

# Practical Knowledge and Perception about Antibiotic Usage and Resistance: A Questionnaire-based Study

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## Abstract

**Introduction:** Nowadays antibiotic resistance is an important global issue of health-care problem which needs urgent attention. Indiscriminate use of antibiotics unnecessarily probably the foremost cause of this problem. Awareness of this fact among under graduate MBBS students and Nursing trainee students who become the health-care provider of future generation is extremely important.

**Materials and Methods:** A format of questionnaire which covers the different aspects of knowledge about proper antibiotic usage was distributed among all students and to assess their knowledge, attitude, and practices regarding antibiotic use and resistance by a five-point Likert scale.

**Results:** Among total 352 participants, 96% of medical students and 82% of nursing students considered that antibiotic resistance is a global issue whereas 96% of medical students and 73% of nursing students agreed with the matter that in India it is also a serious issue. This study also observe the various false practices and belief which include tendency to take a large dose of antibiotics for quicker action, have tendency to skipping of drugs after become well without taking full course of medicines, indiscriminate and injudicious use of antibiotics, that also complicated the scenario. As per their suggestion, measures should be taken to reduce the antibiotic resistance are institutional specific guideline and conduct frequent educational programs, easy access to local and this antibiogram, require regular antibiotic surveillance programs.

**Conclusion:** This study revealed many important clues regarding some improper knowledge, attitude, perception and practices regarding antibiotic resistance and usage among the future doctors, and nurses. The results can be considered, to plan for an effective undergraduate curriculum. The medical education strategies should aim, not only to increase the knowledge but also to change behavior and practices among medical students.

**Key words:** Antibiotic resistance, Indiscriminate antibiotic use, Knowledge questions

## INTRODUCTION

Antibiotics are not only commonly used but also indiscriminately practiced in India. Irrational use of antibiotics without any proper guideline and law against its use make the drugs ineffective very soon which is a

serious health-care problem in many developing countries. In 2011, WHO introduced a six-point policy package to fight against the spread of antibiotic resistance.<sup>1</sup> Many people seek care in different medical stores for their clinical problems, and thus different antibiotics are easily made available and distributed to population neglecting its rational use.<sup>2</sup> However, concern has been raised about the low-quality practices; profit aspirations, poor application of legislation and also about the improper knowledge of general population about this problem.<sup>3</sup>

In India, there is no such strong law against male practitioners and drug sellers. In developing countries,

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more than 50% of antibiotics are purchased without prescription.<sup>4,5</sup> The containment of this problem requires changes in the behavior of practitioners and health workers. In the hospitals, we need to change the behaviors of medical students and nurses, who will be the future health-care provider in our society, which is extremely vital.<sup>6-8</sup>

Young doctors should be given more education during their undergraduate training regarding antibiotic resistance and their appropriate use. This is a crucial time period during which the importance of these issues should be emphasized, because once the doctors become qualified, it is difficult to change their views and habits. The interventions which are undertaken to prevent and control antimicrobial resistance, usually aim to bring about behavioral changes in the target group, and the outcome of these interventions is affected by the previous beliefs and motivations which are held by this group. Hence, for any educational intervention to be successful and for the changes to be sustained, it should change the knowledge, attitudes, and practices of the target group.<sup>8,9</sup> A better understanding of what the students know and believe about the issues of antimicrobial use and resistance can assist us in planning an effective educational intervention for them.

In this regards, this study was conducted among 2<sup>nd</sup> year undergraduate medical students and nursing students to assess their knowledge and attitude concerning antibiotic resistance, as well as their self-reported practices which are related to antibiotic usage.

## MATERIALS AND METHODS

### Study Design

A questionnaire-based study was conducted among two batches of MBBS and nursing students in BSMC, Bankura a Government Medical College in India, each has strength of 150 and 50 in number. A sample size of total 352 was calculated. Before data collection the format of questionnaire was distributed to every student. The questionnaire was prepared after consultation with a group of experts and was submitted for prior test to faculty doctors of various disciplines to check comprehension and clarity of the questions. A total 35-item of questions were placed in each sets based on their knowledge of the local and national prevalence of antibiotic resistance, their perception of the importance of this problem, their attitude about antibiotic prescribing, their beliefs about the causes of antibiotic resistance and what is the knowledge about current and ideal intervention designed to improve antibiotic stewardship. Most questions about perceptions and attitude used five-point Likert scale response options.

### Study Procedure

Each participant was allotted 30 min to answer the questionnaire in the form of options, which they feel appropriate to answer. Informed consent was obtained from the participants, to utilize their data for research purposes.

