



A Cross Sectional, Descriptive Study: Assessment on Knowledge and Practices of the Uses and Resistance of Antibiotic Use

Meena Gyawali¹, Dr. Ravi Roshan Khadka², Md Irfan Alam³, Ahmad Sagheer⁴, Shahedul Islam⁵

¹Public Health Department, Jalalabad State University, Medical Faculty

²Surgery Department, Jalalabad State University, Medical Faculty

^{3,4,5}2nd year Medical Student, Jalalabad State University

ABSTRACT

Background

Antimicrobial resistance (AMR) is one of the most serious global public health threats in this century. As we know medical students are going to be primary care giver / physicians to serve the community and their knowledge and practices regarding the uses of antibiotic plays a vital role. The study aimed to assess the knowledge and practices of antibiotic use and its resistance among undergraduate medical students at the Jalal-Abad State Medical University.

Materials and Methods:

A descriptive cross-sectional study was done through online Google forms for a period of 3 months from September to November 2023. A structured questionnaire was administered to 120 randomly selected Undergraduate Medical students which containing a three-point scale. The variables were assessed using a ten points scale, whose responses were "Yes" or "No" and level of Knowledge on antibiotics was assessed using the scale correct answer above 6 as good knowledge, correct answer below 5 as poor level of knowledge. Similarly for practice was assessed using scale correct answer above 5 as good practice and below 4 as poor practice.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 22.0. Associations between dependent and independent variables were done using a Chi-square test. The statistical significance was done at 95% confidence level ($p < 0.05$). Ethical approval was taken by the University. The questionnaire was adopted from previously conducted similar studies and modified to fit with the current setup.

Result: In total, 120 medical students from 3rd year were selected for the study where the age range was 17-22 years with mean age of 20 ± 1 years. Majority (89.2%) of the participants were found to have good knowledge on antibiotics uses and its resistance while the majority of respondents had poor practices on the uses of antibiotic (50.8%) specially reuse of same antibiotics for similar kind of symptoms. Majority of students who has good knowledge and also had good practices where as students with poor knowledge has poor practices (p value=0.022). Personality traits were found to be a contributing factor in students' tendency to use antibiotics without a prescription.

Conclusion: Most of the students were aware of the antibiotic resistance and its consequences. However, their practices were found to be a matter of concern. An educational intervention can be introduced to bring about behaviour changes regarding antibiotics practices among students.

Key words: Knowledge; Practice; Antibiotic use and resistance, Medical students

Introduction

One of the biggest risks to global public health is antimicrobial resistance (AMR). According to estimates, bacterial AMR contributed 4.95 million fatalities worldwide in 2019 and was directly responsible for 1.27 million of those deaths (1). The primary cause of the emergence of drug-resistant infections is the overuse and misuse of antibiotics in humans, animals, and plants. Common antibiotics' ability to effectively treat common bacterial infections is being threatened by the global growth of antibiotic resistance. (2).

Modern medicine relies on antimicrobial medications to treat bacterial infections. Drug-resistant microorganisms are becoming more prevalent, endangering our capacity to treat common illnesses and carry out life-saving operations including organ transplants, hip replacements and other routine procedures. Antibiotics are the most commonly administered medications in developing nations with high rates of infectious disease, such as Bangladesh, Pakistan, and India. This is why the worrisome rise in antimicrobial resistance (AMR) has been seen (3).

Irrational use of antibiotics has created a havoc of antibiotic resistance. (4) One of the major contributing reasons to the development and spread of resistance is the improper and unnecessary use of antibiotics. A number of complex factors, including prescription knowledge and expertise and uncertain diagnosis, might interact to cause inappropriate administration of antibiotics. Furthermore, patients' expectations, experiences with antibiotics, knowledge, attitudes, and beliefs about self-medication are additional determinants. (5)

Medical students are going to be primary care physicians to serve the community. There is enough data to conclude that physicians and prescribers who have just obtained their licenses lack the necessary training to write prescriptions safely (6). One of the possible causes of this could be inadequate training received during the medical degree program. Thus, the goal of the current study is to evaluate the MBBS students' current antibiotic knowledge and practices.

Subjects and Methods

The cross-sectional study was conducted between September and November of 2023 using Google Forms. A structured questionnaire that was specially created and created based on the literature study was used to collect the data.

