority of respondents knew that physician prescription can influence the occurrence of antibiotic resistance (68.86%, n= 292). In general, around 49.7% (n=211) of the students agreed that antibiotics treat common cold quickly. 59.19% (n= 251) of the students believed that misusing antibiotics will increase the chance of resistance. The rest of the consequences the students chose were leading to ineffective treatment 55.89% (n=237), increase in the side effects 54.24% (n=230) and increase the cost to the patients 35.61% (n= 151).

In this research, 43.6% (n= 185) of respondents think that the broad-spectrum antibiotics were a better choice than the highly selective antibiotics, 30.6% (n= 130) they didn't know the answer and the remaining 25.7% (n=109) they thought that it

was not a better choice. The analysis of the question that state that "For a quick action of an antibiotic, large doses is required" shows 63.4% (n= 269) of respondents didn't think that for a quick action of antibiotics, large doses are required. More than half of the respondents agreed that allergic reaction is one of the most common side effects seen with antibiotic usage.

The appropriate duration for taking antibiotics according to more than half of the respondents was period indicated by physician or pharmacist which shows about 69.5% (n=295) and approximately 15% (n=64) of the respondents stopped taking the antibiotic after the disappearance of symptoms whereas approximately 3% (n=12) of respondents knew the appropriate duration according to their family members or friends. 67% (n=284) of respondents aware that excessive use of antibiotics could disturb the normal bacterial flora. 25% (n=106) of respondents agreed that using more than one antibiotic at the same time give better control to infections (Table 3).

3.3 Self-medication Practices of Antibiotics

After assessing the self-medication practice of the students, we found that approximately 55.6% (n= 236) of students always took antibiotics without prescription, and 44.3% (n= 188) never took antibiotic without prescription. Last time indicated by the students for taking antibiotic without prescription was either a month 27.8% (n=118) or a year ago 33.8% (n=80). The rest of the students either took about a week ago or more than one year.

Table 1. Component of questionnaire

| Knowledge about antibiotics | | Self-medication practice of antibiotic | |
|-----------------------------|---------------------|--|---------------------|
| Type of questions | Number of questions | Type of questions | Number of questions |
| Resistance | 3 | Practice | 3 |
| Indication | 2 | Usage | 1 |
| Dose | 1 | Type of antibiotic | 1 |
| Adverse Drug Reaction | 1 | Source of antibiotic | 1 |
| Duration | 1 | Instructions | 1 |
| Effect of antibiotic | 2 | Dose | 1 |
| | | Adverse drug reaction | 1 |
| | | Duration | 1 |
| | | Storage | 1 |
| | | Satisfaction | 1 |

Table 2. Socio-demographic details of respondents

| Socio-demographic details | | n | % |
|---------------------------|--------------------------|-----|-------|
| Age | ≤21 | 356 | 83.96 |
| | ≥22 | 68 | 16.03 |
| Gender | Female | 294 | 69.33 |
| | Male | 130 | 30.66 |
| Nationality | Arab | 194 | 45.75 |
| | Non-Arab | 230 | 54.24 |
| Program | College of Medicine | 178 | 41.98 |
| | College of Dentistry | 88 | 20.75 |
| | College of Pharmacy | 53 | 12.5 |
| | College of Allied Health | 78 | 18.39 |
| | College of Nursing | 27 | 6.36 |
| Year of study | 1 | 128 | 30.18 |
| | 2 | 106 | 25 |
| | 3 | 103 | 24.29 |
| | 4 | 87 | 20.51 |

Also, while assessing the practice of respondents regarding the usage of misused antibiotics, it was found that, most of the respondents used antibiotics to treat cold & flu 52.96% (n=125), 41.52% (n=98) for fever, and 33.89% (n=80) for infections.

The type of infections mostly reported by the students were Urinary Tract Infections, Respiratory tract infections, Eye Infections, Ulcers, and for Chicken pox. The mostly used antibiotic by the students was found to be Amoxicillin 41.94% (n=99), followed by Metronidazole 12.28% (n=29), Azithromycin 7.2% (n= 17), Ciprofloxacin 6.77 % (n=16), Cefixime 6.35% (n=15), while 24% (n=57) they don't know which type they are taking.

