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KNOWLEDGE, ATTITUDE, AND PRACTICE REGARDING ANTIBIOTIC PROPHYLAXIS IN ORTHOPEDIC SURGERIES AMONG MEDICAL STUDENTS: A CROSS-SECTIONAL STUDY

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Abstract

Background: Surgical antibiotic prophylaxis is a cornerstone for preventing surgical site infections (SSI) in orthopedic surgery but inappropriate use contributes to antimicrobial resistance. Understanding knowledge, attitude, and practice (KAP) among future prescribers is essential to guide educational interventions.

Objective: To assess KAP regarding antibiotic prophylaxis for orthopedic surgeries among undergraduate medical students at a tertiary care hospital.

Methods: A cross-sectional questionnaire-based survey was conducted from January 2024 to January 2025 among 330 willing medical students across all years. A validated 30-item questionnaire assessed knowledge, attitude, and practice regarding antibiotic prophylaxis in orthopedic surgical settings.

Results: Of 330 students, 310 completed the survey (response rate 93.9%). Adequate knowledge was observed in 48% of participants, positive attitude in 75%, and correct practice responses in 40%. Knowledge scores improved with seniority ($p < 0.05$). Common gaps included timing of administration and guideline adherence.

Conclusion: While attitudes were generally positive, knowledge and practice concerning antibiotic prophylaxis were suboptimal, indicating the need for targeted curricular reinforcement and antimicrobial stewardship education.

Keywords: Antibiotic prophylaxis; Orthopedic surgery; Knowledge, attitude and practice; Medical students; Surgical site infection; Antimicrobial resistance

Introduction

Antibiotic prophylaxis in surgery is defined as the administration of an antimicrobial agent before surgical incision to reduce the risk of postoperative surgical site infections (SSI), one of the most

common healthcare-associated complications globally. SSIs account for increased morbidity, prolonged hospitalization, and significant healthcare costs, particularly in orthopedic procedures involving implants where infection consequences can be severe. Effective prophylaxis has been shown to significantly reduce SSI rates when the correct antibiotic is administered at the appropriate time and duration in accordance with evidence-based clinical practice guidelines.[1-3]

Orthopedic surgeries pose unique challenges due to the frequent use of prosthetic material, which increases the risk of infection and complicates management. National and international guidelines such as those from the American Society of Health-System Pharmacists and similar evidence-based recommendations emphasize timely (within 60 minutes before incision) single-dose prophylaxis with preferred agents like first-generation cephalosporins for most orthopedic procedures.[1,4] However, studies across diverse settings reveal poor adherence to prophylactic standards, with considerable variation in choice, timing, and duration of antibiotic use.[5-6]

Future prescribers medical students are expected to understand and apply rational antibiotic use in clinical practice. However, evidence suggests gaps in KAP among students regarding antibiotic use and resistance broadly, with fewer data focusing specifically on surgical antibiotic prophylaxis knowledge.[7-9] In this context, evaluating KAP among medical students can identify educational gaps and inform strategies to improve antimicrobial stewardship before graduation and clinical practice.

Methodology

This prospective cross-sectional study was conducted at Dr. Vasantrao Pawar medical college and research center,Adgao Nashikfrom January 2024 to January 2025**.** A total of 330 undergraduate medical students (Years 1–MBBS final year) were purposively invited; 310 completed the survey. Ethical approval was obtained. A structured, validated questionnaire adapted from WHO and published KAP studies was used, covering demographics, knowledge (choice, timing, duration of prophylaxis), attitude (perceived importance and guideline necessity), and practice scenarios related to orthopedic surgical antibiotic prophylaxis. Participation was voluntary and anonymous. Data were analyzed using descriptive statistics; associations between academic year and KAP scores were assessed using chi-square tests with $p < 0.05$ considered significant.

Results

A total of 330 medical students were approached for participation, of whom 310 completed the questionnaire**,** yielding a response rate of 93.9%**.** The demographic characteristics of the study participants are summarized in Table 1**.** The mean age of respondents was 21.4 ± 1.6 years. Male students constituted 52.3%, while females accounted for 47.7%. Representation was obtained from all years of the MBBS course, with the highest proportion from final-year students (28.4%).

Assessment of knowledge regarding antibiotic prophylaxis in orthopedic surgeries revealed that only 48.1% of students had adequate knowledge (Table 2). Correct identification of the preferred antibiotic (cefazolin) was seen in 46.8% of participants, while only 37.4% correctly knew the recommended timing of administration (within 60 minutes before incision). Knowledge regarding recommended duration (≤24 hours) was particularly low (35.8%). Knowledge scores showed a progressive improvement with advancing academic year.