### Ethical Consideration

All participants gave written informed consents to participate in this study.

## RESULTS

The results are tabulated as percentages in Tables 1-4. Regarding contributory factors (Table 1) behind antibiotic resistance, most of them have improper knowledge and practice. Considering the contributing factor to antibiotic resistance, 35% of the medical students and 51% of the nursing student thought that for quicker relief larger dose of antibiotics will be appropriate. Although larger study group agree with the fact that inappropriate antibiotics selection lately contributes to the antibiotic resistance but at least 15% of study population strongly disagree this truth. 76% of medical students and 49% of nursing student used to believe that irrespective of the etiology of fever, antibiotics help to get relieved from fever. 76% of nursing students and 57% of medical students believe broad spectrum antibiotics are better than targeted antibiotics. In contrast to confident appropriate knowledge various responses also found regarding skipping doses, incomplete courses, and antibiotics safety. 49% of medical students and 35% of nursing students believe that simultaneous use of two or more antibiotics is better to control infections than monotherapy.

Regarding medical practices (Table 2) most of the questions have mixed response, *viz.*, completion of the course of antibiotics, prior consultation with physician before starting antibiotics and usage of antibiotics in common ailments such as common cold, diarrhea, skin infection though 64% of nursing students and 66% of medical students used to check expiry date of antibiotics before consumption.

The self-medication behavior was identified in 24% of the students, but the majority of the participants always consulted a doctor before starting on an antibiotic and most of them always completed the course of the prescribed treatment.

About 82% of nursing students and 96% of medical students consider antibiotic resistance is a global issue, whereas 73% of nursing students and 96% of medical students agrees with the matter that in India it is also a serious issue (Table 3).

**Table 1: Rating by the medical personnel of the factor contributing to antibiotic resistance**

Factors	n (%)				
	Strongly agree	Somewhat agree	Undecided	Somewhat disagree	Strongly disagree
1. Large doses of antibiotics are better to use for quick action					
a. Nursing student (88)	5 (5.7)	40 (45.4)	8 (9.1)	10 (11.3)	25 (28.4)
b. MBBS student (264)	4 (1.5)	91 (34.4)	14 (5.3)	63 (23.8)	92 (34.8)
2. I belief inappropriate empiric choices can be a cause of antibiotic resistance					
a. Nursing student (88)	13 (14.7)	48 (54.54)	2 (2.2)	11 (12.5)	14 (15.9)
b. MBBS student (264)	59 (22.3)	123 (46.6)	7 (2.6)	34 (12.9)	41 (15.5)
3. Use of short course of antibiotics in case of any diarrheal or flu like symptoms					
a. Nursing student (88)	4 (4.5)	51 (57.9)	6 (6.8)	13 (14.7)	15 (17)
b. MBBS student (264)	18 (6.8)	113 (42.8)	37 (14)	58 (22)	38 (14.4)
4. Use of 2 or more type of antibiotics at a time is better choice to control infections					
a. Nursing student (88)	5 (5.7)	27 (30.7)	6 (6.8)	15 (17)	35 (39.7)
b. MBBS student (264)	26 (9.8)	104 (39.4)	11 (4.1)	41 (15.5)	82 (31)
5. Broad spectrum antibiotics is better choice than use highly selective antibiotics					
a. Nursing student (88)	26 (29.5)	41 (46.6)	1 (1.1)	2 (2.2)	18 (20.4)
b. MBBS student (264)	74 (28)	76 (28.7)	18 (6.8)	38 (14.4)	58 (22)
6. When I get fever, antibiotics help me to get better more quickly					
a. Nursing student (88)	26 (29.5)	41 (46.6)	-	9 (10.2)	12 (13.6)
b. MBBS student (264)	34 (12.8)	97 (36.7)	17 (6.4)	60 (22.7)	56 (21.2)
7. When I have a cold, I should take antibiotics to prevent getting a more serious illness					
a. Nursing student (88)	17 (19.3)	13 (14.7)	4 (4.5)	37 (42)	17 (19.3)
b. MBBS student (264)	28 (10.6)	60 (22.7)	13 (4.9)	76 (28.7)	87 (32.9)
8. Whenever I take antibiotics, I contribute to the development of antibiotic resistance					
a. Nursing student (88)	14 (15.9)	10 (11.3)	15 (17)	27 (30.7)	22 (25)
b. MBBS student (264)	32 (12.12)	52 (19.7)	12 (4.5)	101 (38.2)	67 (25.4)
9. Skipping of 1 or 2 doses does not contribute to development of antibiotic resistance					
a. Nursing student (88)	34 (38.6)	19 (21.6)	10 (11.3)	20 (22.7)	5 (5.7)
b. MBBS student (264)	60 (22.7)	82 (31)	21 (7.9)	46 (17.4)	55 (20.8)
10. Antibiotics are safe drugs, hence they can be commonly used					
a. Nursing student (88)	7 (7.9)	12 (13.6)	5 (5.7)	26 (29.5)	38 (43.1)
b. MBBS student (264)	28 (10.6)	30 (11.3)	16 (6)	78 (29.5)	116 (43.9)