The selection of antibiotic mostly depends on the recommendation from the community pharmacist 44.9% (n= 106), whereas 43.6% (n= 103) used antibiotics from previous doctor's prescription, 28.9% (n=68) of students took antibiotics according to the opinion of their family members, 24% (n=57) depend on their own experience, 21% (n= 51) form their medical information, 9% (n= 23) depend on the Opinion of their friends, 8% (n=19) form Internet and 2.5% (n= 6) form Advertisements.

About 58.4% (n=138) chose that they sometimes checked the instructions that come with the package insert while 23.72% (n=56) of students always checked and the rest never checked the instructions. Usually students gets information about the dose they were taking by consulting a doctor or a pharmacist 67.7% (n=160), others 38.9% (n=92) checking the

package insert to know the dose of antibiotic 22% (n=52) from their previous experience, 17.7% (n= 42) from family members/ friends, 10.5% (n=25) form their medical knowledge, 6.3% (n=15) from the Internet and 2.5% (n=6) by guessing the dosage themselves.

In general, most students 84.7% (n=200) did not experience any side effects while using antibiotics and only 8.4% (n=36) experienced side effects. The most reported side effect by the students was diarrhea (n=9). Then the second most reported was allergy (n=5), then vomiting (n=4), fever (N=3), rash (n=3), and the rest only reported once which are constipation, dizziness, sleepiness, nausea. The majority of students discontinued antibiotic after disappearance of symptoms 47.45% (n=112), and about 38% (n=90) after completion the antibiotic course, whereas 15.2% (n=36) stop taking antibiotics after counseling the doctor or pharmacist, the remaining students 13.5% (n=31) after a few days regardless of the outcome and 12.2% (n=29) after antibiotics ran out.

Duration of antibiotic used among students differs, because most of students used antibiotics for 1-5 days 53.3% (n=126), 28.8% (n=68) of students were using antibiotics for 7-10 days, 13.5% (n=32) use antibiotic until disappearing of symptoms and the remaining 4.2% (n=10) use antibiotics more than 10 days. Regarding the behavior of students towards handling the leftover antibiotics 58.8% (n=139) save it in case of reinfection, 13.5% (n=77) of students discard the rest and only 8.4% (n=20) of students share the leftover antibiotic with others.

Table 3. Knowledge about antibiotics

| Questions | Answers | n | % |
|---|--|----------|----------|
| Are you familiar with the term antibiotic resistance? | Yes | 364 | 85.84 |
| | No | 37 | 8.72 |
| | I don't know | 23 | 5.42 |
| Physician prescription of antibiotic can influence the occurrence of antibiotic resistance. | Yes | 292 | 68.86 |
| | No | 58 | 13.67 |
| | I don't know | 74 | 17.45 |
| Antibiotic usage cure common cold quickly. | Yes | 211 | 49.76 |
| | No | 124 | 29.24 |
| | I don't know | 89 | 20.99 |
| Inappropriate antibiotic use can lead to | Increase antibiotic resistance | 251 | 59.19 |
| | Ineffective treatment | 237 | 55.89 |
| | Increased side effects | 230 | 54.24 |
| | Increased cost to the patient | 151 | 35.61 |
| Broad spectrum antibiotics is a better choice than using highly selective antibiotics. | Yes | 185 | 43.63 |
| | No | 109 | 25.70 |
| | I don't know | 130 | 30.66 |
| For a quick action of an antibiotic, large doses are required | Yes | 70 | 16.50 |
| | No | 269 | 63.44 |
| | I don't know | 85 | 20.04 |
| Allergic reaction is one of the most common side effects seen with antibiotic use | Yes | 232 | 54.71 |
| | No | 74 | 17.45 |
| | I don't know | 118 | 27.83 |
| What is the appropriate duration for taking an antibiotic? | Period indicated by physician or pharmacist | 295 | 69.57 |
| | Antibiotics should be used until disappearance of symptoms | 64 | 15.09 |
| | Period indicated in drug leaflet | 53 | 12.5 |
| | Period indicated by family members or friends | 12 | 2.83 |
| Excessive use of antibiotics can affect normal bacterial flora. | Yes | 284 | 66.98 |
| | No | 17.5 | 4.12 |
| | I don't know | 35 | 8.25 |
| Using more than one antibiotic at same time give better control to infections. | Agree | 106 | 25 |
| | Not sure | 176 | 41.50 |
| | Disagree | 142 | 33.49 |

