Section: Pharmacology

Original Research Article

A KNOWLEDGE, ATTITUDE AND PRACTICE STUDY ON RATIONAL USE OF ANTIBIOTICS AND ANTIMICROBIAL RESISTANCE AMONG MEDICAL INTERNS IN A TERTIARY CARE HOSPITAL

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Received *: 04/05/2026*
Received in revised form *: 21/06/2026*
Accepted *: 04/07/2026*

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DOI: 10.70034/ijmedph.2026.3.32

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 195-199

ABSTRACT

Background: Antibiotic resistance is a global threat. Internship is crucial period where theoretical knowledge is applied in clinical practice, offering an opportunity to shape rational prescribing habits. Assessing the KAP of interns helps identify gaps and guide educational interventions to create awareness about antibiotic resistance & promote rational antibiotic use.

Objective: To assess the knowledge, attitude and practice of interns about rational antibiotic use and antibiotic resistance.

Materials and Methods: An observational questionnaire-based study was conducted among 200 interns at Andhra Medical College. First section included 10 knowledge-based questions, scoring out of 10 (0-3:poor, 4-7:moderate, 8-10:Good). Second section assessed attitude, using three-point Likert scale. Third section focused on current antibiotic use practices.

Results: Total 200 interns participated, their average internship duration was 3-6 months. Mean knowledge score was 7.8. Moderate knowledge (score 4-7) was seen in 37% and good knowledge (score 8–10) in 63%. Responses to the attitude-based questions showed about 89% agreed that antibiotics should be prescribed only with clear clinical or microbiological evidence and 98% recognized irrational use contributes to antibiotic resistance. In practice-based questions, they are following rational use of antibiotics.

Conclusion: Interns had good knowledge and a strongly positive attitude towards rational antibiotic use. Most of them were well aware that antibiotic resistance is a serious health issue. Inclusion in the internship training requires multi-modal approach with case-based scenarios, workshops and CME, along with active clinician involvement to promote rational use of antibiotics and thus control the growing problem of antibiotic resistance.

Keywords: Antibiotic resistance, rational antibiotic use

INTRODUCTION

Antibiotics have played a pivotal role in reducing mortality and morbidity from infectious diseases, transforming medical practice over the past century. However, their indiscriminate and irrational use has significantly contributed to the emergence of antimicrobial resistance (AMR), which is now a serious global health threat.[1] The World Health Organization (WHO) has declared antimicrobial resistance a priority concern, noting that resistant pathogens compromise the effective treatment of common infections, leading to prolonged illness, higher treatment costs, and increased mortality.[2] Globally, irrational use of antibiotics—including self-medication, unnecessary prescription for viral infections, incomplete treatment courses, and lack of culture-sensitivity testing—has been identified as a major driver of resistance.[3] In developing countries like India, the situation is further compounded by over-the-counter availability of antibiotics, high burden of infectious diseases, and limited implementation of strict prescription policies.[1] Medical interns represent a crucial group, as their

prescribing practices are being shaped during this formative stage of clinical training. Internship is a period when theoretical knowledge is applied in patient care, making it the most receptive phase for fostering rational prescribing habits.[2] Furthermore, surveys have revealed that although a majority of students advocate for the need of sensitization programs and strict antibiotic policies, their practical knowledge regarding antibiotic choice in specific clinical conditions (such as pregnancy, diarrheal illness, or urinary tract infection) remains inadequate.[3] Therefore, assessing the knowledge, attitude, and practice (KAP) of interns towards rational antibiotic use is essential to identify gaps and to enhance awareness and rational prescribing practices.[1,2]

Aim

To assess the knowledge, attitude, and practice (KAP) of medical interns regarding rational use of antibiotics and antimicrobial resistance in a tertiary care hospital.

Objectives

1. To assess the current level of knowledge about antibiotic use and antimicrobial resistance among medical interns.
2. To examine medical interns' attitude towards antibiotic prescribing and the seriousness of antimicrobial resistance.
3. To assess the practices of medical interns concerning rational antibiotic use and its role in preventing antimicrobial resistance.

