

KNOWLEDGE, ATTITUDE, AND PERCEPTION OF MEDICAL AND DENTAL UNDERGRADUATES ABOUT ANTIMICROBIAL STEWARDSHIP

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ABSTRACT:

Background: Antimicrobial resistance is a growing global health threat, largely driven by inappropriate antibiotic use. Antimicrobial stewardship aims to promote responsible prescribing, making it essential to assess undergraduate knowledge and attitudes early in their training. Objective: To evaluate the knowledge, attitude, and perception (KAP) of medical and dental undergraduates regarding antimicrobial stewardship to identify educational gaps. **Materials and Methods:** A cross-sectional survey was conducted in August 2014 at a tertiary care institute in Karad, India, involving 150 medical and 60 dental second-year undergraduates. A validated questionnaire assessed knowledge (12 questions), attitude (8 questions), and perception (12 questions) about antimicrobial stewardship. Data were analyzed using SPSS 22.0, with statistical significance set at $P < 0.05$. Scores were categorized as poor, average, or good. **Results:** Of 210 participants (mean age: 20.2 years), 52% of medical and 35% of dental students scored average or above in knowledge ($P = 0.007$). Attitude was positive, with 95% of medical and 92% of dental students favoring integrated antimicrobial education ($P = 0.002$). Perception scores were average, with dental students scoring lower ($P < 0.001$). Age distribution showed most participants were 19–21 years. **Conclusion:** While attitudes toward antimicrobial stewardship are positive, knowledge and perception require improvement, particularly among dental students. Curriculum enhancements, including case-based learning, are recommended.

Keywords: Antimicrobial stewardship, medical undergraduates, dental undergraduates, knowledge, attitude, perception.

INTRODUCTION:

Antimicrobial resistance (AMR) poses a global health crisis, driven by inappropriate antimicrobial (AM) prescribing practices, which escalate treatment costs and reduce therapeutic options (1). Antimicrobial stewardship (AMS) programs aim to optimize AM use, curb resistance, and enhance patient outcomes (2). Educating future prescribers, such as medical and dental undergraduates, is pivotal to fostering rational prescribing habits early in their careers

(3). Studies reveal that undergraduate curricula often lack comprehensive AMS training, leaving students ill-equipped to handle clinical scenarios involving AMs (4). This gap is particularly concerning in India, where AMR rates are high due to over-the-counter AM availability and inadequate regulatory enforcement (5).

Understanding the knowledge, attitude, and perception (KAP) of undergraduates about AMS

is essential for curriculum reform. Knowledge encompasses awareness of rational AM prescribing, such as selecting narrow-spectrum agents when appropriate (6). Attitude reflects students' willingness to engage with AMS education, while perception indicates their confidence in applying learned skills (7). Prior research highlights deficiencies in students' knowledge of AM resistance mechanisms and clinical decision-making, with dental students often scoring lower than medical peers (8). Positive attitudes toward integrating AMS with clinical teaching have been noted, yet perception of acquired skills remains average or poor (9).

This study addresses these issues by assessing the KAP of second-year medical and dental undergraduates at a tertiary care institute in Mumbai, India. The focus on second-year students is strategic, as they are at a formative stage of pharmacology education, ideal for embedding AMS principles (10). By identifying specific educational lacunae, this research aims to inform targeted interventions, such as interactive case-based learning, to strengthen AMS education. Such efforts are critical to preparing future prescribers to combat AMR effectively, aligning with global health priorities outlined by the World Health Organization (11).

MATERIALS AND METHODS

This cross-sectional study was conducted in August 2014 at a tertiary care institute in Mumbai, India, after approval from the Institutional Ethics Committee. Participants included 150 medical and 60 dental second-year undergraduates, recruited post-pharmacology classes. The study's objectives were explained, and written informed consent was obtained, with

participation being voluntary (85% participation rate). A structured, pretested questionnaire, adapted from Abbo et al. (3), was validated by senior faculty from pharmacology, microbiology, and medicine departments. It comprised three sections: knowledge (12 multiple-choice questions on rational AM prescribing, scored 0–12), attitude (8 Likert-scale statements, scored 8–24, with reverse scoring for 4 negative statements), and perception (12 yes/no questions on acquired skills, scored 0–12).

