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Knowledge and Attitudes of Second-Year MBBS Students toward Antibiotic Use and Antimicrobial Resistance in a Tertiary Care Teaching Hospital in Western India

Aishwarya Babu, Sameeksha Nair, Sunita Bhatawadekar, Modak Meera*

Department of Microbiology, Bharati Vidyapeeth Deemed University Medical College, Pune, Maharashtra 411043, India.

* **Corresponding author:** Aishwarya Babu, Assistant Professor, Department of Microbiology, Bharati Vidyapeeth Deemed University Medical College, Pune, Maharashtra 411043, India.
Email: aishwaryabkk2@gmail.com

ABSTRACT

Introduction: Antimicrobial resistance (AMR) continues to pose serious and increasing threat to global health. As future prescribers, medical students need to have adequate knowledge about appropriate use of antibiotics. Understanding their level of awareness is essential to implement changes in training of these students regarding antibiotic prescription practices.

Aim: To assess the knowledge and attitude of second-year MBBS students regarding antibiotic use and antimicrobial resistance.

Materials and Methods: A cross-sectional descriptive study was carried out over a period of three months in a tertiary care centre among second-year MBBS students, after receiving approval from the ethics Committee of the institute. Simple random sampling method was done for selection of the study participants. Pre-validated and structured questionnaire was used for collection of data which were distributed via Google Forms. Knowledge-related items were assessed using dichotomous responses, while attitude was evaluated on a five-point Likert scale. Descriptive statistics, including frequencies, percentages and mean scores were used for analysis.

Results: The total number of students who participated in the study was 120. Moderate level of understanding was observed with a mean knowledge score of 7.6 (63%). Notable misconceptions were identified: 64% believed that antibiotics hasten the recovery from common cold and 82.5% considered them to be effective against viral infections. Only 28% could interpret antibiotic susceptibility testing reports accurately. Additionally, 57.5% perceived intravenous administration as the most effective route. Despite these issues, students showed positive attitudes toward rational antibiotic use, institutional antibiotic policies and the requirement of patient education.

Conclusion: Although attitude toward antibiotic stewardship was positive, there was a gap in knowledge among the students. Strengthening undergraduate teaching through incorporation of stewardship practices in the curriculum is necessary to encourage good prescribing practices and to prevent the progression of AMR.

KEYWORDS: Antibiotics; antimicrobial resistance; antibiotic stewardship; medical students.

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INTRODUCTION

Antibiotics are one of the most frequently used therapeutic agents worldwide. Consumption of antibiotics in India was approximately 10.7 units per person, making us the largest consumer in the world.[1] Several factors have been found to have contributed towards this, like absence of stringent regulatory measures, easy over-the-counter availability of antibiotics, usage of substandard drugs for profit, ignorance regarding proper usage of antibiotics and use of irrational fixed-dose combinations.[1-3] In addition, wrong prescribing practices such as usage of antibiotics when not recommended, not sending specimens for culture and sensitivity testing and failure to de-escalate at the right time also contributed towards the development of AMR.[4]

Treatment of infections like meningitis, endocarditis, and neonatal sepsis has become difficult over the past few years with the increasing burden of resistant pathogens.[5] Antimicrobial resistance is now associated with increased morbidity, mortality and healthcare costs.[6] Combating AMR requires a combined effort by integrating active antimicrobial stewardship programs, prescription audits and adherence to standard treatment guidelines.[7]

Medical students are the future of the healthcare system, and they play the major role in deciding the trends in prescription practices. Studies have shown that prescription errors are mostly seen among junior doctors, highlighting the importance of early education regarding rational antibiotic use. Evaluating the knowledge and attitude of medical students can help identify gaps which can guide the policymakers in making changes in the training programmes.[8]

MATERIALS AND METHODS

Study design and setting: This cross-sectional descriptive study was conducted in a tertiary care hospital in Western India over a period of three months, after obtaining clearance from the Institutional Ethics Committee.

Study Population: All MBBS students who are studying in the second year and who consented to participate were included in the study.

Sample Size and Sampling Technique: Sample size calculation was based on a previously reported study with a knowledge level of 39% (10% allowable error) and a 5% level of significance.[7] The minimum required sample size was 92. A total of 120 students were ultimately enrolled using simple random sampling.