MATERIALS AND METHODS

Study setting: Andhra Medical College, Visakhapatnam

Study Design: Observational study

Study period: one month

Study population: Medical interns at Tertiary Care Hospital, Visakhapatnam

Sample size: 200

$$n = \frac{Z^2 \cdot p \cdot (1-p)}{d^2}$$

Inclusion Criteria

1. Medical interns currently undergoing internship training who were present on the day of the study.
2. Medical interns who were willing to participate in the study.

Exclusion Criteria

1. Medical interns who did not give a valid consent to participate in the study.

Study tools:

1. A pre-validated structured KAP questionnaire prepared using Google Forms, containing knowledge, attitude and practice sections related to rational antibiotic use and antimicrobial resistance.

Methodology:

The questionnaire had three sections:

- **Knowledge**: Questions assessing awareness on rational antibiotic use, resistance, empirical therapy, etc.
- **Attitude**: Assessed using a Three-point Likert scale on perceptions regarding antimicrobial resistance and rational prescribing.
- **Practice**: Questions regarding prescribing patterns, self-medication, completion of antibiotic course, and use of culture-sensitivity testing.
- Prior permission was taken from the Institutional Ethics Committee, Andhra Medical College, Visakhapatnam before starting the study.
- Informed consent was obtained from the medical interns.
- Medical interns satisfying inclusion criteria were enrolled in the study.
- A pre-structured questionnaire was prepared.
- An orientation session was given to the medical interns prior to the study.
- The questionnaire was distributed via Google Forms; Google form link was shared through the official WhatsApp group. The responses through Google Forms were collected.

Ethical Considerations

The study was conducted after obtaining approval(Ethics approval number : 216/IEC AMC/SEP 2025) from the Institutional Ethics Committee, Andhra Medical College, Visakhapatnam.

Data Analysis:

Data Entry: After collecting responses through Google Forms, the data were checked to remove any incomplete or irrelevant entries. Only fully completed responses were included in the analysis

Statistical Analysis: Microsoft Excel 2021 was used for data analysis. The responses were categorized and tabulated to assess the frequencies and percentages for each question in the survey. The data were represented as percentages, Pie charts & tables.

RESULTS

A total of 200 medical interns participated in the study. The average duration of internship among the participants was 3–6 months. The responses were analysed under three domains: knowledge, attitude and practice regarding rational antibiotic use and antimicrobial resistance.

Knowledge regarding rational antibiotic use and antimicrobial resistance

The mean knowledge score of the interns was 7.8 out of 10, indicating an overall good level of knowledge. Based on the scoring system, none of the participants had poor knowledge. 74 interns (37%) had moderate knowledge with a score between 4 and 7, while 126 interns (63%) had good

knowledge with a score between 8 and 10. (Figure 1)

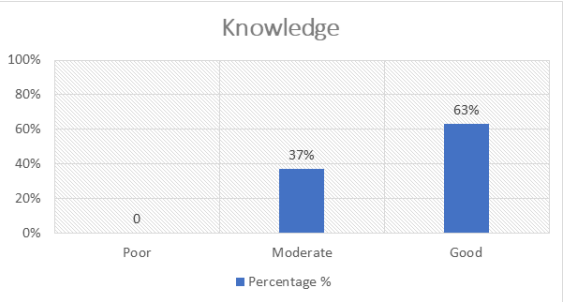


Figure 1: Distribution of knowledge scores among medical interns

Attitude towards rational antibiotic prescribing

The attitude of interns towards rational antibiotic use was generally positive. A majority of interns agreed that antibiotics should be prescribed only when there was clear clinical or microbiological evidence of bacterial infection. Eighty-nine percent agreed with this statement, while 9% were neutral and 2% disagreed.

A very high proportion of participants, 98%, agreed that over-prescription of antibiotics contributes significantly to antimicrobial resistance. Only 2% were neutral, and none disagreed. Similarly, 95% agreed that following standard treatment guidelines helps ensure rational use of antibiotics.

