

## Research Article

**Perception on Antibiotic Usage and Resistance Among Interns of a Medical College in Urban Puducherry**M. Arthi <sup>1</sup>, S. Madhumadhi <sup>2</sup>, Surendar Rangasamy <sup>3</sup>, S. Karrunya <sup>4</sup><sup>1</sup> Community Medicine, Sri Venkateshwaraa Medical College Hospital & Research Centre, Puducherry<sup>2</sup> Community Medicine, Sri Venkateshwaraa Medical College Hospital & Research Centre, Puducherry<sup>3</sup> Community Medicine, Sri Venkateshwaraa Medical College Hospital & Research Centre, Puducherry<sup>4</sup> Community Medicine, Sri Venkateshwaraa Medical College Hospital & Research Centre, Puducherry

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Corresponding Author: *M. Arthi*. Email: drarthisakthi@gmail.com**ABSTRACT**

**Background:** Medical Doctors must play a pivotal role to control and prevent the misuse of antibiotics. Many prescribers are lacking behind in updates and advancement of antibiotic usage. To address such knowledge gap, this study was conducted to assess the perception on antibiotic usage and its resistance among interns of a Medical College in Urban Puducherry.

**Methods:** This study was a Web-based cross-sectional survey conducted between the period of December 2019 - February 2020 (3 months) among interns. A semi-structured Questionnaire was mailed to them through Google forms and data was collected.

**Results:** Out of 103 participants, 25.2% had received training on antibiotic usage during internship period with the mean duration of training for 5±2 hours. Only 21.4% of the total participants reported that they were aware of the guidelines for antibiotic usage followed in their hospital. Majority of them (88.3%) documented that there is a gap between theoretical and clinical approach in antibiotic prescribing pattern and 80% of the total participants have an opinion that there is an irrational usage of antibiotics in India. About 59.2% of the participants are confident in choosing the correct antibiotic. About 43.7% participants reported that usage of too many broad-spectrum antibiotics (3-4 antibiotics) is an important contributor of resistance. Interns who had attended multiple posting were more confident than who had attended single posting which showed a statistically significant result ( $p < 0.05$ ).

**Conclusion:** The current perception on usage of appropriate antibiotics was not adequate among the participants. Hence, consistent education and antibiotic stewardship programs are needed. Also, inculcating the guidelines on antibiotic usage and its resistance in the undergraduate curriculum will strengthen their prescription pattern.

**Keywords:** Interns, Antibiotic usage, prescribing, resistance.

**1. INTRODUCTION**

Antibiotics are the most commonly prescribed drugs globally. The development and usage of antibiotics has successfully overcome the threat of infectious diseases, leading to a global increase in the average life expectancy and quality of life [1]. However, antibiotics have often been prescribed irrationally in many cases, contributing to significant problems [2]. This has resulted in bacterial resistance, treatment failures and hence additional costs to therapy [3].

Antimicrobial resistance (AMR) is a worldwide problem preferentially affecting low- and middle-

income countries [4]. WHO defines AMR as “The change in a microorganism that causes it to become resistant to an antimicrobial drug that was previously effective against it” [1]. The probable reasons for antibiotic abuse are prescription of antibiotics by healthcare professionals for all types of fever, lack of microbiological labs, patients’ reluctance for investigations, patients’ expectation for an antibiotic prescription and also public’s lack of knowledge about the side effects of over-the-counter usage of antibiotics [5].

Around 70 to 80% of antibiotic prescriptions are unnecessarily done by Health care professionals.

Imprudent uses of these drugs have resulted in antimicrobial resistance, which is now emerging as one of the major threats to health care globally [6]. Hence, the containment of this problem requires change in the behavior of practitioners and health workers. In the hospitals, the change in behavior of medical students and interns is extremely vital as they will be the future health-care provider in our society. Thus, young doctors should be given more education during their undergraduate and internship training regarding antibiotic resistance and their appropriate usage. The interventions which should be undertaken to prevent and control antimicrobial resistance should aim on behavioral changes in the target group [7-11]. A better understanding of what the students' knowledge and perception about the issues of antimicrobial use and resistance can assist in planning an effective educational intervention for them. Thus, this study was aimed to assess the perception on antibiotic usage and resistance among interns of a medical college in urban Puducherry.