Table 4. Self-medication practice of antibiotics details of respondents

| Q 3II | Answers | n | % |
|--|--|----------|----------|
| 1. How often do you take antibiotic without prescription? | Never | 188 | 44.33 |
| | Always | 236 | 55.66 |
| 2. When was your last antibiotic taken without prescription? | last week | 27 | 6.36 |
| | last month | 118 | 27.83 |
| | last year | 80 | 33.89 |
| | other | 11 | 4.66 |
| 3. For which of the following complaint(s) did you use antibiotics? | Cold and flu | 125 | 52.96 |
| | Sore throat | 105 | 44.49 |
| | Fever | 98 | 41.52 |
| | Infections | 80 | 33.89 |
| | Tooth ache | 49 | 20.76 |
| | Acne | 28 | 11.86 |
| | Diarrhea | 23 | 9.74 |
| | Body Aches | 22 | 9.32 |
| | Skin wounds | 20 | 8.47 |
| 4. Which of the following drugs do you usually take? | Amoxicillin | 99 | 41.94 |
| | Metronidazole | 29 | 12.28 |
| | Azithromycin | 17 | 7.20 |
| | Ciprofloxacin | 16 | 6.77 |
| | Cefixime | 15 | 6.35 |
| | I don't know | 57 | 24.15 |
| | Others | 3 | 1.27 |
| 5. Your selection of antibiotics depends on... | Recommendation by community pharmacist | 106 | 44.91 |
| | Previous doctor's prescription | 103 | 43.64 |
| | Opinion of family members | 68 | 28.81 |
| | My own experience | 57 | 24.15 |
| | My medical information | 51 | 21.61 |
| | Opinion of friends | 23 | 9.74 |
| | Internet | 19 | 8.05 |
| | Advertisement | 6 | 2.54 |
| 6. Do you check the instructions come with the package insert of antibiotics for self-treatment? | Never | 42 | 17.79 |
| | Sometimes | 138 | 58.47 |
| | Always | 56 | 23.72 |

| Q 3II | Answers | n | % |
|---|--|----------|----------|
| 7. How do you know the dose of antibiotics? | By consulting a doctor or pharmacist | 160 | 67.79 |
| | By checking the package insert | 92 | 38.98 |
| | From my previous experience | 52 | 22.03 |
| | By consulting family members/friends | 42 | 17.79 |
| | My Medical knowledge | 25 | 10.59 |
| | From the Internet | 15 | 6.35 |
| | By guessing the dosage by myself | 6 | 2.54 |
| 8. Have you ever experienced any side effect when you take antibiotics for self-medication? | Yes | 36 | 8.49 |
| | No | 200 | 84.74 |
| 9. When do you normally stop taking antibiotics? | After symptoms disappeared | 112 | 47.45 |
| | After the completion of the course | 90 | 38.13 |
| | After a few days regardless of the outcome | 31 | 13.55 |
| | After consulting a doctor/pharmacist | 36 | 15.25 |
| | After antibiotics ran out | 29 | 12.28 |
| 10. How long do you take your antibiotics? | 1-5 days | 126 | 53.38 |
| | 7-10 days | 68 | 28.81 |
| | Until symptoms disappear | 32 | 13.55 |
| | More than 10 days | 10 | 4.23 |
| 11. How do you handle your leftover antibiotics? | Save in case of reinfection | 139 | 58.89 |
| | Discard the rest | 77 | 13.55 |
| | Share the rest with others | 20 | 8.47 |
| 12. How do you usually store antibiotics? | According to drug leaflet | 118 | 50 |
| | My own experience | 63 | 26.69 |
| | After asking the pharmacist | 49 | 20.76 |
| | Internet source | 5 | 2.11 |
| | Others | 1 | 0.4 |
| 13. Were you satisfied with the results of your self-medicated antibiotics? | Yes | 168 | 71.18 |
| | No | 68 | 28.81 |

Most of the students 50% (n=118) stored according to the drug leaflet, 26.6% (n=63) of students stored according to their experience, 20.7% (n=49) of students stored after asking the pharmacists, and only 5 students store after searching on internet sources. The assessment of self-medication behavior shows that 71.1% (n=168) of students were satisfied with the results of their self-medication behavior and 28.8% (n=68) of students not satisfied (Table 4).

4. DISCUSSION

Self-medication of antibiotics is a global problem and it demands addressing. Health professionals have huge responsibility in tackling self-medication behavior amongst general public [22].