Regarding patient demand, 91% of interns agreed that patient demand or expectation should not influence antibiotic prescribing decisions, while 7% were neutral and 2% disagreed. In relation to confidence in rational prescribing, 82% of interns agreed that they felt confident in their ability to prescribe antibiotics rationally during clinical practice, while 15% were neutral and 3% disagreed. (Figure 2-6)

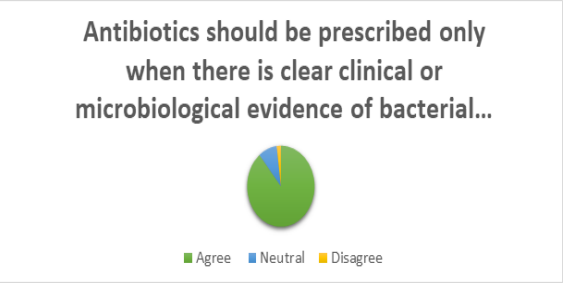
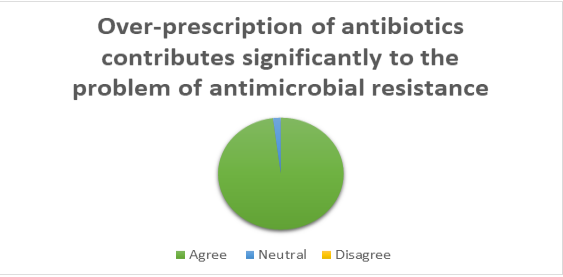


Figure 2



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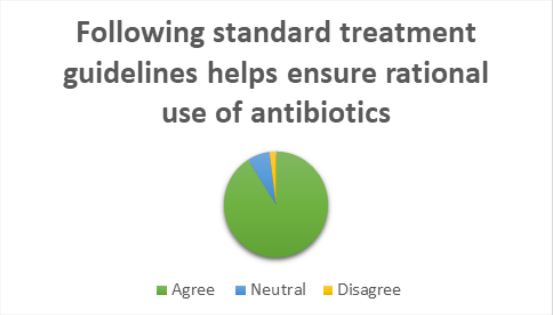

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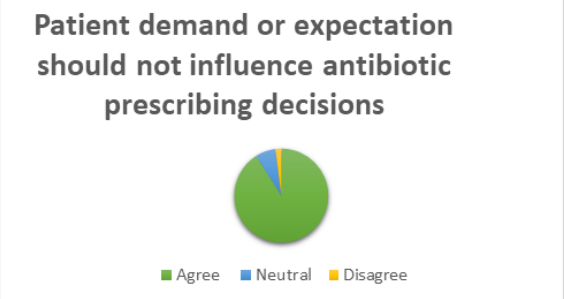

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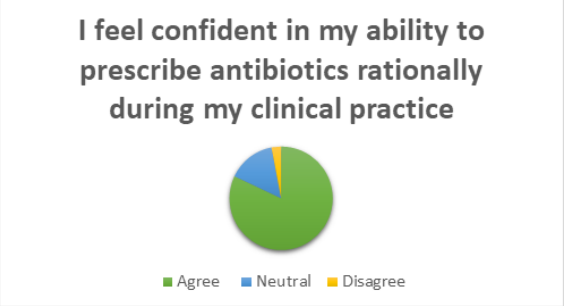

Figure 6

Practice regarding antibiotic use

The practice-based responses showed that most interns followed rational practices regarding antibiotic use. Eighty-six percent reported that they checked the likely cause of infection, whether bacterial or viral, before using or suggesting antibiotics. However, 5% did not follow this practice and 9% followed it only sometimes.

Regarding self-medication, 89% stated that they had not used antibiotics without a doctor's prescription, while 8% reported that they had done so and 3% responded "sometimes." Eighty-four percent of interns reported that they always completed the full course of antibiotics when prescribed, whereas 6% did not and 10% did so only sometimes.

Only 6% of interns reported that they had advised someone to use leftover antibiotics for similar symptoms, while 91% denied this practice. In addition, 92% of interns reported that they referred to standard treatment guidelines or senior clinicians' advice before prescribing antibiotics during clinical postings. (Figure 7)

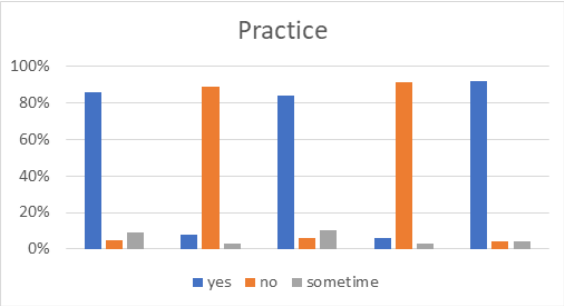

Figure 7: Practice of interns regarding rational antibiotic use

DISCUSSION

The present study assessed the knowledge, attitude and practice of medical interns regarding rational antibiotic use and antimicrobial resistance in a tertiary care hospital. Medical interns represent an important group because internship is the transition period between theoretical learning and independent clinical practice. Prescribing behaviour developed during this period can strongly influence future antibiotic use patterns. Therefore, identifying gaps in knowledge, attitude and practice among interns is important for strengthening antibiotic stewardship.