## 2. METHODOLOGY

A web-based cross-sectional survey was conducted between December 2019 – February 2020 over a period of 3 months. Based on Convenience Sampling method, all the interns were selected for the study. Totally 125 interns were selected. A Pre-tested semi-structured Questionnaire was framed and sent to 6 subject experts (4 from Community Medicine Department and 2 from Microbiology Department) for content validity. Based on their suggestions, the questionnaire was re-framed accordingly. After obtaining approval from Scientific Research Committee and Institutional Ethical Committee, the questionnaire was sent via Google forms to their E-mail addresses. A detailed information about the objective and implication of the study was included in the initial part of the Google form. Subjects had the choice to participate or withdraw from the study which was voluntary. Those who had read and consented to participate were proceeded to the next step. The closed-ended questionnaire comprises of 5 sections; which includes socio-demographic details, second section evaluated

their attitude on antibiotic usage, third section assessed their levels of confidence in prescribing antibiotics, fourth and fifth sections assessed their perception and views on contributors to antibiotic resistance. Out of 125 participants, 103 responded. The data were analysed using SPSS version 23. Descriptive statistical analysis was used to generate frequencies, percentage and proportions. Independent t test was done to find the significant difference between level of confidence and posting completion status.

## 3. RESULTS

Totally 103 interns responded to the survey. The mean age of the participants was 23±2 years. Majority of them (64.1%) were in the age group of 22-24 years with Male: Female ratio of 47:56. Above half of them (52.4%) had completed their postings in more than 3 departments and rest (47.6%) had newly joined internship. About three-fourths of the participants (74.8%) had received training on antibiotic usage during internship period. The mean duration of antibiotic usage training was 5±2 hours. Only 22% of them reported that they were aware of the guidelines for antibiotic usage followed in their hospital; and only 5% of them have got a copy of the guidelines. About 40% of the participants reported that they have the habit of referring the guidelines before prescribing an antibiotic to the patients (Figure 1).

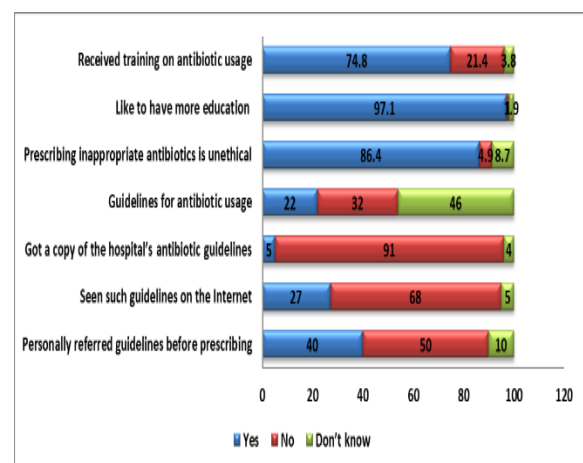


Figure 1: Intern's attitude on Antibiotic Usage

**Table 1: Levels of confidence of interns in prescribing antibiotics (n=103)**

| Areas of confidence in prescribing antibiotics                 | Very confident (%) | Confident (%) | Not confident (%) |
|--|--------------------|---------------|-------------------|
| Making an accurate diagnosis of infection/sepsis               | 03(2.9)            | 80(77.7)      | 20(19.4)          |
| Deciding antibiotic use depending on severity criteria         | 01(1)              | 59(57.3)      | 43(41.7)          |
| Choosing the correct antibiotic                                | 3(2.9)             | 61(59.2)      | 39(37.9)          |
| Choosing correct dosage and interval of administration         | 10(9.7)            | 39(37.9)      | 54(52.4)          |
| Using a combination therapy if appropriate                     | 02(1.9)            | 38(36.9)      | 63(61.2)          |
| Choosing the correct route of administration (local, oral, IV) | 10(9.7)            | 66(64.1)      | 27(26.2)          |
| Interpreting microbiological results                           | 16(15.5)           | 76(73.8)      | 11(10.7)          |
| Plan or stop antibiotic based on clinical diagnosis            | 04(3.9)            | 73(70.9)      | 26(25.2)          |
| Plan duration of antibiotic based on clinical diagnosis        | 04(3.9)            | 51(49.5)      | 48(46.6)          |

Regarding the level of confidence in prescribing antibiotics, about three-fourths (77.7%) of participants were confident in making an accurate diagnosis of infection/sepsis. Around 59.2% of them were confident in choosing the correct antibiotic based on infection.

