

Assessment of Knowledge and Practices regarding Antimicrobial Resistance among Nursing Students in a Teaching Hospital- A Cross-Sectional Study

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Abstract

Background: Antimicrobial resistance (AMR) is the ability of microorganisms to resist the action of antimicrobial agents, resulting in ineffective treatment and persistent infections. AMR is a major global public health issue caused mainly by the excessive and inappropriate use of antibiotics. Nursing students, as future healthcare providers, play an important role in antibiotic administration, patient education, and infection control. Assessing their knowledge, attitude, and practices on antibiotic usage and AMR is critical for identifying gaps and planning targeted educational interventions.

Objectives:

1. To assess the knowledge regarding antimicrobial resistance among nursing students.
2. To evaluate the practices of nursing students related to antibiotics use.

Methodology: A Cross-Sectional study was done among 190 nursing students of Government college of nursing, Government general hospital, Kakinada between Dec 25

to Jan 26, simple random sampling technique was used and data was collected using a semi-structured questionnaire adapted from previously published studies on antimicrobial resistance and analysed using Spss version 26. Prior approval was taken from Institutional Ethics Committee.

Results: A 23.6% of students had adequate knowledge regarding antimicrobial resistance. Inappropriate practices such as self-medication (57%), incomplete antibiotic courses (52%), and storage of leftover antibiotics (51%) was found among more than half of the study participants (53%)

Conclusion: knowledge and practices regarding antimicrobial resistance was inadequate among nursing students. Periodic training has to be ensured about appropriate use of antibiotics and antimicrobial resistance.

Keywords: Antimicrobial Resistance, Knowledge, Attitude, Practices, Nursing Students.

Introduction

Antimicrobial resistance (AMR) is one of the most serious public health challenges of the twenty-first century, threatening the effective prevention and treatment of infectious diseases worldwide. It occurs when microorganisms such as bacteria, viruses, fungi, and parasites develop the ability to resist antimicrobial agents, resulting in treatment failure, prolonged illness, increased healthcare costs, and higher mortality.¹ The World Health Organisation (WHO) has identified AMR as one of the top ten global public health threats, with an estimated 1.27 million deaths directly attributable and nearly 4.95 million deaths associated with bacterial AMR in 2019 alone.^{2,3}

Although resistance is a natural evolutionary phenomenon, its rapid emergence has been largely driven by irrational antibiotic use, including inappropriate prescribing, self-medication, poor adherence to treatment, over-the-counter availability of antibiotics, and inadequate infection prevention and control practices.^{4,5} India, being one of the largest consumers of antibiotics and bearing a substantial burden of infectious diseases, faces a significant challenge in combating AMR. To address this growing threat, the Government of India launched the National Action Plan on Antimicrobial Resistance (NAP-AMR) aligned with the WHO Global Action Plan, while agencies such as the Indian Council of Medical Research (ICMR) and the National Centre for Disease Control (NCDC) continue to strengthen antimicrobial stewardship and surveillance initiatives across the country.^{6,7,8}

Nurses play a pivotal role in antimicrobial stewardship through appropriate antibiotic administration, patient education, infection prevention, and promotion of rational antimicrobial use, making nursing students an important target group for AMR education before they

enter professional practice.⁹ However, studies conducted globally and in India have consistently reported deficiencies in knowledge and inappropriate antibiotic-related practices among healthcare students, including misconceptions regarding antibiotic use for viral infections, self-medication, premature discontinuation of antibiotic therapy, and improper storage of leftover antibiotics.¹⁰⁻¹⁴ Although awareness regarding AMR is improving, evidence from nursing students, particularly from eastern Andhra Pradesh, remains limited. Assessing their knowledge, attitudes, and practices is essential for identifying educational gaps, strengthening undergraduate curricula, and developing effective antimicrobial stewardship interventions. Therefore, the present study was undertaken to assess the knowledge, attitude, and practices regarding antimicrobial resistance among nursing students in a tertiary care teaching hospital in Kakinada.

Objectives:

1. To assess the knowledge regarding antimicrobial resistance among nursing students.
2. To evaluate the practices of nursing students related to antibiotics use.

Results

The mean age of our study population was 20.2 $\pm$ 1.45 years. The majority of them, 93%, are Hindus, and 7% are Christians.