The attitude assessment demonstrated generally favorable perceptions toward rational antibiotic use (Table 3). About 75.2% of students agreed that adherence to antibiotic prophylaxis guidelines is essential, and 82.6% acknowledged that irrational antibiotic use contributes to antimicrobial resistance. However, 29.7% still believed that prolonged antibiotic prophylaxis reduces postoperative infection risk.

Evaluation of practice patterns using hypothetical orthopedic surgical scenarios revealed that only 40.3% of students demonstrated correct practices overall (Table 4). Correct responses were highest for clean elective orthopedic procedures (43.9%) and lowest for duration-related decisions. The discrepancy between positive attitude and suboptimal practice highlights a significant knowledge–practice gap**.**

Tables

Table 1: Demographic Characteristics of Study Participants (N = 310)

Variable	Number (%)
Gender	
Male	162 (52.3)
Female	148 (47.7)
Year of Study	
First MBBS	62 (20.0)
Second MBBS	68 (21.9)
Third MBBS	92 (29.7)
Final MBBS	88 (28.4)
Mean age (years)	21.4 ± 1.6

Table 2: Knowledge Regarding Antibiotic Prophylaxis in Orthopedic Surgeries

Knowledge Item	Correct Response n (%)
Preferred antibiotic for orthopedic prophylaxis (Cefazolin)	145 (46.8)
Correct timing (≤60 min before incision)	116 (37.4)
Recommended duration (≤24 hours)	111 (35.8)
No role of prophylaxis in clean minor surgeries	158 (51.0)
Overall adequate knowledge score	**149 (48.1)**

Table 3: Attitude Toward Antibiotic Prophylaxis (N = 310)

Attitude Statement	Agree n (%)
Guidelines should be strictly followed	233 (75.2)
Irrational use causes antimicrobial resistance	256 (82.6)
Prolonged prophylaxis reduces SSI risk	92 (29.7)
Need for formal training in antibiotic stewardship	241 (77.7)
Antibiotic misuse is a public health concern	265 (85.5)

Table 4: Practice Patterns in Hypothetical Orthopedic Surgical Scenarios

Clinical Scenario	Correct Practice n (%)
Clean elective orthopedic surgery	136 (43.9)
Open fracture prophylaxis	121 (39.0)
Appropriate discontinuation within 24 hours	109 (35.2)
Correct drug choice in implant surgery	125 (40.3)
Overall correct practice	**125 (40.3)**

Discussion

This study reveals that while the attitude toward antibiotic prophylaxis among medical students was generally positive, knowledge and practice levels were suboptimal. Only about half of the participants demonstrated adequate knowledge regarding appropriate antibiotic selection, timing, and duration,

and an even smaller proportion could correctly apply this knowledge in clinical scenarios. These findings are consistent with previous KAP studies conducted among Indian medical students, which reported favorable attitudes toward rational antibiotic use but significant deficiencies in practical application and guideline adherence.[8]

Similarly, international studies evaluating knowledge and practice of surgical antibiotic prophylaxis among healthcare providers and trainees have reported inconsistent adherence to established guidelines**,** particularly with respect to timing and duration of prophylaxis, emphasizing the need for continuous education and antimicrobial stewardship interventions.[5],[9] Studies conducted among surgical residents and practicing clinicians have also identified persistent knowledge gaps, suggesting that inadequate training at the undergraduate level may continue into clinical practice if not addressed early.[10-12]

The observed knowledge–practice gap highlights a critical deficiency in translating theoretical knowledge into clinical decision-making. Comparable findings have been reported in other KAP surveys, where awareness of antimicrobial resistance did not consistently correlate with correct prescribing behavior.[8] This underscores the importance of shifting from purely didactic teaching to competency-based education, incorporating early clinical exposure, case-based discussions, and simulated prescribing exercises. Strengthening antimicrobial stewardship training within the undergraduate curriculum and reinforcing evidence-based guidelines during clinical postings may significantly improve rational prescribing behavior.[13-15] Furthermore, conducting multicenter studies across diverse institutions would help validate these findings and support nationwide curricular reforms aimed at optimizing antibiotic use and combating antimicrobial resistance.

Conclusion

Medical students at a tertiary care centre demonstrated positive attitudes but insufficient knowledge and practice regarding antibiotic prophylaxis in orthopedic surgeries. Targeted educational reinforcement and antimicrobial stewardship integration are essential to prepare future prescribers.

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