Data Collection Tool: Data were gathered using a structured questionnaire developed from previously published studies.[4,7,9,10] The questionnaire consisted of two sections:

- **Knowledge component:** Dichotomous (yes/no) questions related to antibiotic use and resistance
- **Attitude component:** Statements rated on a five-point Likert scale ranging from strongly agree to strongly disagree

The questionnaire was administered electronically via Google Forms within a fixed time frame.

Data Analysis: Responses were compiled using Microsoft Excel and analysed using descriptive statistics. Results were presented as frequencies, percentages and mean values. Findings were represented in graphical and tabular format.

RESULTS

A total of 120 second-year MBBS students completed the survey. The overall mean knowledge score was 7.6, corresponding to 63%, suggesting a moderate level of awareness.

Knowledge Assessment: Several misconceptions regarding antibiotic use were evident among the students. Nearly two-thirds (64%) believed that antibiotics could accelerate recovery from the common cold, while 82.5% assumed that antibiotics were effective against viral infections. Only 28% of the students were able to interpret antibiotic susceptibility testing (AST) reports.

More than half of the students (57.5%) considered intravenous administration to be superior to other routes. Only a small proportion of the students understood the importance of completing the full course of antibiotics even when clinical improvement had occurred.

On the positive side, awareness regarding certain aspects was very good. The majority of the students were aware of restricted antibiotics such as vancomycin (83%), over-the-counter availability of antibiotics (84%), and the contribution of agriculture and animal husbandry towards resistance (83%). 77.5% of the students correctly acknowledged that resistant organisms can spread between individuals. (Table 1, Figure 1)

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Attitude Assessment: Overall, students demonstrated a favorable attitude towards appropriate antibiotic use. Most participants disagreed with the usage of antibiotics for conditions such as runny nose, diarrhoea and uncomplicated fever.

A large proportion supported the implementation of hospital antibiotic policies (87%) and emphasized the importance of patient education regarding adherence to prescribed antibiotic courses (86.7%). But students were unsure in areas such as the role of combination therapy in preventing resistance and the impact of missing dose of antibiotic. (Table 2)

Table 1- Assessment of knowledge regarding antibiotic resistance and usage

S. no	Question	Yes n (%)	No n(%)
1	Treatment with antibiotics speeds up the recovery of common cold	77 (64%)	43 (36%)
2	Antibiotics needs to be initiated before sending the sample for culture and sensitivity	116 (97%)	4 (3%)
3	Do you know how to interpret the antibiotic susceptibility testing report?	34 (28%)	86 (72%)
4	Best mode of giving antibiotics is by intravenous route.	69 (57.5%)	51 (42.5%)
5	Newer antibiotics are always more effective than the older antibiotics	48 (40%)	72 (60%)
6	Antibiotics can be used to treat infections caused by viruses.	99 (82.5%)	21 (17.5%)
7	Even if the patient is improving symptomatically, it is essential to complete the full course of antibiotic	8 (7%)	112 (93%)
8	Vancomycin is a restricted antibiotic in the hospital	100 (83%)	20 (17%)
9	Antibiotics are easily available over the counter in our country	101 (84%)	19 (16%)
10	Do you think antibiotics are rampantly used in agriculture and animal husbandry?	100 (83%)	20 (17%)
11	The problem of antibiotic resistance arises only in people who take antibiotics frequently	43 (36%)	77 (64%)
12	Antibiotic resistant bacteria can spread from one person to the other	93 (77.5%)	27 (22.5%)

Figure 1: Assessment of knowledge regarding antibiotic resistance and usage

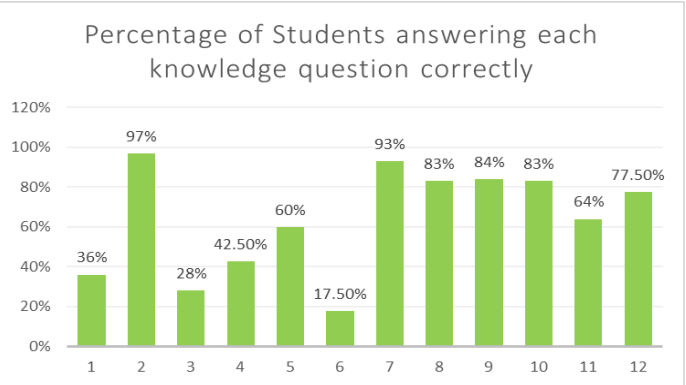

Table 2: Assessment of attitude regarding antibiotic resistance and usage

S no	Question	Strongly agree	Agree	Neutral	Disagree	Strongly disagree
1	I prefer to use antibiotics when I have runny nose	4	9	14	53	40
2	I think antibiotics need to be given in all cases of diarrhoea	5	18	24	57	16
3	I think antibiotics need to be given in all cases of fever	12	17	14	47	30
4	Hospital antibiotic policy is required for rational prescription of antibiotics	72	32	9	4	3
5	Skipping one or two doses of antibiotic cannot result in development of antibiotic resistance	22	27	22	29	20
6	Do you need to educate the patient on the importance of completing the course of antibiotic?	104	8	3	3	2
7	Combination of antibiotics help prevent development of resistance.	29	26	40	22	2