There were three sections on the questionnaire. The first section deal with the sociodemographic data of medical students, whereas the second section of questions were knowledge-based and had ten distinct statements. Practice-related questions are found in the third part. The knowledge and practices of the respondents regarding antibiotics were measured using a scoring system. The participant's total number of right answers to ten items was added up to determine their antibiotic knowledge score, which was computed as a continuous variable. For every right response, one point was given, and for every incorrect response- zero, with a maximum possible score of 10 for each respondent on the correct answers. The knowledge score was divided into two categories: poor knowledge (0–5), good knowledge (scoring >6). Using a shared Google link, the questionnaire was distributed to third-year medical students at the university.

Result

A total of 120 medical students from 3rd year where as the age range was 17-22 years with mean age of 20±1 years. Male (67.5 %) predominance was found over females (32.5%). Where as majority of the students (48.3%) were from India and (44.2%) were from Pakistan followed by (7.5%) from Bangladesh. Regarding marital status majority 94.2% respondents said that they were single whereas remaining 5.8% were married. Similarly on the assessment of their family type majority 70% they were from single family background. And regarding the distribution of students based on their religion maximum 68.3% were from Muslim religion followed by 28.3% Hindu and remaining 2.5% and .8% were from Christian and Jew religion respectively.

Assessment of participants' knowledge of antibiotics use and resistance.

Table1: shows the frequency and distribution of respondents knowledge to questions regarding antibiotics.

SN	Statements	Yes	No
1.	Excessive use of antibiotic can reduce the risk of antibiotic resistance	14(11.7)	106 (88.3%)
2.	Antibiotic should be only taken when prescribed by doctors	102(85%)	18(15%)
3.	Can antibiotic be shared with others with similar symptoms	97(80%)	23(19.2%)
4.	All types of antibiotic are safe to take during pregnancy and breastfeeding	10(8.3%)	110(91.7%)
5.	Taking antibiotic regular can make you more addictive?	63(52.5%)	57(47.5%)
6.	Antibiotic are used to treat infection caused by bacteria.	107(89.2%)	13(10.8%)
7.	Is it possible for antibiotics to cause allergic reaction for some people.	97(80%)	23(19.2%)
8.	Antibiotics are not effective drugs for the treatment of fever	106(88.3%)	14(11.7%)
9.	Antibiotic kills both good and bad organisms.	92(76.7%)	28(23.3%)
10.	The body can usually fight mild infection on its own without antibiotics.	60(50%)	60(50%)

Table 1 shows that the majority of the participants 102 of 120 (85%) agreed that the antibiotic should be only taken after prescribed by doctors. The participants also agreed that antibiotics are not effective drugs for the treatment of fever, as well as 107 (89.2%) believed antibiotics are used to treat infection caused by bacteria. Majority of them (80%) believed that antibiotic might cause allergic reaction for some people.

Assessment of participants' practices on the uses of antibiotics use.

Table: 2 shows the frequency and distribution of respondents to questions on practices regarding antibiotics usage.

SN	Practices related questions	Responses	
		Yes	No
1.	Do you think taking antibiotics regularly can make you more addictive?	59 (49.2%)	61 (50.8%)
2.	Do you save the remaining antibiotic for next time you get sick?	102 (85%)	18 (15%)
3.	Do you stop taking the further treatment once you start feeling better?	23 (19.2%)	97 (80.8%)
4.	Have you share your antibiotics with others?	34 (28.3%)	86 (71.7%)
5.	Do you consult doctor before starting antibiotic?	107 (89.2%)	13 (10.8%)
6.	Do you prefer to take an antibiotic for simple cough and sore throat?	47 (39.2%)	73 (60.8%)
7.	Do you check the expired date of antibiotics before use?	112 (93.3%)	8 (6.7%)

From the study it observed that more than 80% students save the remaining antibiotics for next time. It was satisfying to observe that more than 97% said they don't stop taking full course of antibiotics once they start to get better. Majority (89.2) of students believed in consulting doctor before starting antibiotics. Almost all of them (93.3%) always check expiry date of antibiotic before using it. Similarly, majority of students who find it normal to ask doctor to prescribe antibiotics for them when they catch common cold or cough.

