Knowledge, attitudes, and practice about antibiotics resistance and antibiotic usage among health sciences students in Pakistan

Robina Khurshid[1], Farhan Mukhtar[2], Zeenaf Aslam[3], Aman Ullah[4], Saeed Ur Rahman[1], Shahid Mehmood[5*],

[1]Institute of Nursing, University of Health Sciences, Lahore, Pakistan

[2]University College of Nursing, The Islamia University of Bahawalpur, Baghdad-ul-Jadeed Campus, Bahawalpur, Pakistan

[3]Institute of Nursing Sciences, Khyber Medical University, Peshawar, Pakistan

[4]Department of Horticulture, The University of Agriculture, Peshawar Pakistan

[5]School of Life Sciences, Jiangsu University, Zhenjiang, China

[*]**Corresponding Author**

Shahid Mehmood

School of Life Sciences, Jiangsu University, Zhenjiang, China

Abstract

Background: Antibiotic resistance is a growing public health issue linked to higher morbidity and death rates. Despite the current antimicrobial resistance crisis, there are no such recognized training programs for infectious diseases in developing countries.

Aims: This study aims to determine the knowledge, attitudes, and practice about antibiotics resistance and antibiotic usage among health sciences students.

Methods:

A cross-sectional survey was conducted among health sciences students in different Pakistani institutes. A total of 120 participants were included. The survey questionnaire was developed based on previous research with different question related to student knowledge, attitude and practice

regarding antibiotics used. The questionnaire was divided into three categories: knowledge of antibiotics, knowledge of resistance, and knowledge of antibiotic usage in clinical settings.

Results: Among 120 students 73 (60.8%) were male and 47 (39.2%) were female. The mean age of students was 21 ± 0.7 years. Most of the students 3 (52.5%) students know the antibiotics use and 37 (30.8%) have answer no. Majority of student 51 (42.5%) answer that there is no effect on antibiotics effectiveness over time if overused. A 73 (60.3%) students showed that they stop antibiotics when feel better and 32 (26.7%) complete the full antibiotics course.

Conclusions: In conclusion, the study offers significant insights into the present knowledge, attitudes, and behaviors of health sciences students in Pakistan about antibiotic resistance and overuse. By addressing the observed gaps and misunderstandings, educators and policymakers may contribute to more responsible antibiotic use, protecting the efficacy of these vital treatments for future generations.

Keywords: Antibiotics: antibacterial resistant; knowledge; students; infection

Introduction

A common treatment and preventative measure for a number of bacterial diseases, antibiotics are a type of antimicrobial chemical that are active against bacteria. The chemical that bacteria frequently create and use to combat other germs is known as an antibiotic.1 The global health organization (WHO) estimates that more than 50% of medications are inappropriately prescribed, delivered, and used. Additionally, almost 50% of people administer medications inappropriately. Due to the inadequate healthcare systems in underdeveloped nations, where the monitoring mechanisms for regular medicine usage are frequently not effectively created, the irrational use of medicine is a worrying scenario (Kandasamy et al., 2020, Mikhael et al., 2019, Zhang et al., 2023).

Antibiotic resistance, a global issue and a significant public health concern, is a result of irrational antibiotic use and is what increases hospital stays. One of the biggest challenges to the human health system is antibiotic resistance. Antibiotic resistance is the ability of bacteria to resist antimicrobial agents, which occurs when they adapt to protect themselves against antibiotics. Antibacterial resistance emerged as a result of inappropriate antibiotic usage and excessive antimicrobial use (Kandasamy et al., 2020, Hakami et al., 2022).

Antibiotic resistance is a growing public health issue linked to higher morbidity and death rates. Antimicrobial resistance is predicted to negatively affect the world economy until 2050, particularly in low- and middle-income countries (LMIC), unless steps are made to mitigate the danger. The indiscriminate and illogical use of antibiotics, which is fueled by ignorance and a bad attitude among prescribers and dispensers, is one of the causes of antimicrobial resistance. Furthermore, because antibiotics may be bought over-the-counter without a prescription, residents in low-income nations are more at risk (Lubwama et al., 2021b, Nisabwe et al., 2020, Zaidi et al., 2020).

It is impossible to overstate the importance of pharmacists and doctors in reducing antibiotic resistance. It is desirable for doctors and pharmacists to have continual training in antimicrobial stewardship starting early enough in their education and career to enable optimization of infections' treatment and prevent adverse events linked to antibiotic usage while practicing. Along with the foundations of diagnosing and treating infectious illnesses, this training should cover the link between the overuse of antibiotics and the development of antimicrobial resistance (Lubwama et al., 2021b, Carvalho et al., 2019, Byarugaba, 2004).

