

Understanding Antibiotic Resistance : Awareness and Perception about among Graduate Students

Dr. Shikha Banerjee¹

Assistant Professor, Department of Education
Indira Gandhi National Tribal University
Amarkantak, Madhya Pradesh

Kratisha Singh²

Research Scholar, Department of Education
Indira Gandhi National Tribal University
Amarkantak, Madhya Pradesh

Manasi Sahu³

Research Scholar, Department of Education
Indira Gandhi National Tribal University
Amarkantak, Madhya Pradesh

Abstract

Education plays a crucial role in shaping public understanding and responsible behaviour regarding antibiotic use and antimicrobial resistance (AMR). Educational exposure is expected to enhance health literacy, enabling individuals to differentiate between bacterial and viral infections and to use antibiotics judiciously. However, despite increasing access to formal education, global awareness and acuity regarding antibiotic resistance remain only moderate. Even among educated populations, including graduate students, significant knowledge gaps and misconceptions persist. A common misunderstanding is the belief that antibiotics are effective against viral infections such as the common cold and influenza, whereas antibiotics act solely against bacterial infections. This indicates that education alone, without targeted health-focused instruction, may be insufficient to ensure appropriate knowledge and practices regarding antibiotics.

These educational gaps contribute directly to inappropriate antibiotic use and weaken efforts to control AMR. Although healthcare professionals are more aware than the general public, many educated individuals still assume that antibiotics can cure viral illnesses. While self-medication is widely recognized as risky, behaviors such as discontinuing antibiotic courses prematurely remain common. Many people acknowledge that antibiotic overuse is a serious global problem, yet continue to demand unnecessary prescriptions, reflecting a disconnect between knowledge gained through education and actual health behaviour. Another widespread misconception is that the human body becomes resistant to antibiotics, rather than bacteria. In reality, antibiotic resistance develops in bacteria through natural selection, independent of human physiology. This misunderstanding reduces individuals' sense of personal responsibility for preventing resistance.

Educational outcomes related to antibiotic awareness are also shaped by cultural and socioeconomic contexts. In many societies, minor illnesses are perceived as requiring immediate medical treatment, which puts pressure on healthcare providers to prescribe antibiotics even when they are not medically indicated. In low- and middle-income countries, limited access to healthcare, poverty, and uneven educational opportunities often promote self-medication through pharmacies or informal drug sellers. Countries such as India and China face additional challenges due to hierarchical doctor–patient relationships and traditional prescribing practices, sometimes leading to poly-pharmacy and excessive antibiotic use.

Education is widely recognized as one of the most effective strategies for combating antibiotic resistance. Structured educational interventions help correct misconceptions, improve understanding of AMR mechanisms, and promote responsible antibiotic practices. School- and college-based awareness programs are particularly valuable, as they shape health behaviors early by emphasizing the importance of completing prescribed courses and avoiding antibiotics for viral infections. Awareness and training initiatives also support antimicrobial stewardship by encouraging rational prescribing and responsible consumption. Despite these efforts, persistent gaps in awareness highlight the need for culturally sensitive, education-based interventions.

In this context, the present study aims to assess the level of awareness and perception regarding antibiotic resistance among graduate students. By focusing on this educated group, the study emphasizes the role of education in shaping informed perceptions, responsible attitudes, and appropriate behaviors toward antibiotic use, while also examining how seriously young adults perceive antibiotic resistance as a growing “silent pandemic.”

Keywords: Awareness, Perception, Education, AMR

Introduction

Antibiotic resistance has occurred as one of the most serious challenges to public health in the 21st century, posing a significant threat to the prevention and control of communicable diseases (World Health Organization [WHO], 2020; O'Neill, 2016). It occurs when evolved bacteria develop the ability to survive antibiotics that were effective against them previously (Ventola, 2015). This leads to long-term illnesses, amplifying the costs of healthcare and the higher risk of death (WHO, 2020). While antibiotic resistance is discussed in clinical and medical contexts, its educational dimension is equally serious, particularly among students pursuing graduate studies, who signify an extremely cultured and powerful segment of society (Dyar et al., 2018).

