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Original Research Article

## Knowledge, attitude and practicing behavior regarding antimicrobial use and awareness of antimicrobial resistance among interns and postgraduates in a tertiary care hospital

Samreen Nishat<sup>1</sup>, Mohammed Abdul Muhaimin Ali<sup>2</sup>, Maleha Butul<sup>3</sup>,  
Samra Sameen<sup>1</sup>, Syeda Ayesha Siddiqua<sup>3\*</sup>

<sup>3</sup>Department of Pharmacology<sup>1</sup>Shadan Institute of Medical Sciences, Hyderabad, Telangana, India

<sup>2</sup>Osmania Medical College, Koti, Telangana, India

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**\*Correspondence:**

Syeda Ayesha Siddiqua,

Email: Syedayeshasiddiqua523@gmail.com

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### ABSTRACT

**Background:** Irrational use of antimicrobials and inaccurate practicing behavior leads to the issue of antibiotic resistance. This can be tackled by spreading awareness with the assistance of future medical practitioners. Hence, the present study was taken to determine the knowledge, attitude, and practicing behavior regarding antimicrobial use and awareness of antimicrobial resistance among interns and postgraduates.

**Methods:** The study was conducted on interns and postgraduates in a tertiary care hospital. A standardized questionnaire was distributed to 120 participants and Ethical approval was taken before the study. Data was analyzed using SPSS software. For data comparisons, Chi-square tests were used,  $p \leq 0.05$  is considered significant.

**Results:** The study showed a majority in the 25 to 34 years of age group with female predominance. The subject of antibiotic resistance was moderately relevant to a majority, which highlighted a need for an increase in awareness workshops. The actual knowledge of respondents seems to be accurate in the study, a fair amount of attitude and practicing behavior was observed as well. A significant difference between the interns and postgraduates in knowledge ( $\chi^2=13.736$ ,  $p=0.03$ ), attitude ( $\chi^2=68.091$ ,  $p=0.01$ ), and practice ( $\chi^2=34.821$ ,  $p=0.01$ ) were noticed.

**Conclusions:** Accurate knowledge and practicing behavior were observed in postgraduates and a fair attitude was observed in interns towards antimicrobial use and resistance. The awareness must be extended regarding this issue by conducting educational programs and by updating guidelines. Advancement in antibiotic prescribing pattern is required.

**Keywords:** Antimicrobial use, Antimicrobial awareness, Antimicrobial resistance, Knowledge, Attitude, Practicing behavior

### INTRODUCTION

Antimicrobial resistance is an emerging global and national issue, which has to be confronted to stop its further extension.<sup>1</sup> India is under the burden of antimicrobial resistance, which has been reflected from time to time through various hospitals' research data, due to irrational and improper antimicrobial use, causing an uprise in antimicrobial resistance.<sup>2</sup> It is important to

rationalize the use of antimicrobials to stop its resistance for the better control of diseases.<sup>3</sup> Antimicrobial drugs have been used efficaciously for the treatment and management of a wide range of diseases caused by microbes thereby declining the percentage of morbidity and mortality.<sup>4</sup> It is not the human body but due to inadequate treatment, the bacterium obtains competency to tolerate antibiotics and becomes resistant.<sup>5</sup> The medical scholars should be attentive to the existing issues

related to antimicrobial use and its resistance and as upcoming medical practitioners, they should be guided and provided with ample training in the prescribing and dispensing pattern of antimicrobials.<sup>6,7</sup> Knowledge, attitude and practicing behavior effects the conduct regarding the use of antimicrobials. Poor knowledge and irrelevant attitude<sup>8</sup> towards the prime use of antimicrobials is the major factor behind the increase in antimicrobial-resistant cases.<sup>9</sup> The implementation of an antibiotic management policy in India<sup>10</sup> is not firm in practice and needs to be implemented precisely. The current study is designed to provide knowledge, attitude and practicing behavior regarding antimicrobial use and awareness of antimicrobial resistance among interns and postgraduates.

## METHODS

This is a questionnaire-based cross-sectional study, conducted from May 2022 to July 2022 at Shadan Institute of Medical Sciences (SIMS), teaching hospital and research centre. The study comprised a total of 120 participants of either gender which included interns and postgraduates of the first, second, and third years, respectively. After obtaining consent from the participants, a questionnaire was administered, and was instructed to choose the responses accordingly as per their knowledge, attitude, and practicing behavior.

### Study design

The questionnaire was designed to outline the understanding of antimicrobial use and resistance involving knowledge, attitude, and practicing behavior, among interns and postgraduates. It included 17 questions under four sections, Section A-socio demographic characteristics of respondents, section B-Awareness of antimicrobial resistance, section C-Practicing behavior and section D-guidelines/sources of information, respectively. The marked responses were checked for accuracy and were arranged by using Microsoft office software.