Table 3: Showing the level of knowledge of respondents on uses and resistance of antibiotic

SN	Statement	Responses	
		Frequency	Percentage(%)
1.	Good Knowledge	107	89.2
2.	Poor Knowledge	13	10.8
	Total	120	100

In accordance with the grading scale devised majority 89.2% of the participants were found to have good knowledge and 10.8% to have poor knowledge on antibiotics and resistance of its usages. (see table 3)

Table 4: Showing the Level of Practices of respondents on uses and resistance of antibiotic

SN	Statement	Responses	
		Frequency	Percentage(%)
3.	Good Practice	59	49.2
4.	Poor Practice	61	50.8
	Total	120	100

Above table shows that 50.8% of the respondents had poor practices on the uses of antibiotic where as remaining 49.25% had poor practices of use of antibiotics.

Table 5: Correlation between participants' level of knowledge on antibiotic resistance and their gender

SN	Level of Knowledge	Gender		Total
		Male	Female	
1	Good Knowledge	70*	37	107
2	Poor Knowledge	11	2	13
	Total	81	39	120

Note: p-value=0.034 (Statistically significant)

Above table shows that more male respondents had better knowledge of antibiotic use and resistance than their female counter partners which was statistically significant, p-value = 0.034)

Table:6: Correlation between participants' level of Practices on antibiotic use and their gender

SN	Level of Knowledge	Gender		Total
		Male	Female	
1	Good Practice	38	21	59
2	Poor Practice	43	18	61
	Total	81	39	120

Note: p-value=0.065 (Statistically not significant)

Above table shows that more female respondents had good practices of use of than in comparison to male respondents. (21 vs 38).

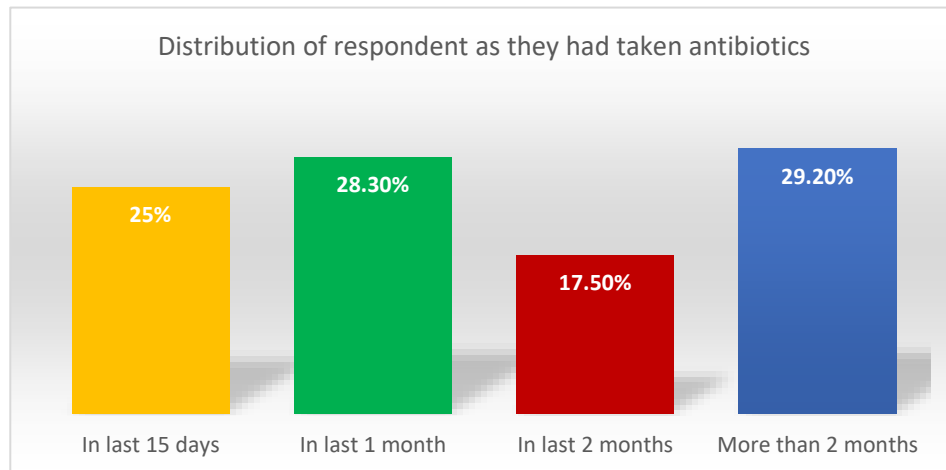
Table 7: Correlation between participants' knowledge on antibiotic resistance and practices regarding antibiotic usage

SN	Level of Knowledge	Level of Practices		Total
		Good Practice	Poor Practice	
1	Good Knowledge	64*	43	107
2	Poor Knowledge	4	9	13
	Total	59	61	120

Note: p-value=0.022 (Statistically Significant)

The correlation between knowledge and practices from above table show that those majority of students who has good knowledge and also had good practices where as students with poor knowledge has poor practices and that statistically significant (p-value=0.022)

Figure:1 Distribution of respondents as per the antibiotics they have taken recently



Above figure shows that almost 70% of the respondents had taken antibiotics in last 2 months where as remaining 29.20% of them had taken their antibiotics for more than 2 months.

Discussion

Inappropriate use of antibiotics leads to antibiotic resistance, which has several clinical and financial ramifications as well as a progressive loss of sensitivity to antibiotics(7). However, the issue of antibiotic overuse with no justification has also been brought up by the WHO. "Combat AMR: No Action Today, No Cure Tomorrow" is the theme for World Health Day.(8,9)

Similar to a study conducted among students at the International University of Africa, where 70.9% of the respondents were male and the remaining 29.15 percent were female, the majority of respondents in this study (65.5%) were male (10). In contrast, 63.7% of study participants in a study conducted in Nepal were female, while 36.3% were male.(11)

Knowledge about antibiotics and its usages

In this study, the majority of students (85%) agreed that antibiotics should only be taken as prescribed by doctors. The level of knowledge regarding the usefulness of antibiotics for bacterial infections was relatively high (89.2%). A study conducted in India found that a similar percentage of participants knew that antibiotics are useful for treating bacterial infections (95.2%) (12). A high degree of understanding on the efficacy of antibiotics in treating bacterial infections was also revealed by another Indian study. One possible explanation for their right response could be that they encountered the content in their course on pharmacology, microbiology, etc.