Those Graduate students, especially those with diverse backgrounds related to their academic work, are future educators, mentors, professionals, researchers, and policymakers. Their level of awareness and perception regarding antibiotic resistance plays a crucial role in shaping responsible health behaviors and informed decision-making (Castro-Sánchez et al., 2016). Education is a powerful tool for developing students' level of understanding of science, critical thinking, and their ethical responsibility related to health issues. However, research indicates that even among educated populations, fallacies about antibiotics persist, such as the belief that antibiotics are useful against infections caused by viruses like the common cold or flu, and that early stopping treatment of antibiotics does not have any serious consequences (McCullough et al., 2016; Ventola, 2015). These misunderstandings directly lead to the overuse and misuse of antibiotics, which accelerates the growth of resistant bacterial strains (WHO, 2015).

Antibiotic resistance spreads outside the factual information to encompass perceptions, attitudes, and behavioral goals (Michaelidou et al., 2020). Graduate education emphasizes independent learning, research orientation, and evidence-based reasoning, making it an ideal stage for addressing complex global issues such as antimicrobial resistance (Dyar et al., 2018). Mixing the two types of education, antibiotic resistance education within higher education programs across different disciplines such as social science, science, education and humanities, can lead to a holistic understanding of the issue. Individuals with accurate knowledge and

understanding are better trained in rational antibiotic use; they usually discourage self-medication, and that does not leave a positive influence on their peers and communities.

Moreover, graduate students often act as role models and sources of information within their families and social circles. Their observations can slightly impact antibiotic use. If graduate students lack adequate awareness or hold incorrect beliefs, the gap between scientific knowledge and public practice widens (McCullough et al., 2016). Therefore, evaluating the level of awareness and perception of antibiotic resistance among those pursuing graduation is essential to their educational needs and to addressing any knowledge gaps. The study emphasizes the level of graduate students, how they perceive antibiotic resistance, and the amount of their educational awareness. Such visions can assist policy makers, educators, and curriculum planners in designing educational interventions that improve health literacy and sustain the role of education in combating antibiotic resistance (WHO, 2015; O'Neill, 2016).

Review Related Literature

Labi et al. (2018) conducted a study in Ghana that examined surgeons' behaviour regarding antibiotic resistance in the hospital and assessed physicians' information and attitudes. A cross-sectional survey was conducted at the Teaching Hospital in Ghana. 159 physicians chose the purposive sampling technique for their participation. A self-developed questionnaire was prepared for data collection. The results showed that senior physicians had better knowledge of antibiotic resistance than junior physicians. Many doctors also underestimated the problem in their own departments, showing the need for focused training, especially for junior physicians.

Odetokun et al. (2019) conducted a descriptive survey on Disinfectant Resistance among veterinary students and Their Individual Antibiotic Use to examine levels of knowledge, perceptions, and observed antibiotic use regarding antimicrobial resistance among veterinarian students in Nigeria. The scholars were selected using convenience sampling, and the data were collected via a questionnaire. The study found that despite positive attitudes and responsible antibiotic use practices, most students had inadequate knowledge of antimicrobial resistance. It highlighted the necessity of early and robust integration of AMR education into the veterinary syllabus, as knowledge was not explicitly linked to age or academic level.

Lubwama et al. (2021) conducted a cross-sectional survey titled Understanding Students' Views on Antibiotic Practice and Drug Resistance. The objective is to estimate students' preparedness for suitable antibiotic use and antimicrobial stewardship. The sample comprised 328 final-year UG students from three universities in Uganda, Kenya, and Tanzania, selected through convenience sampling. Data were collected using a self-administered form. It concluded that 36.6% of final-year students lacked adequate information and were insufficiently prepared for rational antibiotic prescribing, underscoring the need for multidisciplinary, practice-based antimicrobial stewardship training in medical and pharmacy curricula across East Africa.

Sakeena et al. (2018). This study surveyed pharmacy students at Sri Lankan universities to understand their knowledge of the proper use and resistance of antibiotics. It also compared the understanding between junior and senior students to see if knowledge improves with higher education levels. The sample comprised 466 pharmacy students, selected via a census-based

suitability sampling approach. Data were collected using a self-structured feedback form. The results showed that many students use antibiotics. Junior students had some misconceptions, such as thinking antibiotics can treat viral infections. Senior students knew more about antibiotics and drug resistance. This suggests that pharmacy education helps students better understand how to use antibiotics responsibly.

Seid and Hussen (2018) conducted a study on Facts and attitudes towards antimicrobial resistance among final-year UG paramedic apprentices at the University of Gondar, Ethiopia. Data were collected using a self-administered opinion poll from 323 final-year students. The study found that although most students viewed antimicrobial resistance as a serious and unnecessary community health problem, more than half had poor knowledge about it.