Students completed the questionnaire independently in 20 minutes without references. Knowledge scores were categorized as poor (0–4), average (5–8), or good (9–12); attitude as poor (8–12), average (13–18), or good (19–24); and perception as poor (0–4), average (5–8), or good (9–12). Data were analyzed using SPSS 22.0, with statistical significance evaluated via two-sided P-values at a 5% significance level. Descriptive statistics summarized KAP scores, and chi-square tests compared medical and dental students. A graph of age distribution and three tables (knowledge, attitude, perception) were generated to present results.

RESULTS

A total of 210 students (150 medical, 60 dental; mean age: 20.2 years) participated. Figure 1 illustrates the age distribution of participants, revealing that the majority (65%) were between 19–21 years, reflecting the typical age range of second-year undergraduates. Additionally, 25% were aged 18–19, while 10% fell within the 21–22 age group. This distribution confirms that the surveyed cohort aligns with the expected demographic for medical and dental students.

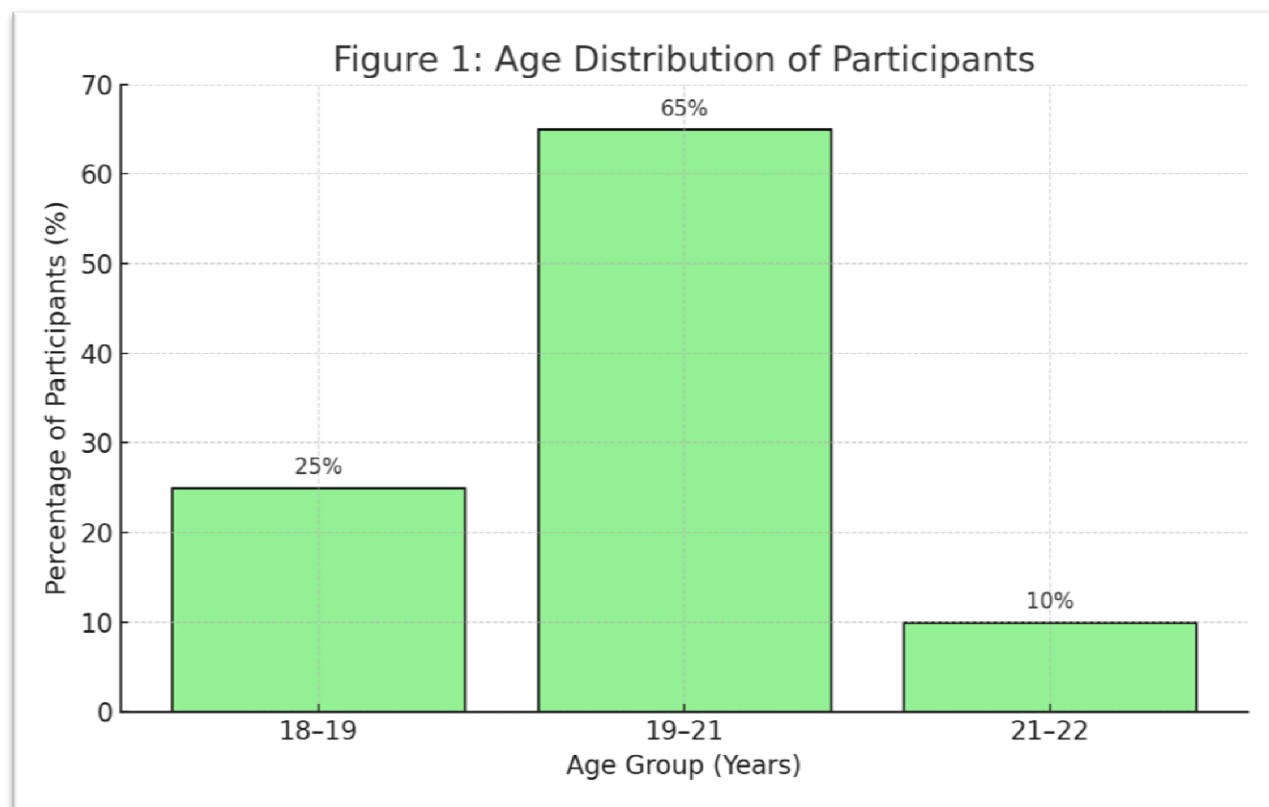


Figure 1: Age Distribution of Participants

Table 1: Knowledge Scores of medical and dental undergraduates

Category	Medical (n=150)	Dental (n=60)	P-value
Poor (0-4)	30 (20%)	25 (42%)	0.007
Average (5-8)	78 (52%)	21 (35%)	
Good (9-12)	42 (28%)	14 (23%)	

Table 1 shows knowledge scores, with 52% of medical and 35% of dental students scoring average. Only 28% of medical and 23% of dental students achieved good scores. The significant

difference ($P = 0.007$) suggests medical students have better knowledge of rational AM prescribing, possibly due to more robust pharmacology exposure.