As per their suggestion measures should be taken to reduce antibiotic resistance are institutional specific guideline and conduct frequent educational programs, requirement of easy access to the local and current antibiogram, require regular antibiotic surveillance programs. Their knowledge of proper health and hygiene and hand washing is absolutely correct to reduce the use of antibiotics (Table 4).

## DISCUSSION

Antibiotic resistance is an emerging public health problem, and everyday different drug resistant microorganisms are isolated in our hospitals against which many of the first line and second line antibiotics are ineffective. It is impossible to invent new drugs frequently to compete this bacterial resistance.

This study revealed many important misconceptions about antibiotics. Some belief of participant's needs rectification, as large proportion of the respondents thought that antibiotics better worked on all fever cases, common cold, and diarrhea cases. Many of them thought that for quicker relief larger doses may be considered. More than half of the students prefer broad spectrum antibiotics than single targeted antibiotics, but they strictly disagree about the tendency of skipping doses.

Our results showed that a majority of the students were well known of the global as well as national problems of antibiotic resistance, but in many condition they use antibiotics irresponsibly. Most of the participants are well aware about the clinical effectiveness of antibiotics depends partially on various factors such as proper use including

**Table 2: Medication practice questions rated response**

Intervention	Strongly agree Nursing student (88) MBBS student (264)	Somewhat agree Nursing student (88) MBBS student (264)	Undecided Nursing student (88) MBBS student (264)	Somewhat disagree Nursing student (88) MBBS student (264)	Strongly disagree Nursing student (88) MBBS student (264)
1. Doctor prescribe a course of antibiotic for you, after taking 2-3 doses you start feeling better and stop taking medicine					
a. Nursing student (88)	7 (7.9)	8 (9)	3 (3.4)	19 (21.6)	51 (58)
b. MBBS student (264)	11 (4.1)	38 (14.3)	2 (0.75)	62 (23.5)	151 (57.1)
2. Do you consult a doctor before starting an antibiotic or buy a antibiotics previously given by doctor					
a. Nursing student (88)	58 (66)	17 (19.3)	2 (2.3)	6 (6.8)	5 (5.7)
b. MBBS student (264)	104 (39)	116 (43.9)	-	28 (10.6)	14 (5.3)
3. Do you check expiry date of the antibiotic before using					
a. Nursing student (88)	57 (64.7)	21 (23.8)	-	10 (11.3)	-
b. MBBS student (264)	176 (66)	75 (28.4)	-	13 (4.9)	-
4. Do you prefer to take an antibiotic when you have any cough and cold					
a. Nursing student (88)	21 (23.8)	25 (28.4)	7 (7.9)	24 (27.2)	9 (10.2)
b. MBBS student (264)	57 (21.6)	93 (35.2)	11 (4.1)	47 (12.8)	57 (21.6)
5. In case of any diarrhea, skin ulcer antibiotics have a role					
a. Nursing student (88)	5 (5.7)	17 (19.3)	3 (3.4)	35 (40)	28 (31.8)
b. MBBS student (264)	27 (10.2)	34 (12.9)	12 (4.5)	102 (38.6)	89 (33.7)