Sholabi and Ajamu (2021) directed a survey design using a self-administered questionnaire for data collection. This healthcare includes 866 participants. This showed that Most students were aware that antimicrobial resistance reduces the effectiveness of antibiotics, and that antibiotic use was very common, often obtained from community pharmacies. Although over half of the participants had decent data about AMR, the study emphasised the need for stronger education and stricter policies to promote appropriate antibiotic use and antimicrobial care.

Yuste et al. (2022) examine a study on the Impact of infectious diseases training on the Perception of Antibiotic Resistance and rational antibiotic use among Spanish Medical Students. The study was conducted at the University of Navarra's medical school in Spain, using a survey method. A total of 994 students participated. The learning found that students who received infectious disease training viewed antibiotic resistance as a more serious public health issue and had much better knowledge of antibiotic stewardship than those without training. However, knowledge declined over time after training, highlighting the need for continuous reinforcement of infectious diseases education.

Siam et al. (2021) conducted a study titled Antibiotic Abuse: A Cross-Sectional Study on Knowledge, Attitude, and Behaviour Among the University Students in Dhaka, Bangladesh. The study adopted a survey design and collected data from 1,400 students at the University using a self-developed questionnaire. This found that more than half of the students had poor knowledge and a neutral attitude toward antibiotics. Bioscience students had better knowledge and more positive attitudes than arts and business students. Students with good knowledge were more likely to have a positive attitude ($p < .05$). Many students did not know that antibiotics do not work for most coughs and colds, over 60% practised self-medication, and almost half did not finish their antibiotic courses. These findings reveal major gaps in students' understanding and use of antibiotics, underscoring the need for improved education and policies to prevent antimicrobial resistance.

Aljayyousi et al. (2019) conducted a cross-sectional study on public practices regarding antibiotic use among Qatar University students and their family members. The aim of this study was to assess the extent of inappropriate antibiotic use among students who study at Qatar University and their families. The sample size was 596, and the sampling technique was convenience sampling. The data were collected through a questionnaire. The study found that people living in large cities are using antibiotics incorrectly, such as taking them without a doctor's prescription and not completing the full course. That's why health educators need to be aware of the proper use of antibiotics.

Al-Haifi et al. (2025) examined knowledge, attitudes, and practices regarding antimicrobial use among undergraduate medical students at universities and institutes in Thamar, Yemen. The aim of the study is to evaluate undergraduate medical students' knowledge of antibiotic resistance and its appropriate use. The survey questionnaire was used, and 1,000 students participated. The study found that medical students have good knowledge of antibiotic resistance, and many students admitted to taking antibiotics without a doctor's prescription.

Shu et al. (2022) conducted a study on knowledge, perceptions, and practices regarding antibiotic use among Sri Lankan doctors. It was a cross-sectional study with a sample size of 262. Convenience sampling was used, and a questionnaire was developed to collect the data. Both knowledge and practice scores were high and correlated. However, the practice score was lower than the knowledge score. This means that even though people have good knowledge, they do not always act on it. Therefore, improving knowledge alone is not enough; other methods are needed to encourage correct practices.

Topor et al. (2017) conducted a survey study on awareness of antibiotic resistance among self-medication users in eastern Romania. The purpose of the study was to evaluate people's consciousness of antibiotic resistance. The sample was 350, and data were collected through a questionnaire. The results of our study on antibiotic resistance awareness in the SMUG group may help policymakers and authorities create educational programs. These programs can improve people's understanding of the correct use of antibiotics and reduce the habit of taking medicines without a doctor's advice.

Vita et al. (2024) examined information, attitudes, and observations concerning antimicrobial resistance among young nurses in Italy. The survey was done with 848 participants. Those who learned about antimicrobial resistance on their own had better knowledge, attitude, and practice. Those who received training from pharmaceutical companies were found to have lower knowledge, attitude and practice.

Fonseca et al. (2012). This study was conducted to increase awareness of antibiotic use and resistance in the local area. The main aim was to help students understand how antibiotics are made and how they work in the body. The researchers used their own questionnaire to collect information. There were 42 participants, and all of them were high school students. The results showed that students can better understand antibiotic resistance and why it is important to use antibiotics properly.