Table 2: Attitude Scores of medical and dental undergraduates

Category	Medical (n=150)	Dental (n=60)	P-value
Poor (8-12)	5 (3%)	5 (8%)	0.002
Average (13-18)	20 (13%)	15 (25%)	
Good (19-24)	125 (83%)	40 (67%)	

Table 2 presents the attitude scores of medical and dental undergraduates toward antimicrobial stewardship. A significantly higher proportion of medical students (83%) demonstrated a good attitude compared to dental students (67%), with the difference being statistically significant ($P = 0.002$). Only 3% of medical students had a poor attitude score, whereas 8% of dental students fell into this category. Additionally, 13% of medical and 25% of dental students had average scores. These findings suggest that while the overall attitude toward antimicrobial stewardship is positive in both groups, dental students exhibit relatively less favorable attitudes, highlighting a need for targeted educational interventions.

Table 3: Perception Scores of medical and dental undergraduates

Category	Medical (n=150)	Dental (n=60)	P- value
Poor (0–4)	10 (7%)	20 (33%)	<0.001
Average (5–8)	120 (80%)	35 (58%)	
Good (9–12)	20 (13%)	5 (8%)	

Table 3 highlights the perception scores of medical and dental undergraduates regarding antimicrobial stewardship. A notable disparity was observed between the two groups, with 33% of dental students exhibiting poor perception scores compared to only 7% of medical students, a statistically significant difference ($P < 0.001$). While 80% of medical students achieved average scores, only 58% of dental students fell within this category. Additionally, good perception scores were reported in 13% of medical and just

8% of dental students. These findings indicate that dental students have comparatively weaker perceptions about antimicrobial stewardship, underlining the need for enhanced educational focus in this area.

DISCUSSION

This study underscores the urgent need to strengthen AMS education among medical and dental undergraduates in India, where AMR is a pressing concern (1). The positive attitude of 83% of medical and 67% of dental students toward AMS aligns with findings by Huang et al., who reported 74% of Chinese medical students favoring AMS education (7). However, the average-to-poor knowledge scores (52% medical, 35% dental students scoring average) echo prior research by Dyar et al., which noted limited understanding of AM resistance among European students (4). This suggests a global gap in undergraduate AMS training, particularly in clinical decision-making (10).

Dental students' lower performance in knowledge and perception may stem from less emphasis on pharmacology in their curriculum compared to medical programs (8). The significant knowledge gap ($P = 0.007$) highlights the need for tailored interventions, such as case-based learning, which Gupta et al. found effective for pharmacology teaching (9). Perception scores, with 33% of dental students rating their skills as poor, indicate a lack of confidence in applying AMS principles, consistent with Abbo et al.'s findings on U.S. students (3). Integrating AMS with clinical subjects, as favored by 95% of participants, could bridge this gap, as supported by Vasundara et al. (12).

The reliance on new AMs to combat resistance, observed in both groups, is concerning, as inappropriate prescribing fuels AMR (5). Educational reforms should emphasize rational prescribing and interdisciplinary roles, as 40% of students were unaware of nurses' and pharmacists' contributions to AMS. Adopting strategies from countries like the UK, where AMS is embedded in undergraduate curricula, could enhance outcomes (2). Interactive sessions and open-access learning platforms, as suggested by Pulcini et al., may further improve engagement and knowledge retention (1).

This study is limited by its single-center design, which may not reflect KAP across diverse Indian institutions. The focus on second-year students excludes perspectives from later years, potentially missing insights from clinical exposure. The questionnaire, while validated, may not capture all AMS nuances. Voluntary participation could introduce selection bias, favoring motivated students.

CONCLUSION

Medical and dental undergraduates exhibit a positive attitude toward AMS but lack adequate knowledge and confidence in applying AMS principles. Dental students, in particular, require targeted interventions. Integrating case-based learning and clinical exposure into the curriculum can address these gaps, fostering rational AM prescribing and strengthening AMS programs.

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