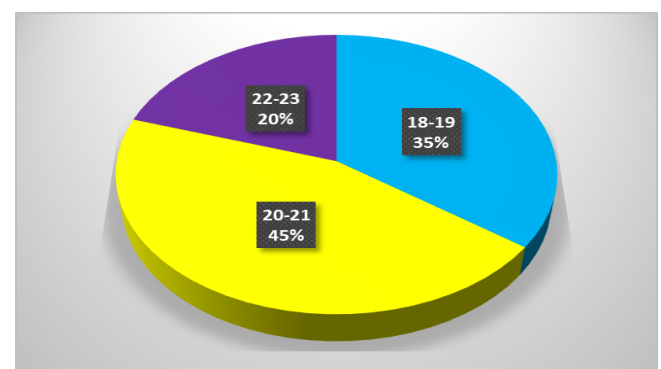


Figure 1: Distribution of participants according to age (N=200)

Figure 1 shows the distribution of participants according to their age, 45% belonged to 20-21 age group, 35% belonged to 18-19 age group and 20% belonged to 22-23%

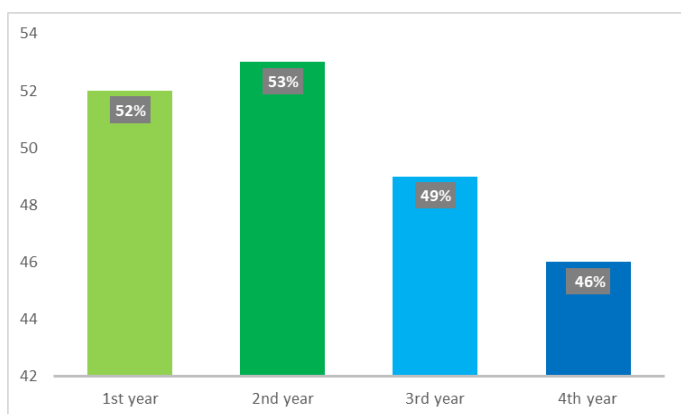


Figure 2: Distribution of participants according to educational status (N=200)

Figure 2 shows the distribution of participants according to their educational status, where a large number, 53%, were in the 2nd year, 52% in 1st year, 49% in 3rd year and 46% in 4th year

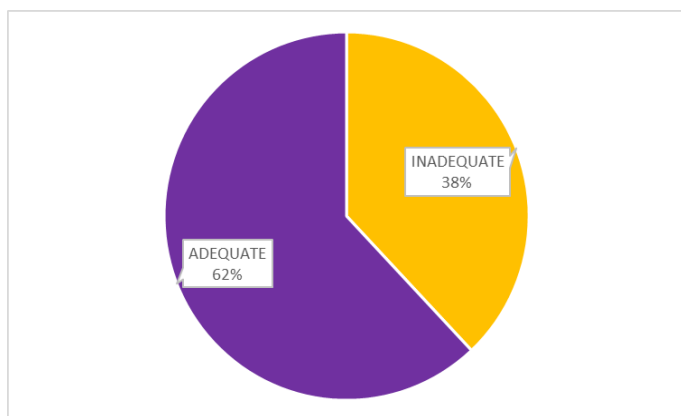
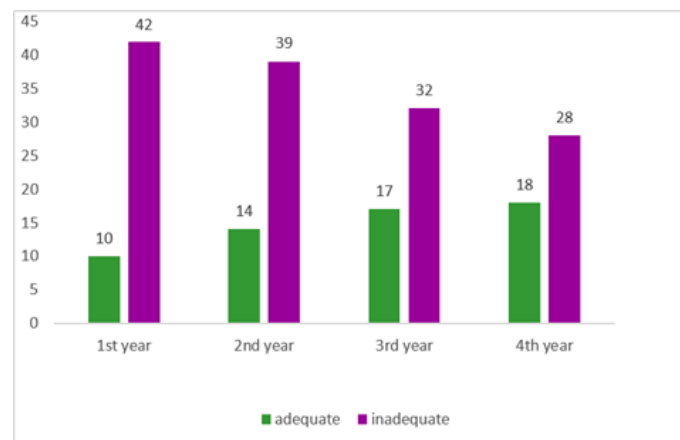


Figure 3: Distribution of study participants based on knowledge levels

Table 1: Antibiotic Use Practices Among Nursing Students (N=200)

Practice	Yes n (%)	No n (%)
Self-medication with antibiotics	114 (57)	86 (43)
Incomplete antibiotic course	104 (52)	96 (48)
Storage of leftover antibiotics	102 (51)	98 (49)

Figure 3 shows the distribution of participants based on knowledge levels; a majority of 62% had adequate knowledge and 38% had inadequate knowledge



$$\chi^2 = 17.5$$

$$p = 0.0006$$

Figure 4: Year of study VS knowledge level

Figure 4 shows the relationship of the study participants' knowledge levels across their respective years of study. The analysis revealed a highly statistically significant association between the year of study and knowledge level ($p = 0.0006$)