**Table 2: Perception of interns regarding contributors to resistance (n=103)**

| Contributors to resistance  | Very important (%) | Moderately important (%) | Unimportant (%) | Don't know (%) |
|---|--------------------|--------------------------|-----------------|----------------|
| Too many antibiotic prescriptions                                       | 56(54.4)           | 27(26.2)                 | 13(12.6)        | 07(6.8)        |
| Too many broad-spectrum antibiotics used                                | 45(43.7)           | 38(36.9)                 | 16(15.5)        | 04(3.9)        |
| Long durations of antibiotic treatment                                  | 29(28.2)           | 37(35.9)                 | 23(22.3)        | 14(13.6)       |
| Dosing of antibiotics are too low                                       | 22(21.4)           | 40(38.8)                 | 24(23.3)        | 17(16.5)       |
| Excessive use of antibiotics in livestock                               | 30(29.1)           | 36(35)                   | 24(23.3)        | 13(12.6)       |
| Poor hand hygiene   | 52(50)             | 41(40)                   | 05(5)           | 05(5)          |
| Not removing the focus of infection                                     | 58(56.3)           | 28(27.2)                 | 02(1.9)         | 15(14.6)       |
| Paying too much attention to pharmaceutical representatives/advertising | 20(19.4)           | 48(46.6)                 | 23(22.3)        | 12(11.7)       |

Only 2% were very confident in using an appropriate combination therapy. Around 26.2% responded that they were not confident in choosing the appropriate route of administration of antibiotics (local, oral, IV). Based on the clinical evaluation, investigation and diagnosis, only 3.9% were very confident in planning or to stop the antibiotic treatment & its duration (Table 1).

Above half of the participants (54.4%) reported that prescribing too many antibiotics (3-4 antibiotics) for a patient is a very important contributor of antibiotic resistance. Around 35.9% think that long duration of antibiotic treatment moderately contributes to resistance and 35% thought that excessive use of antibiotics in livestock is also one of the very important contributors to resistance. Half of them responded that poor hand hygiene in an important contributor of resistance. Paying too much attention to pharmaceutical representatives/advertising was also reported as a very important contributor to resistance by 19.4% of participants (Table 2).

**Table 3: View of interns on antibiotics resistance (n=103)**

| Perception on antibiotics resistance  | Yes (%)  | No (%)   | Don't know (%) |
|---|----------|----------|----------------|
| Gap between theoretical and clinical approach in antibiotic prescription  | 91(88.3) | 5(4.9)   | 7(6.8)         |
| All antibiotic resistance is attributed to hospital community   | 20(19.4) | 62(60.2) | 21(20.4)       |
| Irrational antibiotic usage is existed in India   | 82(80)   | 3(3)     | 18(17)         |
| Antibiotic resistance is a national problem   | 90(87.4) | 6(5.8)   | 7(6.8)         |
| Do you think that antibiotic resistance existed in your hospital?   | 15(14.6) | 65(63.1) | 23(22.3)       |
| Have you ever felt that antibiotics prescribed by you as a doctor would "likely" contribute to the problem of resistance? | 71(68.9) | 8(7.8)   | 24(23.3)       |

Majority of them (88.3%) reported that there is a gap between theoretical and clinical approach in antibiotic prescription pattern. Most of them (80%) had an opinion that there is an irrational

usage of antibiotic in India with inappropriate route of administration; which in turn would be a greater problem in the future (Table 3).

**Table 4: Comparison of level of confidence in prescribing antibiotics between the interns who had completed multiple postings and among the newly joined interns**

| Postings completed                 | Level of confidence |      | p-value |
|------------------------------------|---------------------|------|---------|
|                                    | Mean                | SD   |         |
| Multiple (more than 3 departments) | 34.11               | 9.93 | 0.0078  |
| Newly joined                       | 19.89               | 9.93 |         |

While comparing the level of confidence between the interns who had newly joined internship and those who have completed multiple postings had shown that there was statistically significant difference in level of confidence ( $p < 0.05$ ), interns attended multiple posting were more confident compared to those who had joined newly (Table 5).