Despite the current antimicrobial resistance crisis, there are no such recognized training programs for infectious diseases in developing countries, in contrast to high-income countries where doctors and pharmacists who have specialized in infectious diseases are in charge of prescribing antibiotics. Furthermore, as soon as they begin their internships at health centers, final year undergraduate students start prescribing and/or dispensing antibiotics with very little specialist supervision due to the lack of human resources in health facilities in low- and middle-income countries. Unfortunately, they might not be fully knowledgeable about antibiotic usage or infectious illnesses in general. Studies have revealed that medical and pharmacy students in both wealthy and underdeveloped nations lack a basic understanding of antibiotics (Lubwama et al., 2021b, Sakeena et al., 2018).

To get the necessary information about antibiotics, their uses, and antibiotic resistance, future healthcare workers should obtain appropriate undergraduate antibiotic stewardship training. These students are crucial since they will be the ones promoting responsible medication use among their patients as future clinical practice healthcare practitioners. Since it will be challenging to change students' knowledge, attitudes, and habits once their education is through, undergraduate education

is a great moment to stress the significance of prudent antibiotic usage among students. However, insufficient undergraduate instruction on antibiotic stewardship may be a factor in the misuse of antibiotics in clinical settings, having a major negative impact on patient health (Akbar et al., 2021, Shahpawee et al., 2020).

Pakistan is confronting a significant problem as a result of the fast growth of antibiotic resistance, which is worsened by inappropriate antibiotic usage and a lack of public knowledge. Students in the health sciences, including medicine, nursing, pharmacy, and allied health, play an important role in defining antibiotic prescribing patterns and patient education. Their knowledge, attitudes, and practices have an impact not just on their future clinical decisions, but also on the behavior of the patients with whom they engage. Investigating these elements can aid in the development of customized educational initiatives that address knowledge gaps and encourage ethical antibiotic usage. While studies have addressed antibiotic resistance and usage among healthcare workers, there has been little study done especially on health sciences students in Pakistan. This study intends to fill that vacuum by providing insights into the present state of antibiotic knowledge, attitudes, and practices within this key demographic.

Methods

Study design and setting

A cross-sectional survey was conducted among health sciences students at several health institutes in Pakistan to assess their knowledge, attitude, and perception of antibiotics usage and antibiotic resistance. Khyber Medical University and Rippah University Islamabad have associated health institutes. . A total of 120 sample size were taken as per sample size online calculator.

Questionnaire development

After studying past similar research, the self-administered questionnaire was created. It includes Yes/No questions as well as questions on a 4-point Likert scale (1, disagree; 2, strongly disagree; 3, Agree; 4, strongly agree). A part on socio-demographic variables asked about age, gender, and academic program. The questions were then divided into three categories: knowledge of antibiotics, knowledge of resistance, and knowledge of antibiotic usage in clinical contexts.

Data collection procedure

To obtain data from the target population, the study employed a self-administered questionnaire designed and disseminated online using Google Forms. The questionnaire was also given to the

chosen individuals in physical copy. The study comprised both males and females. Only students majoring in health sciences, such as medical laboratory technicians, nurses, and physical therapists, were eligible. Students from disciplines other than health sciences were barred from participating, as were those who refused to participate. The pupils were given information about the questionnaire and research. The pupils were warned to avoid using assistance when answering their own questions.

Statistical analysis

Frequencies and percentages were used to convey descriptive data. Mean ± standard deviations (SD) were used to define continuous variables. SPSS software were used for biostatistics analysis.

Results

A total of 120 students were participated in this study. Among them 73 (60.8%) were male and 47 (39.2%) were female. The mean age of students was 21 ± 0.7 years. Among 120 student 63 (52.5%) were medical laboratory technology student 34 (28.3%) were of nursing and 23 (19.2%) physical therapy as shown in table 1.

Table 1: Demographic characteristics of students

Variables	N (%)
Gender	
Male	73 (60.8%)
Female	47 (39.2%)
Mean age (years)	21 ± 0.7
Discipline	
Medical laboratory technology	63 (52.5%)
Nursing	34 (28.3%)
Physical therapy	23 (19.2%)

Knowledge about antibiotics resistance and antibiotic usage

Table 2 showed the knowledge of health sciences students about antibiotics resistance and antibiotic usage, whereas 63 (52.5%) students know the antibiotics use and 37 (30.8%) have answer no while 20 (16.7%) was not sure. Most of students 61 (50.8%) were not aware of antibiotics stewardship, however 52 (43.3%) know that antibiotics can kill beneficial bacteria in the body. Importantly 76 (63.3%) students response was yes to take antibiotics over the counters. The answer of most student was no that diagnosis of infection is necessary before antibiotics use. A 57 (47.5%) student think that antibiotic usage speeds up the healing from colds and coughs while 43 (35.8%) answer was no. The 63 (52.5%) students showed that antibiotic misuse can result in the world's inability to effectively treat patients and 33 (27.5%) students response was no. Most of the students 51 (42.5%) answer that there is no effect on antibiotics effectiveness over time if overused.