Table 1 shows the antibiotic use practices among a sample of nursing students (N=200). Showing inappropriate antibiotic behaviours, with a majority of

respondents engaging in sub-optimal practices, self-medication (57%), incomplete courses (52%), and storage of leftovers (51%)

Table 2: Knowledge vs. Antibiotic Use Practices

Knowledge Level	Appropriate Practice	Inappropriate Practice	Total
Adequate knowledge	74	50	124
Inadequate knowledge	22	54	76
Total	96	125	200

Chi-square (χ^2) = 26.8

p-value < 0.001

Table 2 shows the association between the participants' knowledge levels and their antibiotic use practices (N=200), with a highly statistically significant

association between knowledge level and antibiotic practices ($p < 0.001$), indicating that a participant's practice behaviour is strongly dependent on their underlying knowledge.

Discussion

Author	Year	Study population	Adequate knowledge
Preset study	2026	Nursing students, Andhra Pradesh	62%
Kotwani A et al.	2019	Healthcare students, India	55%
Dyar OJ et al.	2018	Healthcare students, Europe	50%
Varshney et al.	2024	Medical students	34.8%
Bharti et al.	2020	MBBS, BDS & Nursing students	81%
Sahu et al.	2021	Nurses	61.9%

In the present study, the majority of participants belonged to the 20–21 years age group (45%), followed by 18–19 years (35%) and 22–23 years (20%), reflecting the typical age distribution of undergraduate nursing students. Students from all four academic years were almost equally represented, thereby providing a balanced assessment across different stages of nursing education. The inclusion of participants from each year of study enhances the representativeness of the findings and allows better evaluation of knowledge and practices throughout undergraduate training. It showed that 62% of

participants had adequate knowledge regarding antimicrobial resistance, which is similar to that reported among nurses by Sahu et al.,¹⁸ who observed a knowledge score of 61.9%, suggesting that awareness regarding AMR among nursing professionals and students is moderate. This proportion is comparatively higher than that reported by Kotwani et al.,¹³ who observed adequate knowledge among 55% of healthcare students in India, and Dyar et al., who reported 50% adequate knowledge among healthcare students across Europe. The relatively better knowledge observed in the

present study may be attributed to increasing awareness regarding antimicrobial stewardship, greater emphasis on AMR in undergraduate nursing education, and widespread access to reliable health information through digital learning platforms following the COVID-19 pandemic. However, our findings were lower than those of Bharti et al.¹⁶ who reported that more than 81% of MBBS, BDS, and nursing students had adequate knowledge regarding antimicrobial resistance. The higher knowledge level in their study may be attributed to differences in study participants, curriculum exposure, and assessment methods.

Nevertheless, nearly two-fifths of the participants still demonstrated inadequate knowledge, indicating that important misconceptions regarding antibiotic use and resistance continue to exist and warrant further educational interventions. (Kotwani et al., 2019;¹³ Dyar et al.,¹⁴2018)

Despite the encouraging level of knowledge, inappropriate antibiotic-use practices were still common among the participants. More than half of the nursing students reported self-medication with antibiotics (57%), discontinuing antibiotics before completing the prescribed course (52%), and storing leftover antibiotics for future use (51%). Likewise, Bharti et al.¹⁶ reported that 49.3% of nursing students considered antibiotics as the first choice for treating sore throat and common cold, reflecting persistent misconceptions regarding antibiotic use. Varshney et al.¹⁵ also reported that although 90% of students correctly identified self-medication as a cause of antimicrobial resistance, inappropriate practices such as self-medication and retention of leftover antibiotics continued to occur. These observations indicate that knowledge alone does not necessarily translate into appropriate behaviour. These findings are concerning

because such practices are well-recognised contributors to the emergence and spread of antimicrobial resistance.

Conclusion

The present study demonstrated that nursing students possessed a moderately adequate level of knowledge (62%) and a positive attitude (65%) towards antimicrobial resistance (AMR). However, inappropriate antibiotic-use practices, including self-medication, incomplete antibiotic courses, and storage of leftover antibiotics, were prevalent among a substantial proportion of participants. A statistically significant association between knowledge and antibiotic-use practices indicated that students with better knowledge were more likely to adopt appropriate antibiotic-use behaviours. These findings highlight that although awareness regarding AMR is improving, important gaps remain between knowledge and practice. Strengthening undergraduate nursing education through structured antimicrobial stewardship training, practical skill-based learning, and continuous reinforcement of rational antibiotic use is essential to equip future nurses with the competencies required to combat the growing threat of antimicrobial resistance.

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