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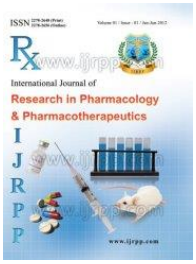

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Antibiotic resistance and usage – a questionnaire based study among medical students in southern India

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ABSTRACT

Objectives

To study the knowledge, attitude, perception and practices (KAP) of medical students regarding antimicrobial resistance (AMR) and usage

Methods

A cross sectional questionnaire based survey among second and third year medical students of a teaching hospital was conducted, whereby their KAP regarding antibiotic use and resistance was assessed by using five point likert scale whose responses ranged from "strongly agree" to "strongly disagree," always" to "never" and "very important" to "unimportant". Data was analyzed using simple descriptive statistics

Observations

The response rate was 100% among the 150 students who were asked to participate in the survey. The number of respondents who agreed that antibiotic resistance is an important and serious public health issue in their hospital is (n=114, 76%). Majority, 94% (n=141) were aware that bacteria are not responsible for causing colds and flu. Among the factors which govern their choice/selection of an antibiotic, the ability of the antibiotic to promote resistance was rated as the most important factor by 95% (n=143) of them. Antibiotic cost was considered as important by only 52% (n=78) of the respondents.

Conclusion

The data obtained helps us arrive at a conclusion with respect to the educational needs of the students regarding antibiotic resistance and guides us towards those aspects which deserve our attention, helping us plan for any future educational intervention as well.

Keywords: *Antibiotic resistance, Medical students, Educational intervention, Medical education*

INTRODUCTION

Since the last decade of the 20th century, antibiotic resistance has posed a significant threat to public health. Added to this threat is the drastic decrease in the number of novel antibiotics introduced in the market.

Decreasing the use of antibiotics and rational antibiotic prescribing is suggested as the most effective strategy for combating antibiotic resistance. [1] To bring about a decrease in antibiotic use requires interventions at multiple levels involving health care professionals and the general lay public. It has been noted that, despite various interventions, irrational, inappropriate and unnecessary antibiotic prescribing by the doctors is still widespread. [2] It may be due to the deeply established views and behaviors of qualified and practicing doctors which are very often difficult to change. Therefore, it has been suggested that the education about prudent antibiotic prescribing should be started at the undergraduate level itself. This is the time when knowledge, attitudes, and behaviours of medical professionals are being shaped. Hence early education and adequate training of undergraduate students of medicine, pharmacy and nursing about prudent antibiotic prescribing, dispensing and usage respectively may be significantly effective in minimizing antibiotic resistance. [1]

The key issue is not who prescribes an antibiotic. Instead of focusing on the one who writes the prescription, we need to develop a coherent multi-disciplinary approach to the entire process from patients presenting with a problem, through diagnosis, prescribing, dispensing and administration of an antimicrobial (when necessary) to assessment of the patient's outcome. Antibiotic management requires effective teamwork between all of the health professions, regardless of who writes the prescription. Therefore, effective education is required for all healthcare professionals to ensure prudent use of antimicrobials and reduce resistance. [3]

It was in this regard that we had conducted previous studies among the medical students in order to assess their knowledge and attitude concerning antibiotic resistance as well as their self reported practices related to antibiotic usage. The present study was undertaken among the second and third year undergraduate medical students belonging to a different institution to which the first author is currently affiliated.

The data obtained from the present study shall be used for comparison with the data of previous studies and it may also be useful for us in planning, and designing an effective educational intervention about antibiotic resistance for the students, keeping their specific needs in our mind.

MATERIALS AND METHODS

A cross-sectional, questionnaire based survey was undertaken in a teaching hospital of southern India among a batch of second and third year MBBS undergraduate students. Institutional ethics committee permission was taken for conducting the study. The questionnaire used was the same as the one earlier used by Khan AKA et al. [4]

Prior to the study, the questionnaire was validated by subject experts for its content and relevance. The questionnaire consisted of 31 questions. A 5-point Likert scale whose responses ranged from "very important" to "unimportant" was used, both to assess the students' perceptions of the causes of antibiotic resistance as well as the factors which influence their decision about antibiotic selection and prescribing.

A series of questions intended to study the attitude of the participants regarding antibiotic resistance and usage were analysed using a 5-point Likert scale whose responses ranged from "strongly agree" to "strongly disagree." Their self reported practices regarding antibiotic usage was also assessed by using a likert scale ranging from "always" to "never".

The participant's knowledge was assessed by a set of four questions. Three of which were of True/False type and one was a likert scale based question.

The students were asked to complete the questionnaire anonymously. Informed consent was obtained from the participants to utilize the data for research purposes. We used simple descriptive statistics to generate frequencies, percentages and proportions.

RESULTS

The response rate was 100% among the 150 students who were asked to participate in the survey. In order to simplify the analysis, we collapsed the five point response of the likert scale into three, such as agree/uncertain/disagree,

important/neutral/unimportant, and usually/sometimes/seldom.

The number of respondents who agreed that antibiotic resistance is an important and serious public health issue in the hospital is (n=114, 76%) when compared to the number of respondents who agreed that antibiotic resistance is an important and serious issue facing the country (n=144, 96%) and the world (n=136, 91%).

Majority, 94% (n=141) were aware that bacteria are not responsible for causing colds and flu and 47% (n=71) were aware that antibiotics do not benefit in the treatment of common cold and fever.

Among the factors which govern their choice/selection of an antibiotic, the ability of the antibiotic to promote resistance was rated as the most important factor by 95% (n=143) of them, whereas, in-vitro antibiotic sensitivity of the organism, antibiotic potential for adverse effects and spectrum of action were also rated as important factors by 88% (n=132) of the respondents.