Table 2: Knowledge about antibiotics resistance and antibiotic usage

No	Questions	Yes n (%)	No n (%)	Not sure n (%)
1	Have you know about antibiotics use?	63 (52.5%)	37 (30.8%)	20 (16.7%)
2	Have you know about antibiotics resistant?	61 (50.8%)	47 (39.7%)	22 (18.3%)
3	Are you aware of antibiotics stewardship?	19 (15.8%)	61 (50.8%)	40 (33.3%)
4	In infection, have you take antibiotics over the counters?	76 (63.3%)	33 (27.5%)	11 (9.2%)
5	Antibiotics can kill beneficial bacteria in the body?	52 (43.3%)	41 (34.2%)	27(22.5%)
6	Antibiotics can cause side effects?	61 (50.8%)	43 (35.8%)	16 (13.3%)
7	Are diagnosis of infection is necessary before antibiotics use?	49 (40.8%)	50 (41.7%)	21 (17.5%)
8	Antibiotic usage speeds up the healing from colds and coughs	57 (47.5%)	43 (35.8%)	20 (16.7%)
9	The preferred treatment for fever is an antibiotic.	31 (25.8%)	64 (53.3%)	25 (20.8%)
10	Are allergic reactions possible with antibiotics?	42 (35%)	44 (36.7%)	36 (30%)
11	It is usually preferable to provide broad spectrum antibiotics over those with a restricted scope.	40 (33.3%)	41 (34.2%)	39 (32.5%)
12	The public health problem of antibiotic resistance is significant.	29 (24.2%)	48 (40%)	43 (35.8%)
13	Antibiotic misuse can result in the world's inability to effectively treat patients.	63 (52.5%)	33 (27.5%)	24 (20%)
14	Antibiotics lose their effectiveness over time if overused.	39 (32.5%)	51 (42.5%)	30 (25%)

Attitude of health science students about antibiotics usage

Table 3 showed the attitude of students about antibiotics resistance and antibiotic usage. Majority of students 73 (60.3%) showed that they stop antibiotics when feel better and 32 (26.7%) complete the full antibiotics course. The 87 (72.5%) of student save unused antibiotics for a later date and 17 (14.2%) doesn't do that. About 36 (30%) of students not know how much antibiotic to administer and 57 (47.5%) response was yes while 27 (22.5%) was not sure about this. Only 29 (24.2%) students answer yes that they identify genuine infection from normal flora by looking at a microbiology report but 40 (33.3%) could not identify that.

Table 3: Attitude of students about antibiotics resistance and antibiotic usage

S. No.	Question	Yes n (%)	No n (%)	Not sure n (%)
1	When you feel better, do you stop taking your antibiotics?	73 (60.3%)	32 (26.7%)	15 (12.5%)
2	Do you save unused antibiotics for a later date?	87 (72.5%)	17 (14.2%)	16 (13.3%)
3	Identify whether or not to provide an antibiotic?	66 (55%)	43 (35.8%)	11 (9.2%)
4	Do you know how much antibiotic to administer?	57 (47.5%)	36 (30%)	27 (22.5%)
5	Do you know how to choose the ideal antibiotic?	51 (42.5%)	33 (27.5%)	36 (30%)
6	Could you identify genuine infection from normal flora by looking at a microbiology report?	29 (24.2%)	40 (33.3%)	51 (42.5%)
7	Understand when to transition from an IV to an oral antibiotic regimen?	32 (26.7%)	33 (27.5%)	55 (45.8%)

Practice of health science students about antibiotics usage

Most of the students 43 (35.8%) were agree and 27 (22.5%) strongly agree that antibiotics help me recover more rapidly when I have a fever while 24 (20%) were disagree and 26 (21.7%) strongly disagree. Importantly 51 (42.5%) students were agree and 26 (21.7%) strongly agree to purchase antibiotics without a prescription from a pharmacy. In addition 35 (29.2%) were disagree, 34 (%28.3) agree and 26 (21.7%) strongly agree to give any remaining antibiotics to friends or family if they become ill as shown in table 4.