Objectives

1. To assess the level of awareness and perception about antibiotic resistance among graduate students.
2. To examine students' attitudes toward the safe and appropriate use of antibiotics.
3. To analyse behavioural practices related to antibiotic consumption among graduate students.
4. To study the mean difference between boys' and girls' related to antibiotic resistance.
5. To study the mean difference of antibiotic usage in urban and rural localities.
6. To analyse the understanding and knowledge of different streams of undergraduate students about antibiotics.

Hypotheses

H₀₁: There is no significant difference in students' knowledge and perceptions regarding the safe and appropriate use of antibiotics.

H₀₂: There is no significant difference between students' attitudes and cognitive behavioural practices regarding antibiotic consumption.

H₀₃: There is no significant difference in the mean of antibiotic resistance between boys and girls of undergraduate students.

H₀₄: There is no significant mean difference in antibiotic usage between students from urban and rural localities.

H₀₅: There is no significant difference among students from different undergraduate streams.

Methodology

The present study was conducted using a quantitative research approach and adopts a descriptive survey research design. The data were collected using a self-structured questionnaire administered via Google Forms to facilitate efficient, wide-reaching data collection. The study sample comprised 150 graduate students, selected through an appropriate sampling technique. The questionnaire was designed to assess multiple dimensions, including knowledge, cognitive understanding, attitudes, perceptions, emotional aspects, and social-behavioral aspects related to antibiotic resistance. The collected data were systematically analyzed using appropriate statistical techniques, such as percentage analysis, mean, t-test, and Analysis of Variance (ANOVA), to examine patterns, differences, and relationships among the variables.

Data Analysis

Table1: Dimension wise Item Analysis with persentage

Dimension	Items	Yes	No
1. Knowledge	1)Have you heard the word ' <i>antibiotic</i> '?	94.6%	5.4%
	2)Do you know that missing antibiotic doses can be harmful?	79.7%	20.3%
	3)Do you know that using antibiotics too much can cause problems?	85.1%	14.9%
	4)Do you know that antibiotic resistance makes infections harder to treat?	79.7%	20.3%
	5)Do you know that resistance can spread from one person to another?	51.4%	48.6%

Dimension	Items	Yes	No	Not Sure
2. Cognitive	1) Do you think antibiotics can cure the common cold or flu?	37.8%	31.1%	31.1%
	2) Do you think taking more antibiotics makes you recover faster?	35.1%	64.9%	

	3)Do you think antibiotic resistance is a serious health problem in the future?	77%	23%	
	4)Do you think resistance develops in bacteria, not in the human body?	60.8%	39.2%	

Dimension		Items		Yes		No	
3.Social		1)Have you ever given your		36.5%		63.5%	
Dimension	Items	Yes	No	Often	Sometime	Always	Never
4. Attitude	1)Do you think it is important to know the correct use of antibiotics?	93.2%	6.8%				
	2) Do you want to learn more about the safe use of antibiotics?	93.2%	6.8%				
	3)Do you believe any myths about antibiotics?	23%	77%				
	4)Have you heard wrong or false information about antibiotics?	62.2%	37.8%				
	5) Do you buy antibiotics over the counter without a prescription?			13.5%	45.9%		40.5%
	6)Do you always complete the full antibiotic course given by the doctor?				44.6%	47.3%	8.1%

Dimension	Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Yes	No
5. Perception	1)Do you take antibiotics only when a doctor tells you to take them?	4.05%	4.05%	25.7%	40.5%	25.7%		
	2)Antibiotics should be taken only when	4.7%	4.7%	14.9%	39.2%	36.5%		

	prescribed by a doctor.							
	3)It is acceptable to use leftover antibiotics for similar illnesses.	29.7%	20.3%	29.7%	14.9%	5.4%		
	4) Antibiotics are often prescribed unnecessarily.	10.8%	20.3%	24.3%	35.1%	9.5%		
	5)People should be educated more about antibiotic resistance.	12.2%	2.7%	9.5%	35.1%	40.5%		
	6)Do you read the instructions before taking antibiotics?						81.1%	18.9%
	7)Do you think people expect antibiotics for minor illnesses?						73%	27%
	8)Do you think lack of awareness increases antibiotic resistance?						83.8%	16.2%

Dimension	Items	Yes	No
6.Emotional	1)Have you ever stopped taking antibiotics after feeling better?	68.9%	31.1%
	2)Have you ever felt any side effects after taking antibiotics?	40.5%	59.5%
	3)Do you save leftover antibiotics for later use?	48.6%	51.4%