In the present study, the overall knowledge of interns regarding rational antibiotic use and antimicrobial resistance was good. The mean knowledge score was 7.8 out of 10. Among the participants, 63% had good knowledge and 37% had moderate knowledge, while none had poor knowledge. This suggests that most interns were aware of the basic principles of rational antibiotic use and the problem of antimicrobial resistance. The good knowledge score may be due to undergraduate teaching, clinical exposure during internship and increased awareness about antimicrobial resistance as a major public health issue.

The attitude of interns towards rational antibiotic prescribing was also strongly positive. Most interns agreed that antibiotics should be prescribed only when there is clear clinical or microbiological evidence of bacterial infection. This is an important finding because unnecessary antibiotic use for viral or non-bacterial illnesses is one of the major causes of antimicrobial resistance. The finding that 98% of interns agreed that over-prescription of antibiotics contributes significantly to antimicrobial resistance shows that interns were aware of the consequences of irrational prescribing.

A high proportion of interns also agreed that following standard treatment guidelines helps ensure rational use of antibiotics. This reflects a favourable attitude towards guideline-based prescribing. Standard treatment guidelines help in choosing the appropriate antibiotic, dose, route and duration, and reduce unnecessary broad-spectrum antibiotic use. In the present study, 95% of participants agreed with the importance of treatment guidelines, indicating that interns understood the role of structured prescribing practices in preventing antimicrobial resistance.

Another important finding was that most interns agreed that patient demand or expectation should not influence antibiotic prescribing decisions. This is clinically relevant because patient pressure is one of the factors that can lead to unnecessary antibiotic prescription, especially in respiratory tract infections and other self-limiting illnesses. In this study, 91% of interns agreed that patient demand should not influence prescribing decisions, suggesting a rational attitude towards independent clinical decision-making.

Although most interns had a positive attitude, only 82% felt confident in their ability to prescribe antibiotics rationally during clinical practice. This indicates that although knowledge and attitude were good, some interns may still require practical training in antibiotic selection, dose adjustment, duration of therapy, culture-sensitivity interpretation and clinical decision-making. This gap between knowledge and confidence highlights the need for case-based discussions, bedside teaching and regular antibiotic stewardship training during internship.

The practice responses showed that most interns followed rational antibiotic use practices. Eighty-six percent reported that they checked whether the likely cause of infection was bacterial or viral before using or suggesting antibiotics. This is an important rational practice because antibiotics are ineffective in viral infections and unnecessary use increases resistance. Similarly, 92% reported that they referred to treatment guidelines or senior clinicians' advice before prescribing antibiotics during clinical postings. This indicates that interns were not prescribing independently without guidance and were willing to follow standard recommendations.

However, some gaps were observed in practice. Eight percent of interns reported using antibiotics without a doctor's prescription and 3% reported doing so sometimes. Although this proportion is small, it is significant because medical interns are expected to be role models for rational drug use. Self-medication with antibiotics can lead to inappropriate antibiotic selection, inadequate dosing, incomplete treatment and development of resistance. Similarly, 10% of interns reported completing the full antibiotic course only sometimes, and 6% reported that they had advised someone to use leftover antibiotics for similar symptoms. These practices indicate that continuous reinforcement is necessary even among medically trained individuals.

The findings of the present study are comparable to previous studies among medical interns and healthcare students, which have reported good awareness of antimicrobial resistance but variable translation of knowledge into actual practice. The present study also supports the need for regular educational interventions, as knowledge alone may not be sufficient to ensure rational antibiotic prescribing. Practical exposure to antibiotic

stewardship, microbiology-based prescribing, prescription audits and feedback from clinicians can help improve rational prescribing behaviour.

The study emphasizes the importance of including antibiotic stewardship training as a regular component of internship teaching. Educational activities such as case-based scenarios, clinical pharmacology discussions, workshops, continuing medical education programs and active involvement of clinicians can improve both confidence and practice among interns. Interns should also be trained in interpretation of culture and sensitivity reports, empirical antibiotic selection, de-escalation, duration of therapy and avoidance of unnecessary antibiotic combinations.