Table 4: Practice about antibiotics resistance and antibiotic usage

S. No.	Question	Disagree n (%)	Strongly disagree n (%)	Agree n (%)	Strongly agree n (%)
1	Antibiotics help me recover more rapidly when I have a fever.	24 (20%)	26 (21.7%)	43 (35.8%)	27 (22.5%)
2	It is normal to purchase antibiotics without a prescription from a pharmacy?	19 (15.8%)	24 (20%)	51 (42.5%)	26 (21.7%)
3	Every time I use an antibiotic, I help the spread of antibiotic resistance.	41 (34.2%)	25 (20.8%)	39 (32.5%)	15 (12.5%)
4	Is it important to verify the antibiotic's expiration date before using it?	22 (18.3%)	11 (9.2%)	54 (45%)	33 (27.5%)
5	Give any remaining antibiotics to friends or family if they become ill.	35 (29.2%)	25 (20.8%)	34 (%28.3)	26 (21.7%)
6	It's crucial to finish the entire antibiotic course.	22 (18.3%)	25 (20.8%)	48 (40%)	25 (20.8%)

Discussion

Since improper use of antibiotics is a major contributor to antimicrobial resistance, prescribers' and dispensers' understanding of antibiotic usage is crucial. Antibiotic resistance is one of the most important worldwide health care concerns of the twenty-first century. Resistance is developing to almost all antibiotics used in clinical settings. The 'Faceless Pandemic' that has gripped the entire planet is antibiotic resistance (Bhardwaj et al., 2022, Pang et al., 2019).

The study focuses light on the knowledge gaps, attitudes, and behaviors surrounding antibiotic resistance and misuse among Pakistani health sciences students. The large number of students who self-medicate with over-the-counter antibiotics raises worries about the possibility of increasing resistance development. The widespread belief that antibiotics speed up recovery from colds and coughs is concerning, and it emphasizes the significance of correct health education.

In this study about knowledge of students regarding antibiotics use, 63 (52.5%) students know the antibiotics use and 37 (30.8%) have answer no while 20 (16.7%) was not sure. Most of students 61 (50.8%) were not aware of antibiotics stewardship, however 52 (43.3%) know that antibiotics can kill beneficial bacteria in the body. The 63 (52.5%) students showed that antibiotic misuse can result in the world's inability to effectively treat patients and 33 (27.5%) students response was no. According to a prior study, medical students' poor performance poses a risk to the treatment of infectious illnesses since they are the ones who initially interact with patients and decide how to

treat infections in patients depending on various clinical circumstances. Most settings in lower- and middle-income nations have extremely few or no clinical pharmacists. Poor practical abilities may eventually result in the prescription of incorrect antibiotics, one of the causes of antimicrobial resistance (Sulis et al., 2020, Kollef et al., 1999). A study in Africa showed that 36.6% (120/328) of the students demonstrated good overall complete knowledge in general. The mean scores for general antibiotic knowledge, knowledge of antibiotic resistance, and knowledge of the use of antibiotics in clinical settings were 58% (CI: 57%- 60%), 95% (CI: 94%- 97%), 54% (CI: 52% - 56%), and 46% (CI: 44% - 48%), respectively (Lubwama et al., 2021a).

In present study, majority of students 73 (60.3%) showed that they stop antibiotics when feel better and 32 (26.7%) complete the full antibiotics course. The 87 (72.5%) of student save unused antibiotics for a later date and 17 (14.2%) doesn't do that. According to a prior research of the Lebanese population, almost half of the respondents (53.1%) said that they would go through with the entire course of antibiotic therapy (Mouhieddine et al., 2015). In a similar vein, a research conducted in Saudi Arabia revealed that only 32% of students finish their antibiotic course and that 40% of students quit taking them when they feel better (Al-Haddad et al.). According to a research conducted in China, of those who had leftovers, 63.1% said they were the result of unfulfilled prescriptions, while 35.3% said they were the result of drug purchases (Sun et al., 2019).

Importantly in our study 51 (42.5%) students were agree and 26 (21.7%) strongly agree to purchase antibiotics without a prescription from a pharmacy. According to earlier research, the majority of students took antibiotics up to three times in the preceding academic year. Only 128 (39.0%) of the 282 students who responded to the survey indicated they had never purchased antibiotics without a prescription (Lubwama et al., 2021a). Furthermore, because antibiotics may be purchased over-the-counter without a prescription, residents in low-income nations are more at risk (Byarugaba, 2004, Whitehead et al., 2001).

The results highlight the necessity of strong antimicrobial stewardship initiatives in health sciences curriculum. Antibiotic stewardship is a topic about which there is a lack of understanding, which points to a place where educational interventions might have a significant influence. A thorough patient education strategy is required to guarantee proper usage and avoid the emergence of antibiotic-resistant strains, as evidenced by the tendency to prematurely finish antibiotic treatments and preserve unused medications.

Conclusions

In conclusion, the study offers significant insights into the present knowledge, attitudes, and behaviors of health sciences students in Pakistan about antibiotic resistance and overuse. By addressing the observed gaps and misunderstandings, educators and policymakers may contribute to more responsible antibiotic use, protecting the efficacy of these vital treatments for future generations.

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