Our findings showed that most of the students were familiar with the term antibiotic resistance (85%). In comparison with the findings in KSA [23], results were similar and comparable (65%) but higher in UK [24]. This research, 4th year students had the highest percentage which shows that their knowledge and practice helped them to be more familiar. So, if we focused on the early years of medical students and educated them more about the importance of antibiotic resistance that might change their practice when they become professionals. Another significant difference was found between year of study regarding the use of antibiotics in common cold and there was a high misconception regarding this misuse in first year students which may be due to their previous believes and practices. It's a common misconception which was issued in other studies done in KSA [25] and China [26] which may lead to unnecessary treatment, side effects and increase resistance.

Half of the respondents chose cold and flu the most complain they used antibiotic for, which was found also in a study done in Nigeria (32%) [27]. This common problem usually happen as they might believe, that antibiotics will relief their illness faster. Amoxicillin/Clavulanate was the most common drug used by the students which was also reported in KSA 68% [23], and reported in community settings in Yemen (52.35%) [28], and Indonesia (46%) [29]. The reason for it's highly usage is due to its effect on respiratory tract infections and it's commonly prescribed by physician.

Despite the adequate knowledge it was found that there is high prevalence of self-medication practice and it is also seen in Peru [30] Ghana

[19] and KSA [17]. More than half of the students saved the antibiotics in case of reinfection which was also reported in Nigeria. [27] less than half of the respondents (45 %) select their antibiotic depending on recommendations from community pharmacist which was similar in Nigeria [31] because they had lack of regulations regarding dispensing antibiotics. But only few students 9% depends on pharmacist's advice in Kuwait [32]. Many students were satisfied with the result of their self-medication. Our findings showed that 8.5% of respondents experienced side effects as a result of self-medication. A higher percentage of side effects was found in China. [33] 47% of the students stopped taking the antibiotic after disappearing the symptoms and a less percentage was reported in Italy [34].

The limitation of this study was the time of administering the questionnaire to the students as it was the end of the semester and before the final exams so they might be distracted and this could have affected their answers. Also, this study was done in one institutional where the results cannot be generalized to the whole population. In addition, authors did not assess the cause and impact of their self-medication which could highlight the main reason behind their practice.

5. CONCLUSION

Antibiotic Self-medication practice of health science students is more prevalent, despite the adequate knowledge about the antibiotics. It is alarming to note that the future prescribers have self-medication attitude towards antibiotics and the satisfaction is higher which may lead to sustainability of the malpractice. Therefore, authors recommend awareness programs conducted for students from the beginning of their university years.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The ethical approval of the study was granted by the Institutional Review Board of the Gulf Medical University on letter dated 24th May 2018.