Overall, the present study showed that medical interns had good knowledge, positive attitude and generally rational practices regarding antibiotic use and antimicrobial resistance. However, small gaps were observed in self-medication, completion of antibiotic courses and use of leftover antibiotics. These gaps should be addressed through regular training, strict implementation of antibiotic policies and continued sensitization during internship.

CONCLUSION

Interns showed good knowledge and a positive attitude toward rational antibiotic use. Most recognized that irrational use leads to antimicrobial resistance. Majority agreed antibiotics should be prescribed only with clear evidence. Rational prescribing practices were commonly followed during internship. Regular training and CME programs can further strengthen antibiotic stewardship.

Limitations: The present study had a few limitations. It was a single-centre study conducted among medical interns of one tertiary care hospital, so the findings may not be generalized to all interns. The study was conducted for a short duration of one month and assessed knowledge, attitude and practice at only one point of time. Since the data were collected through a self-administered Google Forms questionnaire, there may be chances of recall bias or socially desirable responses.

Source of Funding: Nil

Conflict of interests: Declared none.

Google form questionnaire

Section	Question	Response options
Knowledge	Antibiotics are useful for bacterial infections.	Yes / No / Don't know
Knowledge	Antibiotics are useful for viral infections.	Yes / No / Don't know
Knowledge	Irrational use of antibiotics can cause antimicrobial resistance.	Yes / No / Don't know
Knowledge	Incomplete course of antibiotics can contribute to resistance.	Yes / No / Don't know
Knowledge	Culture and sensitivity testing helps in rational antibiotic selection.	Yes / No / Don't know
Knowledge	Broad-spectrum antibiotics should be used only when indicated.	Yes / No / Don't know
Knowledge	Self-medication with antibiotics is inappropriate.	Yes / No / Don't know
Knowledge	Antibiotics should be prescribed in correct dose and duration.	Yes / No / Don't know
Knowledge	Overuse of antibiotics increases treatment failure in future infections.	Yes / No / Don't know
Knowledge	Standard treatment guidelines help in rational antibiotic prescribing.	Yes / No / Don't know
Attitude	Antibiotics should be prescribed only when there is clear clinical or microbiological evidence of bacterial infection.	Agree / Neutral / Disagree
Attitude	Over-prescription of antibiotics contributes significantly to antimicrobial resistance.	Agree / Neutral / Disagree
Attitude	Following standard treatment guidelines helps ensure rational use of antibiotics.	Agree / Neutral / Disagree
Attitude	Patient demand or expectation should not influence antibiotic prescribing decisions.	Agree / Neutral / Disagree
Attitude	I feel confident in my ability to prescribe antibiotics rationally during my clinical practice.	Agree / Neutral / Disagree
Practice	Do you check the likely cause, bacterial or viral, before using or suggesting antibiotics?	Yes / No / Sometimes
Practice	Have you ever used antibiotics without a doctor's prescription?	Yes / No / Sometimes
Practice	Do you always complete the full course of antibiotics when prescribed?	Yes / No / Sometimes
Practice	Have you ever advised someone to use leftover antibiotics for similar symptoms?	Yes / No / Sometimes
Practice	Do you refer to treatment guidelines or senior clinicians' advice before prescribing antibiotics during clinical postings?	Yes / No / Sometimes

REFERENCES

1. Kulkarni P, Kuruvilla A, Roy R, Ravi I. An evaluation of knowledge, attitude and practice of rational antibiotic usage and antimicrobial resistance among interns in a teaching tertiary care hospital: a cross-sectional questionnaire/based study. Indian J Pharm Pharmacol. 2017;4(4):192-7.
2. Akalu SD, Belavadi NG. Awareness of antibiotic usage and antimicrobial resistance among interns in a tertiary care hospital. Int J Basic Clin Pharmacol. 2017 Sep; 6:2159-62.
3. Patel P, Shah J, Nyati P, Tripathi S. A survey on knowledge and attitude of rational use of antibiotics on predesigned proforma among interns and 1st year postgraduate students. International Journal of Pharma Sciences and Research. 2016;7(8):350-6.