**Table 3: Beliefs**

Beliefs	Strongly agree Nursing student (88) MBBS student (264)	Somewhat agree Nursing student (88) MBBS student (264)	Undecided Nursing student (88) MBBS student (264)	Somewhat disagree Nursing student (88) MBBS student (264)	Strongly disagree Nursing student (88) MBBS student (264)
1. I belief widespread use of antibiotics is a contributing cause of resistance					
a. Nursing student (88)	21 (23.8)	29 (32.9)	3 (3.4)	19 (21.6)	16 (18.2)
b. MBBS student (264)	157 (59.5)	62 (23.5)	2 (.75)	26 (9.8)	17 (6.4)
2. Antibiotics can prevent any illnesses from becoming worse					
a. Nursing student (88)	15 (17)	14 (15.9)	7 (7.9)	28 (31.8)	24 (27.3)
b. MBBS student (264)	42 (15.9)	34 (12.8)	9 (3.4)	66 (25)	113 (42.8)
3. I belief Indiscriminate and injudicious use of antibiotics can lead to exacerbation of prolongation of illness					
a. Nursing student (88)	38 (43.2)	12 (13.6)	3 (3.4)	25 (28.4)	10 (11.36)
b. MBBS student (264)	58 (22)	51 (19.3)	10 (3.7)	80 (30.3)	65 (24.6)
4. I belief Indiscriminate and injudicious use of antibiotics can lead to emergence of bacterial resistance					
a. Nursing student (88)	36 (41)	42 (47.7)	3 (3.4)	4 (4.54)	3 (3.4)
b. MBBS student (264)	111 (42)	98 (37.1)	6 (2.2)	35 (13.2)	13 (4.9)
5. I belief genetic mutation is one of the cause of antibiotic resistance					
a. Nursing student (88)	17 (19.3)	20 (22.7)	12 (13.6)	23 (26.1)	16 (18.2)
b. MBBS student (264)	149 (56.4)	87 (32.9)	5 (2)	10 (3.78)	13 (4.9)
6. I belief inappropriate duration of course a contributing cause of resistance					
a. Nursing student (88)	28 (31.8)	31 (35.2)	2 (2.7)	17 (19.3)	10 (11.36)
b. MBBS student (264)	87 (32.9)	90 (34)	8 (3)	44 (16.6)	35 (13.2)

(Contd...)

**Table 3: (Continued)**

Beliefs	Strongly agree Nursing student (88) MBBS student (264)	Somewhat agree Nursing student (88) MBBS student (264)	Undecided Nursing student (88) MBBS student (264)	Somewhat disagree Nursing student (88) MBBS student (264)	Strongly disagree Nursing student (88) MBBS student (264)
7. I believe antibiotic resistance is an important and serious public health issue worldwide					
a. Nursing student (88)	33 (37.5)	40 (45.4)	3 (3.4)	9 (10.2)	3 (3.4)
b. MBBS student (264)	164 (62.1)	92 (34.8)	3 (1.1)	2 (0.75)	3 (1.1)
8. I believe antibiotic resistance is an important and serious public health issue in our country					
a. Nursing student (88)	29 (32.95)	36 (40.9)	2 (2.27)	13 (14.7)	8 (9)
b. MBBS student (264)	166 (62.87)	91 (34.4)	-	3 (1.13)	3 (1.1)
9. Patients demand and expectation leads to use frequent wrong antibiotics					
a. Nursing student (88)	29 (32.9)	14 (15.9)	4 (4.5)	26 (29.5)	19 (21.6)
b. MBBS student (264)	78 (29.5)	87 (32.9)	5 (1.9)	59 (22.3)	35 (13.2)
10. I believe Indiscriminate and injudicious use of antibiotics can lead to additional burden of medical cost					
a. Nursing student (88)	45 (51.1)	26 (29.5)	5 (5.6)	7 (8)	5 (5.7)
b. MBBS student (264)	186 (70.4)	71 (26.9)	4 (1.1)	3 (1.1)	-

self-medication, proper doses, and taking incomplete course. Their knowledge of proper health and hygiene and hand washing is absolutely correct to reduce the use of antibiotics.

The most optimistic fact is that most of these participants are well aware of the situation about the increasing drug resistance, and this self-motivated awareness is a great opportunity to win the battle against antibiotic resistance. Many similar studies has reported that insufficient public knowledge regarding antibiotics is one of the most common cause of antibiotic resistance of various countries.<sup>9-12</sup>

Last but not the least is strict government policy for antibiotic use is utmost important to control the whole situation of indiscriminate use of these precious drugs as early as possible.

There was statistically significant difference between medical and nursing students regarding knowledge of the antibiotic uses. Apart from teaching about antibiotic prescribing, the principle protocols for antibiotic use in health-care providers should form an integral part of the undergraduate teaching.<sup>13</sup> In this study, the four leading causes of antibiotic resistance were (1) overuse or misuse of antibiotics, (2) unnecessary use of broad-spectrum antibiotics, (3) poor adherence to prescribed antibiotics, and (4) lack of access to antibiotic susceptibility testing.<sup>8,14</sup>

Regarding interventions to prevent antibiotic resistance, their knowledge and attitude is satisfactory and majority of participants believed in that most appropriate measures were as follows: (1) Establishing rational antibiotic surveillance program, (2) easy availability of clinical

microbiology laboratory, (3) local guidelines for rational use of antibiotics, and (4) habits of proper hand hygiene.<sup>5,15</sup> This requires proper counseling of patients by physicians and also require honesty of medical retailers when any patient seeking treatment or medicine, respectively. It is also true that current antibiogram for the most hospitals is not readily available or not strictly followed by the physicians. There also have no strict policy regarding interventions that can restrict physician's behavior strictly. When the risk factors for bacterial resistance are identified, effective measures should be undertaken, then only to reduce the risk of future resistant infections. The adoption of certain guidelines and polices regarding more appropriate use of antibiotics can improve patient outcomes and minimized the resistance microorganisms.