### Statistical analysis

Data was analyzed using SPSS software. Data is depicted as frequency and percentages in tabulated and graphs form. For data comparisons Chi-square tests were used,  $p \leq 0.05$  was considered significant.

## RESULTS

The current study has 120 participants, questionnaires were distributed to either gender (male N=46, 38.3% & female N=74, 61.7%) and the recorded responses were analyzed. The majority of the participants belonged to the age group of 25-34years (N=69, 57.5%) and female predominance was noticed (N=74, 61.7%). Out of 120 participants, interns were in majority (N=65, 54.2%) than postgraduates (N=55, 45.8%) (Table 1).

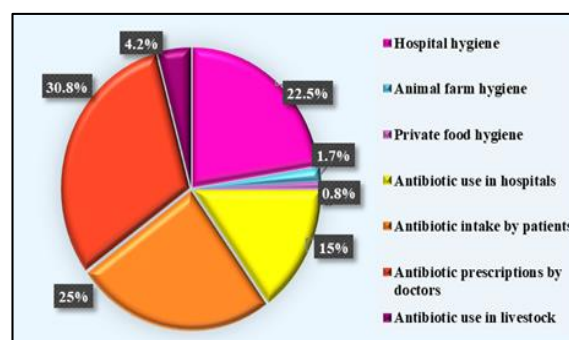
**Table 1: Sociodemographic characteristics of respondents (n=120).**

Variables	N	%
<b>Age (years)</b>		
18 to 24	43	35.8
25 to 34	69	57.5
35 to 44	05	4.2
45 to 55	03	2.5
<b>Gender</b>		
Male	46	38.3
Female	74	61.7
<b>Profession</b>		
Interns	65	54.2
Postgraduates	55	45.8

**Table 2: Awareness of anti-microbial resistance (n=120).**

Variables	N	%
<b>How much is the subject of antibiotic resistance is relevant to you in your daily work?</b>		
Highly	24	20
Moderately	57	47.5
Sparsely	32	26.7
Not at all	07	5.8
<b>How often do you have contact to patients with multidrug resistant infection during your daily routine?</b>		
Daily	13	10.8
Weekly	33	27.5
Monthly	43	35.8
Rarer	29	24.2
Never	02	1.7

Awareness of anti-microbial resistance, where most of the respondents said, (N=57, 47.5%), the subject of antibiotic resistance is moderately relevant to them (Table 2). A high percentage responded that they may have monthly contact with patients having multidrug-resistant infections, (N=43, 35.8%). Awareness of anti-microbial resistance is depicted in (Figure 1), where a majority percentage agreed that the awareness can be spread by the means of, antibiotic prescription by doctors (30.8%).



**Figure 1: Awareness of anti-microbial resistance.**

**Table 3: Actual knowledge of respondents.**

Key knowledge questions	Correct answer	Respondents' answer (N)	Respondents' answer (%)
<b>Antibiotic resistance occurs when your body becomes resistant to antibiotics, and they don't longer work</b>	False	False-89	17.4
		True-31	82.6
<b>Many infections are becoming increasingly resistant to treatment by antibiotics</b>	True	True-119	99.2
		False-01	0.8
<b>If bacteria are resistant to antibiotics, it is difficult to treat the infections.</b>	True	True-110	91.7
		False-10	8.3
<b>Prescription of antibiotics with overly broad-spectrum coverage can precipitate Antibiotic resistance</b>	True	True-118	98.3
		False-02	1.7
<b>Antibiotic resistance is an problem in other countries</b>	False	False-117	97.5
		True-03	2.5
<b>Antibiotic resistance is only an issue for people who take them frequently</b>	False	False-91	75.8
		True-29	24.2
<b>Bacteria resistant to antibiotics can be spread from one person to another</b>	True	True-113	94.2
		False-07	5.8
<b>Antibiotic resistant infections could make medical procedures much more dangerous</b>	True	True-117	97.5
		False-03	2.5

The actual knowledge of respondents is shown in (Table 3), maximum correct responses were noticed for the statement, "many infections are becoming increasingly resistant to treatment by antibiotics", (N=119, 99.2%), followed by the statement, "prescription of antibiotics with overly broad-spectrum coverage can precipitate Antibiotic resistance", (N=118, 98.3%), while the minimum percentage of the correct responses, was for the statement, "antibiotic resistance occurs when your body becomes resistant to antibiotics, and they don't longer work," (N=89, 17.4%). Addressing the problem of antibiotic resistance, where a majority of the participants agreed that healthcare workers should wash their hands regularly (N=68, 56.7%) and prescribers should only prescribe antibiotics when they are needed (N=62, 51.7%) (Table 4).