In line with a study conducted among second-year medical students in Mysore, India, 75.8% of respondents agreed that antibiotics might kill healthy bacteria(13). Our survey found that 76.7% of respondents agreed that antibiotics can kill good bacteria.

Practices related discussion about antibiotics resistance and its usages

According to a study conducted in Sudan, 70.4% of participants agreed with the assertion that they do not share antibiotics with others, but 71.71% of participants in our study disagreed with this statement (14). Only 52.8% of participants in our study agreed that using antibiotics on a regular basis can make them more addictive; in contrast, 93.1% of participants in a similar study conducted in Zimbabwe agreed with this statement (15).

In our study, 85.2% of the students sought medical advice before taking antibiotics, compared to 69.6% of students in a Nigerian research who occasionally seek medical advice before using antibiotics. According to our research, roughly 80.8% of participants stated they typically discontinued taking antibiotics once they felt better. This percentage is comparable to an 82.6% study conducted in Nigeria (16).

In the present study, the majority of medical students (80.8%) disagreed that an antibiotic treatment should be stopped as soon as the illness's symptoms disappear. Our research's results are consistent with those of Bharath et al., who found that 75% of medical students knew how important it is to finish an antibiotic course (17). Approximately 85 percent of students regularly stored unused antibiotics for later use. Among medical students from the southern region of India, this practice was comparatively lower (less than 50%) (18).

Up to 28.3% of students in our study shared antibiotic leftovers with friends and family. According to a similar survey conducted in Nigeria, 17.7% of students give their friends, family, or roommates their leftover antibiotics when they're unwell without first consulting a doctor (19). While most students in our study disagreed, a small percentage (37.2%) thought that antibiotics were used to treat common colds and sore throats. Similar findings were found in a research conducted in western China, where over 10% of students had the false impression that ordinary colds should be treated with antibiotics (20).

When asked if students check the expiration dates of antibiotics before using them, the majority of respondents (93.3%) indicated that they do, which is consistent with a survey conducted in Lebanon that found 84.4% of respondents thought that students check the dates (21).

The correlation between knowledge and practices in our study shows that those majority of students who has good knowledge and also had good practices where as students with poor knowledge has poor practices (p-value=0.022) and our findings were consistent with study done Cypriot university (22)

Limitations

A primary constraint is that our sample consisted solely of medical faculty members from a single institution in Jalal-Abad, Kyrgyzstan (JASU). A more realistic representation of the knowledge and practices among the local student population would have been obtained by include students from other programs offered by the institution as well as from universities around the nation.

Secondly, the sample was limited to third-year students who had recently begun their clinical studies. There's a chance that these students haven't learned the practical application of antibiotics. The current sample may not have adequately illustrated the impact of education; a larger sample, with students from more advanced classes, might have done so.

Conclusion

According to our survey most of the medical students were generally well informed on the usage of antibiotic. In terms of practices, a significant deal of improvement is required.

Recommendation

The antibiotics should be prescribed rationally, and medical curricula should include proper guidelines on this topic as medical students are going to be primary care physicians in near future.

Reference

1. Antimicrobial Resistance Collaborators. (2022). Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis. *The Lancet*; 399(10325): P629-655. DOI: [https://doi.org/10.1016/S0140-6736\(21\)02724-0](https://doi.org/10.1016/S0140-6736(21)02724-0)
2. World Health Organization (WHO); Antimicrobial resistance; Fact Sheets <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance>
3. World health organization. Prevention and containment of antimicrobial resistance. Available at http://www.ino.searo.who.int/LinkFiles/Other_Content_WHD11-Seminar_Presentation-WRpdf. Accessed 15 February 2016.
4. WHO. WHO Global Strategy for Containment of Antimicrobial Resistance [Internet]. WHO. [cited 2019 Feb 01]. Available from: http://www.who.int/drug-resistance/WHO_Global_Strategy.htm/en/
5. Davey P, Pagliari C, Hayes A (2002) The patient's role in the spread and control of bacterial resistance to antibiotics. *Clin Microbiol Infect* 8: 43–68. PMID: 12427207
6. Petrov A. Skills of Bulgarian medical students to prescribe antibacterial drugs rationally: A pilot study. *IMAB – Annu Proceeding Sci Pap.* 2018;24:2020–3
7. Khajuria K, Kaur S, Sadiq S, Khajuria V. KAP on antibiotic usage and resistance among second professional medical students. *Int J Basic Clin Pharmacol* 2019;8:68-73.