#### 4. DISCUSSION

The present study was conducted to assess the perception on antibiotic usage and its resistance among interns of a Medical college in Urban Puducherry. Majority of the participants (64.1%) were in the age group of 22-24 years with a mean age of  $23 \pm 2$  years and a Male: Female ratio of 47:56. Similarly, other studies from India also reported similar age group and gender [12, 14, 17, 18].

Internship is the training period where interns start to prescribe medicines for patients. Prescription pattern varies amongst various Departments depending on the type of patients reported, in this present study above half of them (52.4%) had completed their postings in more than 3 departments and rest (47.6%) had newly joined internship and 25.2% of the participants had received training on antibiotic resistance for a mean duration of  $5 \pm 2$  hours. Around similar results were observed in the study by Kulkarni *et al.* [17]. where 42% had completed at least one of the major clinical postings in the departments of Medicine, Surgery, Obstetrics and Gynaecology.

In the current study only 22% participants reported to be aware of the antibiotic usage guidelines followed in their hospital and about

40% have the habit of referring the guidelines before prescribing an antibiotic for patients. Whereas in a study done by Musallam *et al.* [13] respondents were either not following guidelines or they are unsure about them.

Regarding the level of confidence in prescribing antibiotics, 59.2% of the present study participants responded that they were confident in choosing the correct antibiotic based on infection. Whereas only 3.9% were very confident in planning or to stop the antibiotic treatment and its duration based on the clinical evaluation, investigation and diagnosis. While contrasting findings was observed in studies by Musallam *et al.* [13] and Chandan *et al.* [14] where the confidence level reported were 35 – 66 % and 75% respectively. In a study by Hoque *et al.* [16] 46% of the respondents felt least confident in using a combination therapy and almost 90% of participants were confident in choosing the correct dose and interval of drug administration and 84% in planning the duration of the antibiotic treatment. This discrepancy in their awareness and confidence levels can be attributed to the varying internship training programs in each hospital and also due to the antibiotic training received.

When comparing the level of confidence between the interns who had newly joined internship and those who have completed multiple postings shown that there was statistically significant difference in level of confidence among the interns who had attended multiple postings ( $p < 0.05$ ). Similar findings were reported by Kulkarni *et al.* [17] This could be due to better experience and exposure in prescribing pattern of interns from various departments.

Probing in the reasons for antibiotic resistance among the current study participants the responses reported were prescribing too many antibiotics (54.4%), long duration of antibiotic treatment (35.9%), poor hand hygiene (50%), paying too much attention to pharmaceutical representatives/advertising (19.4%) and excessive use of antibiotics in livestock (35%) as the contributors of developing antibiotic resistance. Similar findings were reported in the study by Musallam *et al.* [13] and Hoque *et al.*

[16] But 21% participants in the study by Kulkarni *et al.* [17] reported that combination of antibiotics could prevent development of resistance. Lomi *et al.* [12] reported that 82.14% of the participants reported that indiscriminate use of antibiotic leads to emergence of antibiotic resistance, whereas 34.94% participants believed that poor hand hygiene has no relation to development of resistance.

Majority of the participants in present study (88.3%) reported that there is a gap between theoretical and clinical approach in antibiotic prescription pattern and 80% had an opinion that there is an irrational antibiotic usage in India, accompanied with inappropriate route of administration this would be a greater problem in the future. Similar findings of antibiotic resistance as global and nationwide problem were reported by Khan *et al.* [15]

## 5. CONCLUSION

In the current study, perception on usage of appropriate antibiotics was not adequate among the newly joined interns. This can be rectified by educational and antibiotic stewardship programs. Improvement in the internship curriculum requires multi-modal approach with inclusion of tailored educational and training interventions like case-based scenarios, group discussions, workshops, continued medical education programmes, sensitization programmes and seminars, in addition active involvement of the clinicians with regular up gradation of their knowledge would aid in ensuring rational use of antibiotics and thus control the growing problem of antibiotic resistance along with more effective training of the future prescribers. However, more emphasis could be added on antibiotic usage and its resistance to their undergraduate curriculum.

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