Knowledge and Perception Regarding Antibiotic Resistance Amongst Medical Students

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ABSTRACT *Antibiotic Resistance is becoming a major problem worldwide with decreasing effectiveness of antibiotics in treating common infections. The medical fraternity is thought to be the most important determinant for the same. Since medical students are the future doctors, it is imperative to assess their knowledge and perception about Antibiotic Resistance and then only required amendments can be suggested for improving the curriculum. The study finds that the preliminary knowledge about Antibiotic Resistance is same amongst Undergraduate and Post graduate students. But the clinical exposure and of undergraduate students appear insufficient and can be improved. Research field also needs to be more attractive to medical students.*

INTRODUCTION:
Antibiotic Resistance (AR) has become a major problem in today's world affecting developed and developing nations alike. The decreasing effectiveness of antibiotics in treating common infections has quickened in recent years, and with the arrival of untreatable strains of carbapenem resistant Enterobacteriaceae, we are at the dawn of a post antibiotic era [1].

The two main contributing factors are (i) excessive irrational use of antimicrobials (AMs) and (ii) insufficient infection control policies favouring the spread of resistant microorganisms [2]. The increasing resistance amongst microorganisms and the dwindling development of new antibiotics [3] is posing a threat to medicine. Indian hospitals have reported very high Gram-negative resistance rates, with very high prevalence of ESBL (Extended Spectrum Beta Lactamases) producers and also high carbapenem resistance rates. Increasing carbapenem resistance will invariably result in increased usage of colistin, currently the last line of defence, with a potential for colistin-resistant and Pan Drug Resistant bacterial infections [4, 5, 6].

PURPOSE OF THE STUDY: A vast majority of participants suggested a gap in knowledge about infectious diseases, microbiology and Antimicrobial (AM) prescribing in university programs [7]. The medical fraternity are the major determinants to the issue. As early as in 1993, the British Society of Antimicrobial Chemotherapy (BSAC) Working Party on Antimicrobial Use considered training in infectious diseases (ID) and knowledge of prescribing of antimicrobial drugs insufficient in clinicians, which is one of the major causes of misuse. According to a recent policy paper by the Infectious Diseases Society of America (IDSA), clinician training and continuing education in appropriate antimicrobial use in the United States (US) is "highly variable, non standardized, infrequent, and highly prone to bias", especially when conveyed or sponsored by pharmaceutical firms or their agents. Apart from initial training and, to a limited extent, in preparation for board recertifica-

tion examinations, there is little if any compulsory training or education of physicians in antimicrobial stewardship." Conversely, focus on prescribing older, narrow-spectrum drugs in targeted therapy has been taught in medical schools and has been common practice in northern European countries such as Scandinavia and the Netherlands for several decades [8] Since the doctors are the major determinants in the emergence of AR, the medical students' perception and knowledge about the issue need to be assessed.

The study aims to assess the knowledge and attitudes of medical students at Undergraduate (UG) and Post graduate (PG) about these factors. The aim is to know how the students feel and this knowledge may further be utilized to improve the education pattern and revise the training needs of medical students in wake of the problem of Antibiotic Resistance.

MATERIALS AND METHODS
Study Type: Questionnaire based Cross sectional study.
Study Population: Undergraduate (UG) and Post graduate (PG) medical students in a medical college in India.

Sample size: A total of 410 Questionnaires that included 261 UG and 149 PG students.

Study tool: This is a questionnaire based study conducted to assess and compare the knowledge and perception of Undergraduate and Post graduate medical students.

The questionnaire was designed with the help of experts in the field of medicine and Antibiotic Resistance. The Questionnaire was developed to assess the knowledge and perception of the students on factors that cause AR and also the Institutional, Social and Regulatory, and Research factors that may help in reducing AR.

The questionnaire was distributed amongst the UG and PG medical students and each of them was asked to rank the given factor on the basis of relevance.

The participants were divided into two groups depending on their educational status, whether undergraduate oe post graduate medical student. They were asked to rank the various stakeholders of the issue based on their relative importance.

500 Questionnaires were distributed amongst the students of which 458 were returned. After initial assessment 410 questionnaires were include in the study, rest being excluded due to incompletion or duplicate ranking given by participants.

RESULTS : The questionnaires were analysed and on the basis of ranking provided by candidates in each of the group consolidate ranking was given to various factors associated with AR.

Causes of AR : Both the groups ranked **Inappropriate prescription by doctors** and **self-medication by patients** as the most important factors (As shown in Figure 1). Various causes that were to be ranked are

Inappropriate prescription by doctors

Lack of effective diagnostics

Self-medication by patients
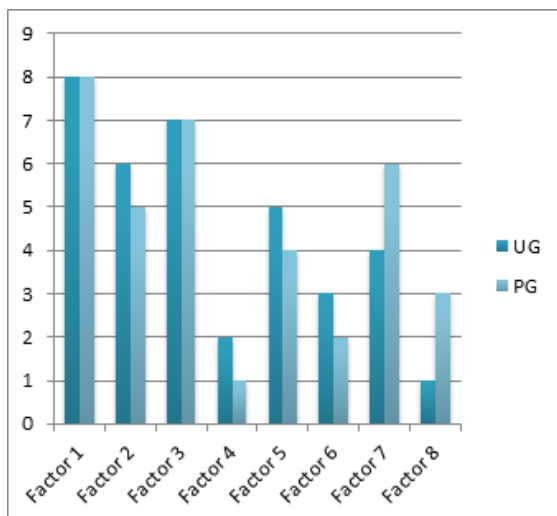
Use of antibiotics in food production

Increase in bacteria due to poor hygiene

Migratory population

Poor quality of antibiotics

Marketing by Pharma companies

Figure 1: Causes of AR and their relevance

Factors reducing AR (Ranking as most effective): Factors that can be helpful in reducing AR in community were divided into three types – Institutional, Social and Regulatory factors and Research factors.