ACKNOWLEDGEMENTS

The authors would like to acknowledge the students for participating in this research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Fiske CT, Bloch KC. Infectious Diseases. In: Hammer GD, McPhee SJ. Eds. Pathophysiology of disease: An introduction to clinical medicine, 8e New York, NY: McGraw-Hill; 2014.
2. Rather IA et al. Self-medication and antibiotic resistance: Crisis, current challenges, and prevention. Saudi J Biol Sci. 2017;24(4):808-812.
3. Bennadi D. Self-medication: A current challenge. J Basic Clin Pharm. 2013;5(1):19-23.
4. Dye C. After 2015: infectious diseases in a new era of health and development. Philos Trans R Soc Lond B Biol Sci. 2014;369(1645):20130426.
5. WHO. Interventions and strategies to improve the use of antimicrobials in developing countries Drug management program; 2001. Available:www.who.int/drugresistance/Interventions_and_strategies_to_improve_the_use_of_antim.pdf
6. Hashemi S, et al. Irrational antibiotic prescribing: A local issue or global concern? EXCLI J. 2013;12:384-395.
7. Knobler SL, et al. The resistance phenomenon in microbes and infectious disease vectors: Implications for human health and strategies for containment: Workshop Summary. National Academies Press (US); 2003.
8. Ministry of Health and Prevention issues warning against dispensing antibiotics without medical prescription - Ministry of Health and Prevention – UAE; 2017. Available:http://www.mohap.gov.ae/en/MediaCenter/News/Pages/1921.aspx (Accessed 23 February 2019)
9. Helal R, Abou-El, Wafa H. Self-medication in University Students from the City of Mansoura, Egypt. J Environ Public Health. 2017;1-7.
10. Alshogran O, et al. Patterns of self-medication among medical and nonmedical University students in Jordan. Risk Manag Healthc Policy. 2018; 11:169-176.
11. Sawalha A. A descriptive study of self-medication practices among Palestinian medical and nonmedical university students. Research in Social and Administrative Pharmacy. 2008;4(2):164-172.
12. Fast Facts Community Antibiotic Use CDC Cdc.gov; 2018. Available:www.cdc.gov/antibiotic-use/community/about/fast-facts.html [Accessed 23 February 2019]
13. About Antimicrobial Resistance Antibiotic/Antimicrobial Resistance CDC Cdc.gov; 2018. Available:www.cdc.gov/drugresistance/about.html [Accessed 23 February 2019]
14. Antibiotic resistance World Health Organization; 2018. Available:www.who.int/en/news-room/fact-sheets/detail/antibiotic-resistance [Accessed 23 February 2019].
15. Al-Kubaisi, K et al. What drives using antibiotic without prescriptions? A qualitative interview study of university students in United Arab Emirates. Pharm Pract (Granada). 2018;16(2): 1172.
16. Sharif SI, Sharif RS. Antibiotics use with and without a prescription in healthcare students. Am J Pharmacol Sci. 2013;1(5): 96-99.
17. Khanam P, Haj Ali D. Assessment of the knowledge and self-medication behaviours towards antibiotics among nursing students at King Saud Bin Abdulaziz University for Health Sciences, Al Ahsa. J Nurs Care. 2017;6(6):2-6.
18. Donmez S, et al. Knowledge, attitude and practice of self-medication with antibiotics among nursing students. Int J Pharmacol. 2017;14(1):136-143.
19. Donkor E, et al. Self-Medication practices with antibiotics among tertiary level students in Accra, Ghana: A cross-sectional study. Int J Environ Res Public Health. 2012;9(10):3519-3529.
20. Pal B, et al. Self-Medication with Antibiotics among Medical and Pharmacy Students in North India. Am Med J. 2016;7(2):7-12.
21. Creative Research Systems. Sample Size Formulas; 2019.

- Available: www.surveysystem.com/sample-size-formula.htm (Accessed 20 February 2019).
22. Lukovic JA, et al. Self-medication practices and risk factors for self-medication among medical students in Belgrade, Serbia. PLoS ONE. 2014;9(12): e114644.
 23. Soomro S, et al. Awareness and knowledge about antibiotic use and resistance among students of Northern Border University Saudi Arabia. J Trop Dis. 2017;05(05).
 24. Inácio J, et al. Master of Pharmacy students' knowledge and awareness of antibiotic use, resistance and stewardship. Curr Pharm Teach Learn. 2017;9(4):551-559.
 25. Harakeh S, et al. Perceptions of medical students towards antibiotic prescribing for upper respiratory tract infections in Saudi Arabia. BMJ Open Respir Res. 2015;2(1): e000078.
 26. Hu Y, et al. Knowledge, attitude and practice with respect to antibiotic use among Chinese medical students: A multicentre cross-sectional Study. Int J Environ Res Public Health. . 2018;15(6): 1165.
 27. Abimbola IO, et al. Knowledge and practices in the use of antibiotics among a group of Nigerian university students. Int J Infect Contro. 2013;9(1).
 28. Albawani SM, et al. Self-medication with antibiotics in Sana'a City, Yemen. Trop J Pharm Res. 2017;16(5):1195.
 29. Hadi U, et al. Survey of antibiotic use of individuals visiting public healthcare facilities in Indonesia. Int J Infect Dis. 2008;12(6):622-629.
 30. Núñez M, et al. Antibiotic self-medication in university students from Trujillo, Peru. Medicina Universitaria. 2016;18(73):205-9.
 31. Akoria O, Tudjegbe I. Antibiotic use among final year undergraduates in university of Benin, Nigeria. West Afr J Pharmacol Drug Res. 2010;25(1).
 32. Al-Hussaini M, et al. Self-medication among undergraduate medical students in Kuwait with reference to the role of the pharmacist. Journal of J Res Pharm Pract. 2014;3(1):23.
 33. Lv B, et al. Knowledge, attitudes and practices concerning self-medication with antibiotics among university students in western China. Trop Med Int Health. 2014; 19(7):769-779.
 34. Scaioli G, et al. Antibiotic use: A cross-sectional survey assessing the knowledge, attitudes and practices amongst students of a school of medicine in Italy. PLoS ONE. 2015;10(4):e0122476.

© 2020 Aboullilah et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:

*The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/57354>*