Dimension	Items	Yes	No
7.Behavioural	1)Do you take antibiotics at the same time each day as advised?	81.1%	18.9%
	2)Have you ever forgotten to take a dose of antibiotics?	64.9%	35.1%

Dimension	Items	Often / Always	Sometimes	Never
9. Practices related to antibiotic use	1)Have you taken antibiotics without a prescription?	17.6%	43.2%	39.2%
	2)Do you complete the full course of antibiotics prescribed to you?	52.7%	39.2%	8.1%
	3)Do you check expiry dates before taking antibiotics?	79.7%	14.9%	5.4%
	4)Do you consult a doctor before taking antibiotics?	59.5%	35.1%	5.4%

Dimension	Items	Strongly Agree	Agree	Disagree	Strongly Disagree
10. Educational	1)Do you think antibiotic resistance should be included in the UG curriculum for better awareness?	51.4%	41.7%	4.9%	2%

Figure1. analysis through pie chart regarding Source of Information of antibiotic resistance.

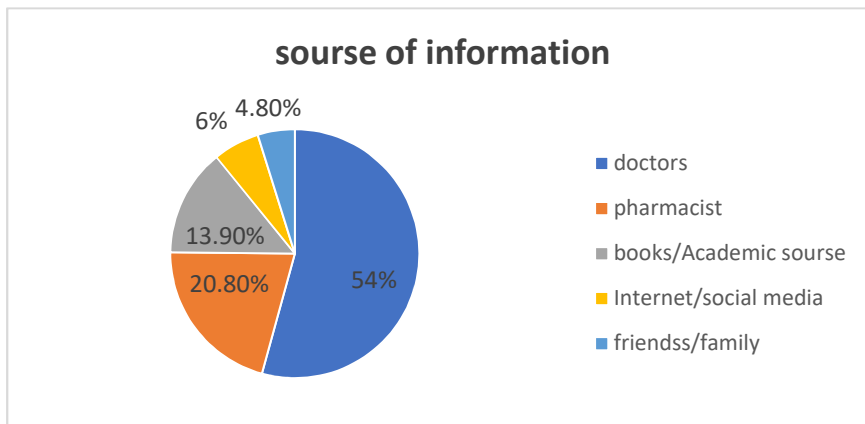
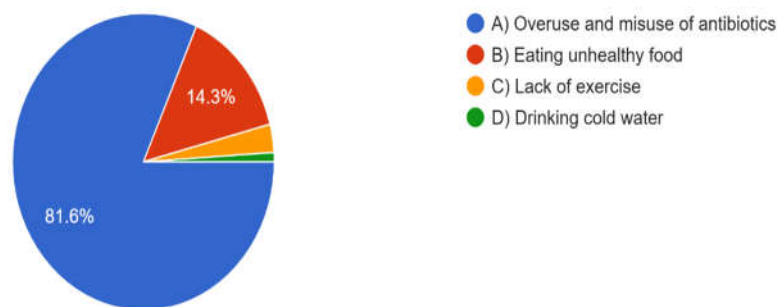


Figure2. pie chart showing main cause of antibiotic resistance.



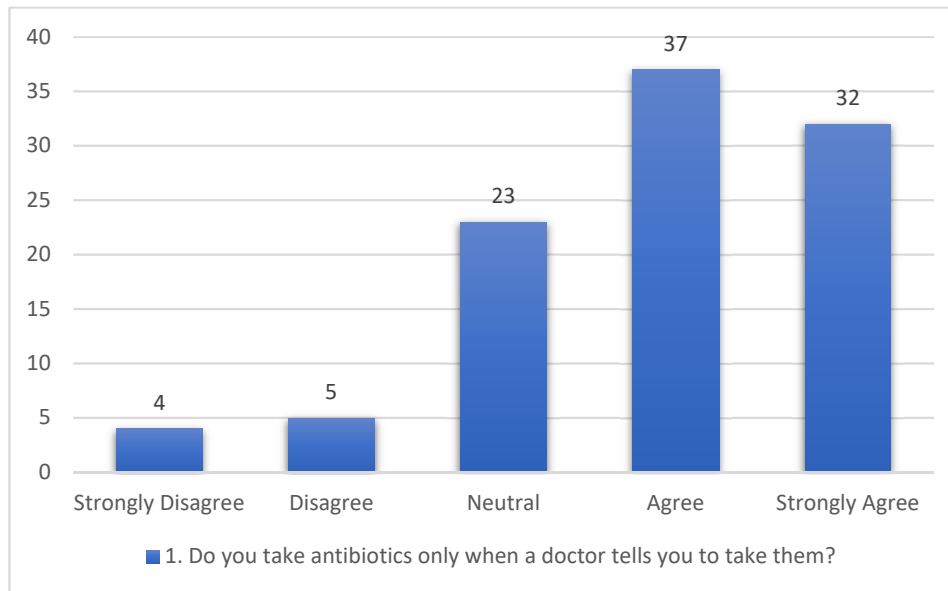
1.