Institutional factors : Amongst the 6 factors to be rated as most effective, the UG students considered the **Awareness about Antibiotic policy in healthcare workers** while the PG students found **Institutional Antibiotic Policy** to

be the most useful measures. [Table 1]

S no	Factor	UG	PG
a	Improved bacterial diagnostic services	3	5
b	Physician's attitudinal change regarding use of Antibiotics	2	2
c	Institutional Antibiotic Policy	4	1
d	Awareness about Antibiotic policy in healthcare workers	1	3
e	Periodic awareness & training programmes in Antibiotic Policy	6	4
f	Formulation of Hospital Infection Control Committee & Nurse	5	6
g	Monitoring & Control of Hospital infection by Hospital Infection Control Nurse	7	7

Table 1: Institutional factors to reduce AR

Social & Regulatory Framework : The **Legal framework to restrict sale/purchase of antibiotics without prescription** was unanimously considered as the most effective way to curb and control AR by both UG and PG students. Other 5 factors were also similarly ranked by both the groups. (Table 2)

S No	Factor	UG	PG
a.	Legal framework to restrict sale/purchase of antibiotics without prescription	1	1
b.	Improved hygiene practices in population	3	2
c.	Public awareness about antibiotic usage	2	3
d.	Right to health in constitution	5	6
e.	Accreditation of public health facilities	6	5
f.	Standards & Regulating environments for Antibiotics manufacturers	4	4

**Table 2: Social & Regulatory Framework to reduce AR**

Research : Both the UG and PG groups were of the opinion that **Encouraging Research in new Antibiotics** can be the most effective solution to the problem of AR.

S No	Factor	UG	PG
a.	Encouraging Research in new Antibiotics	1	1
b.	Antibiotic Holiday	2	4
c.	Contribution of Physicians in Research	3	2
d.	Awareness of process of Research	4	3

Table 3: Research measures to reduce AR

Stakeholders : 8 Stakeholders were identified and participants were asked to rank them in the order of their importance to the issue of AR. **Doctors and Pharmacists** proved to be the most important stakeholders by both the groups. Postgraduates considered Patients, while undergraduates scored Government as the next important stakeholders.

Figure 2: Various Stakeholders
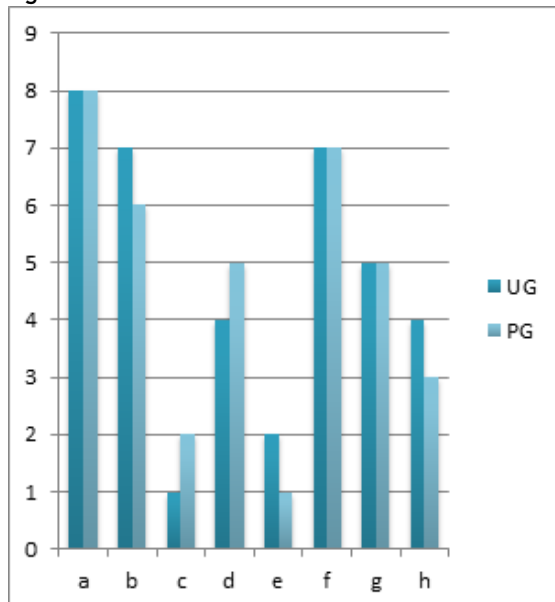
- Doctors
- General Public Patients
- Media
- Pharma industry
- Medical Students
- Pharmacists/Chemists
- Government
- World Health Organisation (WHO)

DISCUSSION: The analysis of the results shows that there is not much variation between the knowledge of Undergraduate and Post graduate medical students about the factors causing Antibiotic resistance. This reflects that the basic education is consistent and the undergraduate teaching well covers the issue of Antibiotic resistance and its development. As the same factors of **Inappropriate prescription by doctors** and **self-medication by patients** are ranked as the top most causes of AR, it shows that the perception of UG students is in congruence with that of the experience of the PG students. Little variation observed in the ranking by two groups indicates the difference between perception and on ground observations of the groups.

When discussing the measures that may help in reducing the AR, UG students perceive **Awareness about Antibiotic policy in healthcare workers** as the most effective Institutional factor while PG students report the **Institutional Antibiotic policy** to be the most important. There are subtle difference between the perceptions regarding Institutional factors which reflect a low level of exposure to the UG students. It may be suggested to improve upon the clinical exposure of UG students and also to increase the participation in the current problems in the medical field.

Both the UG as well as PG students believe that **Legal framework to restrict sale/purchase of antibiotics without prescription** can be best used to control the issue of AR. Perception of UG correlates well with the experience gained by PG students regarding the Social and Regulatory factors to reduce AR.

Encouragement to develop new Antibiotics is considered as the most effective potential solution to reduce AR by both UG and PG students. Further the results display a variation in perceptions of the two groups which highlights the fact that the involvement in research activities of the two groups is different.

Finally Doctors and Pharmacists are ranked as the most important stakeholders for AR by all the medical students.

CONCLUSION:
The study finds that the basic knowledge about AR is same for UG and PG students and thus it shows that the curriculum at UG level adequately covers the developmental process of Antibiotic Resistance.

Further, the results show there is need to increase the clinical exposure of UG students and also need to implement measures to encourage students in participating in research activities.

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