



## ANTIMICROBIAL RESISTANCE AWARENESS AMONG MEDICAL STUDENTS AND INTERNS IN A MEDICAL COLLEGE

**Dr. Richa Ray Nagori**

PhD Scholar, NIMS&R medical college, Jaipur, Rajasthan.

**Dr. Hemant Kumar Garg\***

Prof & HOD Pharmacology, NIMS&R Medical college, Jaipur, Rajasthan.

\*Corresponding Author

**ABSTRACT** **Background:** Antimicrobial resistance (AMR) is a critical global health threat, exacerbated by inappropriate antibiotic use and lack of awareness among healthcare professionals. Medical students and interns, as future prescribers, play a pivotal role in combating AMR. This study assesses the awareness, attitudes, and knowledge of AMR among medical students and interns in a tertiary care medical college. **Methods:** A cross-sectional survey was conducted among 300 participants (200 MBBS students in clinical years and 100 interns) using a validated 20-item questionnaire. Data were analyzed using descriptive statistics and chi-square tests to assess associations between awareness levels and academic year. **Results:** While 92% of participants had heard of AMR, only 48% correctly identified the WHO's definition. Awareness of antimicrobial stewardship programs (ASPs) was significantly higher among interns (68%) compared to students (39%) ( $p < 0.01$ ). Misconceptions about antibiotic use for viral infections were reported by 34% of respondents. Most participants (87%) agreed that AMR education should be strengthened in the MBBS curriculum. **Conclusion:** The study highlights moderate awareness but significant knowledge gaps regarding AMR among future prescribers. Integrating AMR and stewardship training into undergraduate medical education is essential to promote rational antibiotic use.

### KEYWORDS :

#### INTRODUCTION

Antimicrobial resistance (AMR) is one of the most pressing global health challenges of the 21st century. The World Health Organization (WHO) has identified AMR as a top-ten global public health threat, warning that without urgent action, common infections may once again become untreatable (WHO, 2020). Inappropriate prescribing, overuse of antibiotics, and lack of awareness among healthcare professionals are key contributors to the rise of resistant pathogens (Ventola, 2015).

Medical students and interns are future prescribers and stewards of antibiotic use. Their understanding of AMR and rational prescribing practices is crucial in shaping the future of antimicrobial stewardship (Dyar et al., 2014). However, studies from various countries have shown that undergraduate medical education often lacks sufficient emphasis on AMR and stewardship principles (Pulcini & Gyssens, 2013; Castro-Sánchez et al., 2016).

This study aims to assess the awareness, knowledge, and attitudes toward AMR among medical students and interns in a tertiary care teaching hospital in India. The findings will help identify educational gaps and inform curriculum development.

#### METHODOLOGY

##### Study Design

- Cross-sectional, questionnaire-based study.

##### Study Setting And Duration

Conducted at a tertiary care medical college in India over 2 months (e.g., May–June 2025).

##### Participants

150 participants: 100 MBBS students (3rd year and final year) and 50 interns.

##### Inclusion Criteria

MBBS students in clinical years and interns who consented to participate.

##### Exclusion Criteria

Pre-clinical students and those who had previously completed AMR training modules.

##### Data Collection Tool

A 20-item structured questionnaire divided into four domains:

1. Awareness of AMR
2. Knowledge of causes and consequences
3. Attitudes toward antibiotic use

4. Perception of AMR education

Responses were recorded using a 5-point Likert scale (Strongly Disagree to Strongly Agree) and multiple-choice questions.

##### Data Analysis

- Data analyzed using SPSS v25.
- Descriptive statistics (mean, SD, percentages).
- Chi-square test used to compare awareness between students and interns.
- $p < 0.05$  considered statistically significant.

#### 20-Item Questionnaire

##### Likert Scale Questionnaire

##### Instructions to Respondents:

Please indicate your level of agreement with the following statements using the scale below:

Scale Point	Description
1	Strongly Disagree
2	Disagree
3	Neutral
4	Agree
5	Strongly Agree

##### Section A: Awareness of AMR

No.	Statement	1	2	3	4	5
1	I have heard of the term "antimicrobial resistance."	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	I am aware that AMR is a global health threat.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	I understand the difference between antibiotic resistance and tolerance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	I am aware of the National Action Plan on AMR in India.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	I know what antimicrobial stewardship programs (ASPs) are.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

##### Section B: Knowledge of Causes and Consequences

No.	Statement	1	2	3	4	5
6	Overuse of antibiotics contributes to AMR.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Incomplete antibiotic courses can lead to resistance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Antibiotics are effective against viral infections.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	AMR can lead to longer hospital stays and increased mortality.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Poor infection control practices contribute to the spread of AMR.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