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DISCUSSION

Inappropriate use of antibiotics has led to the emergence of antimicrobial resistance as a major problem to the public health. The perception and understanding of medical students are the most important factors that influences the prescribing behaviour in clinical practice as they are the future prescribers.

In the present study, the mean knowledge score of 63% indicates a moderate level of understanding among second-year MBBS students. Similar findings were found in study by Rajiah et al. where the undergraduate medical students showed a knowledge score of around 60–65% related to antibiotics and its resistance.[11] In a study by Shah P et al. moderate knowledge levels were observed among preclinical and paraclinical students.[12] This shows that despite receiving formal teaching in pharmacology and microbiology, students were not clear about many concepts especially related to antibiotics.

Majority of students in the present study believed that antibiotics could speed up recovery from common cold (64%) and treat viral infections (82.5%). Similar observations were found in study by Chuenchom et al. and Sharma et al., where more than 70% of the medical students were under the misconception that antibiotics were useful in viral illnesses.[13,14] These suggest that wrong perceptions regarding viral illnesses are still common among medical students just like the general public. This is concerning, as one of the situations where antibiotics are unnecessarily prescribed are viral upper respiratory tract infections.

Knowledge regarding AST reports was poor, with only a very few students being confident in its interpretation. Similar results were found in a study by Datta S et al.[15] Poor understanding of AST can result in selection of wrong antibiotic, untimely escalation and failure to de-escalate therapy, all contributing to resistance. 57.5% of students believed that the intravenous route was the best mode for antibiotic administration. In a study by Abbood M et al. medical students thought that intravenous antibiotics had more efficacy as compared to oral.[16] These showed that medical students need to have deeper knowledge about bioavailability and pharmacokinetics.

Awareness of students regarding restricted antibiotics such as vancomycin (83%), over-the-counter availability of antibiotics (84%) and the role of agriculture and animal husbandry in resistance (83%) was good in the present study. This shows that students are conscious about the increasing impact of resistance to antimicrobials globally and the need for antibiotic stewardship practices. Most of the students thought that antibiotics are not required for runny nose, diarrhoea and fever indicating their attitude towards its rational use. These findings were consistent with studies by Kulkarni P and Singh S et al, which demonstrated an improvement in attitude of medical students towards judicious antibiotic use.[17,18] This could be due to increased exposure to public health campaigns and early sensitization through microbiology teaching. Like the study by Wushouer H et al and Singh R et al, most students were aware about antibiotic stewardship. 87% believed that antibiotic policy is essential in every hospital and 86.7% thought that compulsory and frequent patient education regarding appropriate antibiotic usage is required to control antibiotic misuse.[19,20]

Students seemed to be unclear regarding the concepts of using antibiotic combinations and skipping doses of antibiotics. These again highlights the partial understanding of the students regarding pharmacodynamics and resistance mechanisms.[21]

LIMITATIONS

The study relied predominantly on responses which were self-reported and which can introduce response bias. Additionally, as it was conducted at a single center, the findings may not be broadly generalizable.

CONCLUSIONS

The findings of this study suggest that while second-year MBBS students shows a positive attitude towards judicious use of antibiotics, important gaps persist in their knowledge. Usage of antibiotics for viral infection, inadequate knowledge regarding AST interpretation were some of the problematic areas. Integrating antimicrobial stewardship concepts and practical training into undergraduate education may help reduce these gaps and promote responsible prescribing behaviour.

CONFLICTS OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest

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None

AUTHOR'S CONTRIBUTION

AB: Concept, design, literature search, data acquisition, manuscript preparation, manuscript review;

SN: Concept, data acquisition, literature search, manuscript review;
SB: Design, data acquisition,literature search, manuscript review;
MM: Data acquisition,Manuscript review, manuscript editing

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