Figure3. pie chart showing educational strategies can help reduce antibiotic resistance in society.

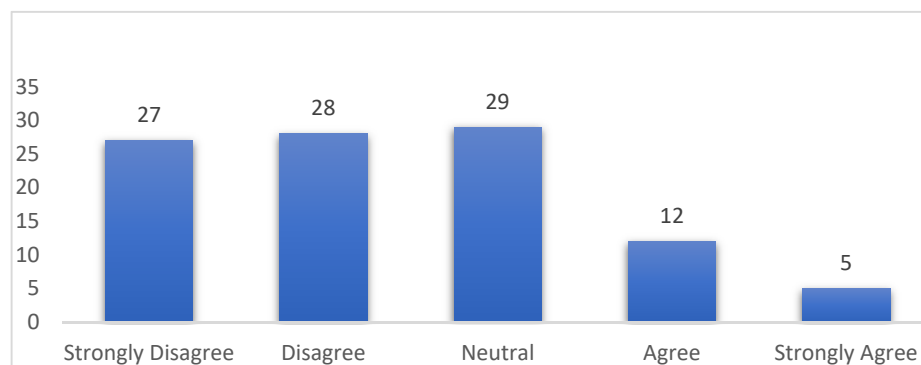


Figure 4. Item wise analysis through bar diagram

- Do you take antibiotics only when a doctor tells you to take them?

**Figure 5.** Item wise analysis through bar diagram

- It is acceptable to use leftover antibiotics for similar illnesses.

**Figure 5.** Item wise analysis through bar diagram

- Antibiotics are often prescribed unnecessarily.

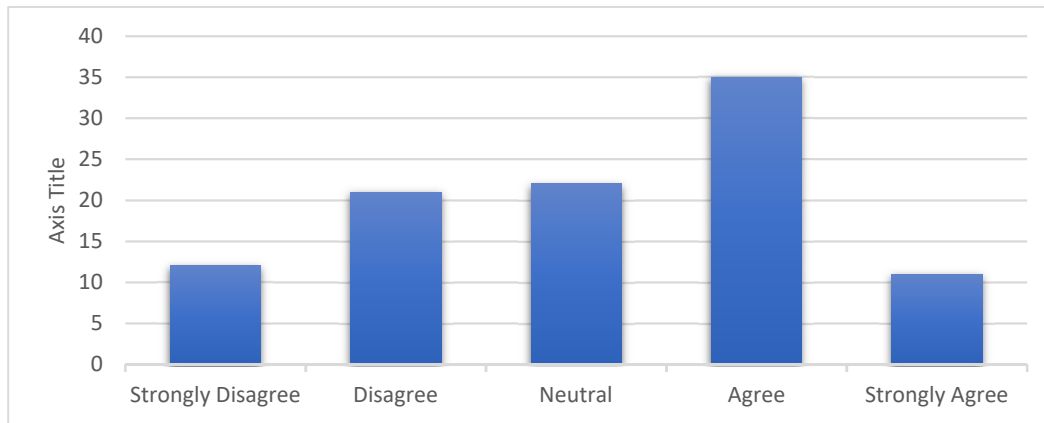


Table No 1 . Streams wise analysis with ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	73.954	4	18.488	2.380	.057
Within Groups	745.888	96	7.770		
Total	819.842	100			

The table presents the one-way ANOVA analysis of undergraduate students across different streams to examine differences in their perceptions of antibiotic resistance.

Table No 2. Age wise analysis with ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	14.991	2	7.495	.913	.405
Within Groups	804.851	98	8.213		
Total	819.842	100			

The table presents the one-way ANOVA results for undergraduate students across age groups to examine differences in their perceptions of antibiotic resistance.