**Table 4: Addressing the problem of antibiotic resistance (N=120).**

Parameters	N	%
<b>Healthcare workers should wash their hands regularly</b>		
Agree strongly	45	37.5
Agree	68	56.7
Neither agree nor disagree	03	2.5
Disagree	03	2.5
Disagree strongly	01	0.8
<b>Prescribers should only prescribe antibiotics when they are needed.</b>		
Agree strongly	54	45
Agree	62	51.7
Neither agree nor disagree	02	1.7
Disagree	01	0.8
Disagree strongly	01	0.8

The practicing behavior, where a majority of the respondents agreed that there is an influence of prescribing behavior on the development of antibiotic resistance (N=90, 75%) is shown in (Table 5).

**Table 5: Practicing behavior (n=120).**

Parameters	N	%
<b>Influence of prescribing behavior on the development of antibiotic resistance within region</b>		
Yes	90	75
No	27	22.5
Do not know	03	2.5
<b>Barriers to discussing antimicrobial resistance with patients while prescribing</b>		
Lack of time	36	30
Lack of patient's interest	43	35.8
Concern that it will unsettle the patient	24	20
Limited knowledge about the subject	17	14.2

A high number of participants said that lack of patient interest is a barrier to discuss antimicrobial resistance while prescribing, (N=43, 35.8%). Skin or wound infection is an indication for an antibiotic prescription for a majority percentage of the participants, (99.2%) (Figure 2). Guidelines/sources of information, where the majority of participants said, they moderately read standard treatment guidelines for antibiotic therapy before prescribing (N=42, 35%) is depicted in (Table 6).

A high number of participants wanted to have more evidence-based therapy guidelines (n=73, 60.8%). A majority percentage of the participants seem to have information from internet forums as their sources to get current information on antibiotic therapy and resistance (17%) (Figure 3).

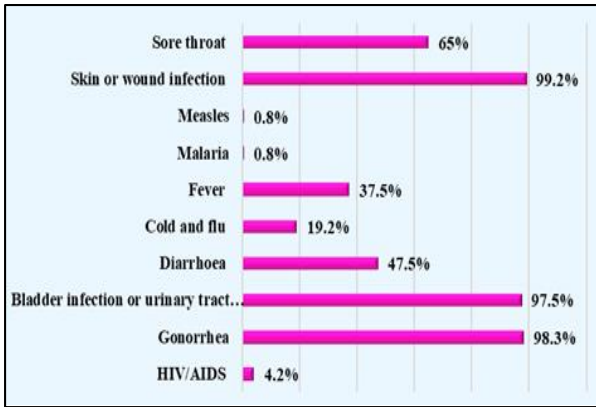


Figure 2: Indications for an antibiotic prescription.

Table 6: Guidelines/sources of information (n=120).

Parameters	N	%
<b>Do you read standard treatment guidelines for antibiotic therapy before prescribing?</b>		
Frequently	38	31.7
Moderately	42	35
Rarely or never	24	20
There are no good guidelines	16	13.3
<b>Would you like to have more evidence-based therapy guidelines?</b>		
Yes	73	60.8
No	19	15.8
Do not know	28	23.4

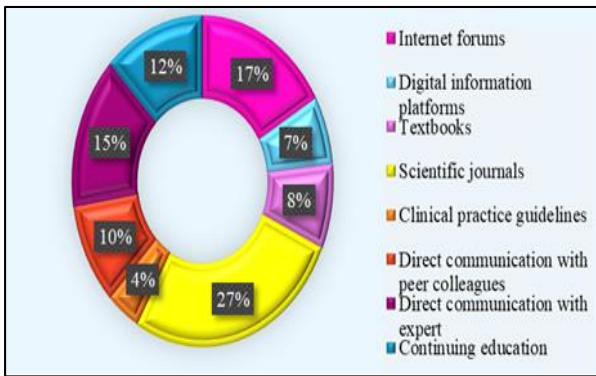


Figure 3: Sources to get current information on antibiotic therapy and resistance.

**Relationship between interns and postgraduates about attitude on antibiotic resistance**

The statistical value of Chi-square test was 68.091 with a p value of 0.01. It shows a significant difference in attitude regarding antibiotic resistance among postgraduates and interns. The attitude of interns about antibiotic resistance was better when compared to postgraduates (Table 7).