## CONCLUSION

This study revealed an important insight regarding the knowledge, attitude, perception and practices regarding antibiotic resistance, and usage among the future doctor and nurses. The medical education strategies should aim, not only to increase the knowledge but also to change the behavior and practices among medical and nursing students which can be considered, to plan for an effective undergraduate curriculum.

## LIMITATION

The main limitation of this study is that the data provided is of local interest. It is also true that the knowledge of common people about antibiotic resistance is far different from health-care providers. Sometime there is a possibility

**Table 4: Physicians rating to interventions to reduce antibiotic resistance**

Intervention	Strongly agree Nursing student (88) MBBS student (264)	Somewhat agree Nursing student (88) MBBS student (264)	Undecided Nursing student (88) MBBS student (264)	Somewhat disagree Nursing student (88) MBBS student (264)	Strongly disagree Nursing student (88) MBBS student (264)
1. Institutional-specific antibiotic guideline					
a. Nursing student (88)	44 (50)	21 (23)	23 (26)	-	-
b. MBBS student (264)	179 (67.8)	58 (21.9)	22 (8.3)	3 (1.1)	2 (0.75)
2. Conduct frequent educational					
a. Nursing student (88)	64 (72.7)	16 (18.1)	6 (6.8)	2 (2.2)	-
b. MBBS student (264)	178 (67.4)	72 (27.2)	5 (1.9)	5 (1.9)	4 (1.5)
3. Easy access to local and current antibiogram					
a. Nursing student (88)	30 (34.1)	28 (31.8)	13 (14.7)	7 (7.9)	10 (11.3)
b. MBBS student (264)	137 (51.9)	88 (33.3)	20 (7.5)	12 (4.5)	7 (2.6)
4. Updating about local antibiotic resistance pattern					
a. Nursing student (88)	41 (46.6)	20 (22.7)	12 (13.6)	12 (13.6)	3 (3.4)
b. MBBS student (264)	147 (55.7)	90 (34.1)	9 (3.4)	12 (4.5)	6 (2.2)
5. Regular antibiotic surveillance programs as infection control tool					
a. Nursing student (88)	35 (39.7)	29 (32.9)	10 (11.3)	9 (10.2)	5 (5.6)
b. MBBS student (264)	162 (61.3)	71 (26.9)	14 (5.3)	6 (2.2)	11 (4.1)
6. Regular updating about the situation of antibiotic resistance pattern in my institution					
a. Nursing student (88)	43 (48.8)	32 (36.3)	11 (12.5)	2 (2.27)	-
b. MBBS student (264)	156 (59.1)	77 (29.1)	13 (4.9)	13 (4.9)	5 (1.9)
7. Proper isolation of the patient in hospitals can leads to reduce the use of antibiotics					
a. Nursing student (88)	50 (56.8)	29 (32.9)	4 (4.5)	5 (5.6)	-
b. MBBS student (264)	149 (56.4)	62 (23.4)	10 (3.7)	19 (7.2)	24 (9)
8. Proper hand washing can reduce of use of antibiotics					
a. Nursing student (88)	47 (53.4)	29 (32.9)	3 (3.4)	6 (6.8)	3 (3.4)
b. MBBS student (264)	191 (72.3)	66 (25)	2 (0.75)	5 (1.9)	-
9. Knowledge of proper health and hygiene is absolutely require to reduce use of antibiotics					
a. Nursing student (88)	44 (50)	24 (27.2)	8 (9)	12 (13.6)	-
b. MBBS student (264)	152 (57.5)	91 (34.4)	11 (4.1)	5 (1.9)	5 (1.9)
10. Strict government policy for antibiotics restriction and empiric antibiotic use					
a. Nursing student (88)	39 (44.3)	29 (32.9)	12 (13.6)	4 (4.5)	4 (4.5)
b. MBBS student (264)	176 (66.6)	64 (24.2)	14 (5.3)	6 (2.7)	4 (1.5)

that some participants may give socially acceptable answer that may not be reflecting their usual habits.

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