Analysis of Awareness, Perception, Attitude, and Behavioral Practices Regarding Antibiotic Resistance

The present study examined the awareness, perception, attitude and behavioral practices of the respondents towards antibiotic resistance. The percentage analysis revealed that participants had varying levels of understanding and practices, with some areas of strength and some areas that need further intervention.

The results regarding awareness indicated that the respondents had a relatively high level of knowledge about antibiotic resistance. The overall awareness percentage was calculated as 79.68% which shows that large part of the participants are aware of antibiotics, their proper use and the consequences of their misuse. This high level of awareness might be indicative of respondents' exposure to information on antibiotic resistance through educational programme, healthcare interactions, media, or personal experiences. The result is consistent with a satisfactory knowledge among the respondents, but the percentage also indicates that some knowledge gaps persist, which may influence antibiotic-related decision-making and healthcare behaviors.

The perception analysis also showed a very positive outlook of the respondents regarding antibiotic resistance and its associated risks. The total perception score was 79.84% and this was the second highest score among all the dimensions studied. This finding indicates that the participants, in general, considered antibiotic resistance to be a serious public health problem and were aware of the potential consequences of inappropriate antibiotic use. The positive perception found by respondents implies that they are likely to be willing to recognize the importance of responsible antibiotic consumption and the need for measures to prevent the spread of resistant microorganisms. Such positive perceptions are important because they are often related to a person's willingness to engage in preventive health behaviours and to comply with medical recommendations.

The findings on attitude showed a comparatively lower score. The overall percentage of attitude was 61.85%, which shows a moderate level of positive attitude regarding antibiotic resistance and related healthcare practices. Although respondents had knowledge and considered antibiotic resistance as an important problem, the attitudes did not reflect the same level of commitment toward responsible antibiotic use. This difference suggests that awareness and perception may not always result in positive attitudes. Respondents' attitudes can be influenced by factors such as personal beliefs, cultural influences, convenience, past experiences with antibiotics and healthcare access. The moderate attitude score underscores the importance of focusing on educational and behavioral interventions to improve positive attitudes as well as responsible decision-making about antibiotics.

The highest percentage across all dimensions was obtained by the analysis of behavioural practices with an overall score of 85.89%. This finding suggests that, overall, respondents displayed positive behaviours in relation to the use of antibiotics and compliance with practices to prevent antibiotic resistance. A high score for behavioural practice indicates that many participants reported adhering to recommended guidelines such as completing prescribed courses of antibiotics, consulting healthcare professionals and avoiding inappropriate use of antibiotics. Positive behavioural practices are particularly important as they have a direct impact on reducing the emergence and spread of antibiotic-resistant bacteria. The high score also points to the effectiveness of existing awareness campaigns and healthcare guidance in promoting appropriate antibiotic-related behaviour.

In the following we compare the four dimensions and find an interesting pattern. The highest percentage was for behavioural practices (85.89%), followed by perception (79.84%) and awareness (79.68%). The lowest score was for the attitude dimension (61.85%). These findings suggest that although respondents have adequate knowledge and show generally positive behaviours and perceptions, their attitudes towards antibiotic resistance need to be further strengthened. The gap between awareness and attitude suggests that educational programmes

should not only provide information but also build commitment to behaviour, personal responsibility and long term change in attitudes.

Finally, the study results showed that the respondents had good level of knowledge and perception about antibiotic resistance and their behavioural practices were highly positive . Nonetheless, the moderate attitude score underlines the importance of continuing public health education, awareness campaigns and behavioral interventions to foster more positive attitudes towards antibiotic stewardship. Strengthening attitudes, along with awareness and perception, will be essential to ensure sustainable changes in behaviour and to tackle the growing global challenge of antibiotic resistance.

Discussion

The present study aimed to assess awareness, perceptions, attitudes, and behavioral practices regarding antibiotic resistance among graduate students. The study's findings revealed varying levels of understanding and practice among the respondents, highlighting both positive awareness and areas requiring further improvement.

The analysis of perceptions showed that the respondents had a relatively positive view of antibiotic resistance. The overall perception percentage was 79.84%, indicating that most participants understood the seriousness of antibiotic resistance and its impact on public health. The high perception score suggests that the respondents were generally aware of the consequences of improper antibiotic use and the importance of responsible antibiotic practices. This finding reflects that the participants had a favourable outlook toward preventing antibiotic misuse and controlling antibiotic resistance.