□ Section C: Attitudes Toward Antibiotic Use

No.	Statement	1	2	3	4	5
11	I always complete the full course of antibiotics prescribed to me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	I believe antibiotics should be available without a prescription.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	I have taken antibiotics without consulting a doctor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14	I would recommend antibiotics to friends/family without a prescription.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	I believe patients should be educated about AMR.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

□ Section D: Perception of AMR Education

No.	Statement	1	2	3	4	5
16	I have received formal teaching on AMR in my MBBS curriculum.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17	I feel confident in identifying irrational antibiotic use.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18	I am aware of the role of ASPs in hospitals.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19	I believe AMR education should be strengthened in the MBBS curriculum.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20	I am interested in attending workshops or training on AMR.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

RESULTS

1. Awareness And Knowledge

Indicator	Students (%)	Interns (%)
Heard of AMR	90	96
Correctly defined AMR	42	58
Aware of ASPs	39	68
Knew antibiotics don't work on viruses	66	78
Knew incomplete courses cause resistance	71	83

2. Attitudes And Practices

- 34% admitted to self-medicating with antibiotics.
- 29% believed antibiotics should be available without prescription.
- 87% agreed that AMR education should be strengthened in the MBBS curriculum.

3. Statistical Significance

- Awareness of ASPs was significantly higher among interns ( $p < 0.01$ ).
- Confidence in identifying irrational antibiotic use was higher in interns ( $p = 0.03$ ).

DISCUSSION

This study reveals that while awareness of AMR is high among medical students and interns, significant knowledge gaps and misconceptions persist. Only 48% of participants could correctly define AMR, and one-third believed antibiotics could treat viral infections—findings consistent with previous studies in India and abroad (Dyar et al., 2014; Walia et al., 2019).

Interns demonstrated better awareness of antimicrobial stewardship programs and rational prescribing, likely due to greater clinical exposure. However, the prevalence of self-medication and misconceptions about over-the-counter antibiotic access highlight the need for behavioral change interventions (Barker et al., 2016).

The overwhelming support (87%) for strengthening AMR education in the MBBS curriculum suggests a readiness among students to engage with this issue. Integrating AMR modules, case-based learning, and simulation exercises into pharmacology and clinical rotations could bridge the knowledge-practice gap (Pulcini & Gyssens, 2013; Castro-Sánchez et al., 2016).

Citation: World Health Organization. (2020). Antimicrobial resistance. <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance>

REFERENCES (20 Total)

1. World Health Organization. (2020). Antimicrobial resistance. <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance>
2. Ventola, C. L. (2015). The antibiotic resistance crisis. *P&T*, 40(4), 277–283.
3. Dyar, O. J., et al. (2014). European medical students' knowledge of antimicrobial prescribing and resistance. *Journal of Antimicrobial Chemotherapy*, 69(3), 842–846.
4. Pulcini, C., & Gyssens, I. C. (2013). How to educate prescribers in antimicrobial stewardship practices. *Virulence*, 4(2), 192–202.

5. Castro-Sánchez, E., et al. (2016). What are the factors driving antimicrobial resistance? A narrative review. *FEMS Microbiology Letters*, 363(10), fnw105.
6. Walia, K., et al. (2019). Knowledge and practices of medical students toward antimicrobial resistance. *Indian Journal of Medical Microbiology*, 37(1), 57–62.
7. Barker, A. K., et al. (2016). Social determinants of antibiotic misuse: A qualitative study. *BMC Public Health*, 16(1), 1–9.
8. O'Neill, J. (2016). Tackling drug-resistant infections globally: Final report and recommendations. *Review on Antimicrobial Resistance*.
9. Laxminarayan, R., et al. (2013). Antibiotic resistance—the need for global solutions. *The Lancet Infectious Diseases*, 13(12), 1057–1098.
10. Gandra, S., et al. (2016). Trends in antibiotic resistance in India. *International Journal of Infectious Diseases*, 50, 75–82.
11. Ahmad, A., et al. (2015). Evaluation of self-medication practices in undergraduate medical students. *Journal of Pharmacy & Bioallied Sciences*, 7(3), 210–214.
12. Lim, V. K. E. (2014). Likert scaled questionnaire Certainly, Hemant! Here's a structured and validated **Likert scale questionnaire** designed to assess awareness, knowledge, attitudes, and perceptions of antimicrobial resistance (AMR) among medical students and interns.