8. Maragakis LL, Perencevich EN, Cosgrove SE. Clinical and economic burden of antimicrobial resistance. *Expert Rev Anti Infect Ther* 2008;6:751-63.
9. World Health Organization. The Evolving Threat of Antimicrobial Resistance Options for Action. Geneva: World Health Organization; 2012. Available from: http://whqlibdoc.who.int/publications/2012/9789241_503181_eng.pdf
10. Lawan Saadatu Sunusi, Mousnad Mohamed Awad, Njelekela Hassan, Chiroma Abubakar Isa: Assessment of Knowledge and Attitude towards Antibiotic Use and Resistance among students of International University of Africa, Medical Complex Sudan: Open Access Text:DOI: 10.15761/GDT.1000171:
11. Shah P, Shrestha R, Mao Z, Chen Y, Chen Y, Koju P, et al. Knowledge, Attitude, and Practice Associated with Antibiotic Use among University Students: A Survey in Nepal. *Int J Environ Res Public Health*. 2019;16:3996.
12. Gupta MK, Vohra C, Raghav P. Assessment of knowledge, attitudes, and practices about antibiotic resistance among medical students in India. *J Family Med Prim Care*. 2019;8:2864-9.
13. Mohan, Kishore, Hemanth. Knowledge, attitude, and practice toward antibiotic use and antibiotic resistance among 2nd-year medical students: A cross-sectional study. *Natl J Physiol Pharm Pharmacol [Internet]*. 2024;(0):1.
14. Sa'adatu Sunusi L, Mohamed Awad M, Makinga Hassan N, Abubakar Isa C. Assessment of knowledge and attitude toward antibiotic use and resistance among students of international university of Africa, medical complex, Sudan. *Glob Drugs Ther [Internet]*. 2019;4(2).
15. Zulu A, Matafwali SK, Banda M, Mudenda S. Assessment of knowledge, attitude and practices on antibiotic resistance among undergraduate medical students in the school of medicine at the University of Zambia. *Int J Basic Clin Pharmacol [Internet]*. 2020 Jan. 24 [cited 2023 Dec. 29];9(2):263-70.
16. Alex IO. Knowledge of antibiotic use and resistance among students of a medical school in Nigeria. *Malawi Med J [Internet]*. 2019;31(2):133.
17. Bharath Kumar VD ,Monika N ,Kalpana L ,Veena RM. Assessment of awareness about antibiotic resistance among first year medical undergraduates in a medical college. *International Journal of Clinical Pharmacology Research*. 2015 Nov;5(5):239–42.
18. [Afzal Khan A K](#), [Gausia Banu](#), [Reshma K K](#). Antibiotic resistance and usage—A survey on the knowledge, attitude, perceptions and practices among the medical students of a southern Indian teaching hospital. *J Clin Diagn Res [Internet]*. 2013;
19. Ajibola O, Omisakin O, Eze A, Omoleke S. Self-medication with antibiotics, attitude and knowledge of antibiotic resistance among community residents and undergraduate students in northwest Nigeria. *Diseases [Internet]*. 2018;6(2):32.
20. Lv B, Zhou Z, Xu G, Yang D, Wu L, Shen Q, et al. Knowledge, attitudes and practices concerning self-medication with antibiotics among university students in western China. *Trop Med Int Health [Internet]*. 2014;19(7):769–79.
21. Sakr S, Ghaddar A, Hamam B, Sheet I. Antibiotic use and resistance: an unprecedented assessment of university students' knowledge, attitude and practices (KAP) in Lebanon. *BMC Public Health [Internet]*. 2020;20(1).
22. Baddal B, Lajunen TJ, Sullman MJM. Knowledge, attitudes and behaviours regarding antibiotics use among Cypriot university students: a multi-disciplinary survey. *BMC Med Educ [Internet]*. 2022;22(1).