Similarly, the awareness analysis showed that respondents had a high level of awareness of antibiotic resistance. The overall awareness percentage was calculated as 79.68%. This indicates that most respondents were knowledgeable about antibiotics, their proper use, and the risks associated with antibiotic misuse. The respondents appeared to understand that unnecessary or incomplete antibiotic use can contribute to the development of antibiotic resistance. The high awareness rate may be attributed to educational exposure, media influence, academic learning, and the growing public health discussions on antibiotic resistance.

In contrast, the attitude analysis revealed a comparatively moderate level of attitude among the respondents, with an overall percentage of 61.85%. Although the respondents demonstrated awareness and a positive perception, their attitudes toward antibiotic use and related practices were not equally strong. This suggests that awareness alone may not always translate into appropriate attitudes and responsible decision-making. Some respondents may still hold casual attitudes toward self-medication, incomplete antibiotic courses, or the unnecessary use of antibiotics without professional consultation. Therefore, there remains a need for attitude-oriented educational interventions and awareness programs that encourage responsible behavior and strengthen positive health practices.

The findings regarding behavioral practices were more encouraging. The overall percentage of behavioral practices was 85.89%, indicating a high level of positive practices among respondents regarding antibiotic use. This suggests that most participants followed appropriate behaviors such as consulting healthcare professionals before taking antibiotics, completing prescribed courses, and avoiding unnecessary antibiotic consumption. The high percentage of positive practices may reflect the influence of educational awareness and public health campaigns promoting the rational use of antibiotics.

Overall, the study findings indicate that the respondents demonstrated good awareness, positive perception, and strong behavioral practices regarding antibiotic resistance. However, the moderate attitude percentage highlights the existence of certain misconceptions and inconsistent attitudes that may affect responsible antibiotic use. Therefore, there is a need for continuous educational programs, awareness campaigns, and health interventions to further improve attitudes and ensure the rational use of antibiotics among students. Strengthening knowledge and promoting responsible antibiotic-related behaviour can play an important role in reducing the growing problem of antibiotic resistance.

A one-way ANOVA was conducted to examine differences in undergraduate students' perceptions of antibiotic resistance across different streams. The analysis showed that the calculated F value was 2.380 and the p-value was 0.057. Since the p-value is greater than 0.05, the result is not statistically significant.

This indicates that there is no significant difference in undergraduate students' perceptions of antibiotic resistance across academic streams. Although slight variations may exist among the groups, these differences are not strong enough to be considered meaningful statistically.

The findings suggest that students across different streams have almost similar levels of awareness and perception of antibiotic resistance. This may be due to the widespread availability of health-related information through education, media, and awareness campaigns.

A one-way ANOVA was conducted to examine differences in undergraduate students' perceptions of antibiotic resistance across age groups. The analysis revealed that the calculated F value was 0.913 and the p-value was 0.405. Since the p-value is greater than 0.05, the result is not statistically significant.

This indicates that there is no significant difference in undergraduate students' perceptions of antibiotic resistance across age groups. The findings suggest that students of different ages possess a similar level of awareness and understanding about antibiotic resistance.

The similarity in perception may be due to common educational exposure, access to information through the media and the internet, and increasing student awareness of the misuse of antibiotics.

Results

The results of the present study revealed that undergraduate students possessed a good level of awareness, positive perception, and favourable behavioral practices regarding antibiotic resistance. The overall perception percentage was found to be 79.84%, indicating that most respondents understood the seriousness of antibiotic resistance and the importance of responsible antibiotic use. Similarly, the awareness percentage was 79.68%, showing that students had adequate knowledge regarding antibiotics, their proper use, and the risks associated with misuse. The behavioral practices percentage was comparatively high at 85.89%, suggesting that most respondents followed appropriate practices such as consulting healthcare professionals and completing prescribed antibiotic courses. However, the attitude percentage was comparatively moderate at 61.85%, indicating that although students were aware of antibiotic resistance, some inconsistent attitudes and misconceptions regarding antibiotic use still existed. Furthermore, the one-way ANOVA analysis conducted across

academic streams and age groups revealed no statistically significant differences in students' perceptions of antibiotic resistance, as the p-values for stream-wise ($p = 0.057$) and age-wise ($p = 0.405$) analyses were greater than the 0.05 level of significance. These findings suggest that students across different streams and age groups possessed relatively similar levels of awareness and perception regarding antibiotic resistance, possibly due to common educational exposure, media influence, and increasing public health awareness.

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