**Relationship between interns and postgraduates about practice of antibiotic resistance**

The Chi-square test value was 34.821 with a p value of 0.01. There was an observation of significant difference in practicing behavior among postgraduates and interns. The postgraduates were far better than the interns (Table 7).

**DISCUSSION**

The main objective of this current study is to evaluate the knowledge, attitude, and practicing behavior among interns and postgraduates by generating distinct data on antimicrobial use and awareness and also about its resistance, trying to encourage rational use of antimicrobials, and also reinforcing antibiotic management control guidelines.<sup>11</sup>

Adequate training for future medical practitioners on antimicrobial resistance has been suggested by the world health organization (WHO).<sup>12</sup> Programs like, ‘antibiotic stewardship’, which measures and improves the prescribing pattern of antibiotics by clinicians, and its sensible use by patients should be encouraged.<sup>13</sup> In our study, participants belonging to the 25 to 34 years of age group were found to be in majority (N=69, 57.5%), along with female predominance (N=74, 61.7%). This is similar to a cross-sectional survey study done in Saudi Arabia where a majority of the participants were from a similar age group (N=176, 39.7%) and females were in majority,<sup>14</sup> (N=309, 69.8%).

Antibiotic usage and its resistance require a superior consideration. In this study, the subject of antibiotic resistance is moderately relevant to the participants (N=57, 47.5%), which indicates a need for high awareness about this topic. The majority responded that they may have monthly contact with patients having multidrug-resistant infections (N=43, 35.8%).<sup>15,16</sup> Numerous studies have confirmed that awareness about antimicrobial use and resistance among medical students must be encouraged and the management of multidrug-resistant infection in healthcare settings should be addressed well.<sup>17</sup> High percentage (30.8%) of participants agreed that the awareness can be spread by the means of, antibiotic prescription by doctors, which is in agreement with a study done in south India, where the prominence of antimicrobial prescribing by educational institutions is addressed.<sup>18</sup> The actual knowledge of respondents seems to be accurate in the study, as a majority marked, “Many infections are becoming increasingly resistant to treatment by antibiotics,” (N=119, 99.2%), which is in similarity to the global impact estimation done in 2019, by university of Oxford, where 1.2 million people died directly due to antibiotic-resistant infections.<sup>19</sup>

**Table 7: Knowledge, attitude and practicing behaviour of interns and postgraduates on scale of good, fair and poor.**

Variables	Interns (N=65)			Postgraduates (N=55)			Chi-square value	P value
	Good	Fair	Poor	Good	Fair	Poor		
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)		
<b>Knowledge</b>	10 (15.4)	12 (18.5)	43 (66.1)	46 (83.6)	4 (7.3)	5 (9.1)	13.736	0.03
<b>Attitude</b>	41 (63.1)	15 (23.1)	09 (13.8)	08 (14.5)	10 (18.2)	37 (67.3)	68.091	0.01
<b>Practicing behaviour</b>	13 (20)	17 (26.2)	35 (53.8)	40 (72.7)	10 (18.2)	05 (9.1)	34.821	0.01

Regarding addressing the problem of antibiotic resistance, the majority of the participants agreed that healthcare workers should wash their hands regularly (N=68, 56.7%), which is in agreement with the study done on hand hygiene in 2011, where they proposed to make Hand washing as educational priority.<sup>20</sup> Most of the participants said, prescribers should only prescribe antibiotics when they are needed (N=62, 51.7%).<sup>21</sup> Participants in a majority said, there is an influence of prescribing behavior on the development of antibiotic resistance within the region,<sup>22</sup> (N=90, 75%). According to most of the participants (N=43, 35.8%), lack of patient interest is a barrier in discussing antimicrobial resistance while prescribing.<sup>23</sup> For the majority percentage (99.2%), Skin or wound infection is an indication for an antibiotic prescription.<sup>24</sup> In this study majority, (N=73, 60.8%), would like to have more evidence-based therapy guidelines for antibiotic therapy, and internet forums (17%) seem to be a major information source on antibiotic therapy and resistance.<sup>25,26</sup>

## CONCLUSION

Our study concludes that the actual knowledge of the medical students seems to be accurate, regarding antimicrobial use and resistance. More awareness can be raised by conducting various educational programs and workshops. The study also displayed medical students had a fair attitude towards this issue but the barriers to discussing antimicrobial resistance with patients while prescribing, i.e., lack of patient interest must be addressed sensibly. In our study, medical students were fully aware of the influence of prescribing behavior on the development of antibiotic resistance and most of them would like to have more evidence-based therapy guidelines for antibiotic therapy. Developments in the antibiotic prescribing pattern must be done by updating the standard treatment guidelines by authorities.

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