Antibiotic cost was considered as important by only 52% (n=78) of them. The self reported practices of the respondents pertaining to antibiotic use and resistance were examined with a likert scale, the results of which are shown in table 1.

The questionnaire also consisted a list of possible causes which might be responsible for the development of antimicrobial resistance and the respondents were asked to rate them according to their importance. The corresponding ratings given by the respondents are depicted in table 2.

Table 1: Respondents' self reported practices regarding antimicrobial use.

	Survey item	**Always** n(%)	**Seldom** n(%)	**Never** n(%)
P1	The Doctor prescribes a course of antibiotic for you. After taking 2-3 doses you start feeling better.			
	a) Do you stop taking the further treatment	21 (14.0)	29 (19.3)	100 (66.7)
	b)Do you save the remaining antibiotics for the next time you get sick	24 (17.0)	28 (19.8)	89 (63.10)
P2	Do you give the leftover antibiotics to your friend /roommate if they get sick	11 (7.3)	38 (25.4)	100(66.67)
P3	Do you complete the full course of antibiotics?	117(82.4)	24 (17.6)	0 (0)
P4	Do you consult a doctor before starting an antibiotic?	123 (82.0)	26 (17.4)	0 (0)
P5	Do you check the expiry date of the antibiotic before using it?	148 (98.0)	2 (1.3)	0 (0)
P6	Do you prefer to take an antibiotic when you have cough and sore throat?	51 (36.1)	70 (49.6)	20 (14.2)

Table 2: The possible causes of antibiotic resistance according to their importance

Sl No	**Cause of antibiotic resistance**	**Important (N=150)**	**Unsure(N=150)**	**Unimportant(N=150)**
1	Use of antibiotics for self-limited non bacterial infections	128 (85.3)	18 (12.00)	4 (2.7)
2	Use of antibiotics for shorter than standard duration	100 (66.6)	28 (18.7)	22 (14.70)
3	Use of antibiotics with a broader than necessary spectrum	108 (72.00)	31 (20.67)	11(7.33)
4	Poor Infection control measures	78 (50.5)	43 (30.50)	20 (14.20)
5	Poor access to microbiological facilities	81 (53.0)	64 (42.0)	4 (2.70)

6	Use of antibiotics for self limited bacterial infections	102 (67.0)	47 (30.0)	0 (0)
7	Empirical Antibiotic therapy (Best Guess Therapy)	73 (48.0)	55 (36.0)	21 (14.1)
8	Mutational & evolutionary changes in the microorganism	132 (89.0)	14 (19.6)	0 (0)
9	Lack of restrictions on antibiotic usage	114 (81.0)	25 (17.0)	0 (0)
10	Excessive antibiotic use in live stock (animals raised for food)	115 (85.0)	19(14.2)	0 (0)
11	Use of antibiotics for longer than standard duration	100 (66.6)	28(18.7)	22 (14.7)

DISCUSSION

Majority of the students in our study were well aware of the global as well as the nationwide problem of antimicrobial resistance, but at the hospital level antibiotic resistance was not considered to be a problem. A similar response was noted in our previous study [5] and elsewhere where most respondents underestimated the prevalence of antibiotic resistance at their own institution. [6, 7]

The students need to be made aware that antibiotic resistance varies in different healthcare contexts in relation to both geography and primary and secondary care settings, and how to access the information that they need to keep up to date with and how to use this information to make appropriate changes in their future practice. [2] Apart from teaching about antibiotic prescribing, the principles of protocol development for antibiotic use in health care facilities should form an integral part of undergraduate teaching. [8]

The attitude of the study participants with regards to antibiotic use and resistance was found to be casual and lax. 53% (n=79) of them reported that antibiotics should be taken on developing a cold and fever, 40% (n=60) participants believed that antibiotics are safe drugs; hence they can be commonly used. Various studies have similarly reported that more than 60% of their participants believed that antibiotics should be prescribed for viral illnesses.[9] Such wrong beliefs may lead to inappropriately high rates of antibiotic consumption which can result in a corresponding increase in bacterial resistance. [10]

When asked to rate the important causes of antimicrobial resistance most of the participants [132 (89.0%)] rated mutational and evolutionary changes in the microorganism, and use of antibiotics for self-limited non bacterial infections, [128 (85.3)] as common causes. Similar to some previous studies, [11] only [78 (50.5%)] of the respondents felt that poor or lack of infection control measure to be an important cause for resistance to develop, which highlights the lack of awareness regarding the significance of infection control measures.

Learning about antimicrobial prescribing in pharmacology must be connected clearly with infection control in microbiology. [3] The significance of simple measures like hand hygiene in the control of resistance should be endorsed [12] and its practice should be inculcated at an earlier stage of medical education.

Outcome-based education is said to be important tool in which the requirements are explicitly defined in detail to ensure medical graduates are fit to practice. This can be utilized for educating the students about antibiotics so as prescribers they are fit to prescribe antibiotics, maximize their effective and efficient use and minimize the development of resistance. [2]

Various studies have noted that unrealistic patient expectations were the single most important cause of inappropriate prescribing. Hence public and patient education would be the most important means of reducing inappropriate antibiotic use. Small group exercises, that facilitate students to practice patient education skills such as negotiating with patients about the need for antibiotics and educating them about proper use of antibiotics should from an important part of students' antibiotic curriculum. [13]

Our study, despite of its limitations of drawing conclusions based on a convenience sample

involving only two batches of second and third year medical students from one single teaching hospital provides an important insight regarding their knowledge, attitudes, perceptions and practices which can be considered in order to plan for an effective undergraduate curriculum regarding antibiotic resistance and usage.

CONCLUSION

This study provides an important insight about the knowledge, attitudes and practices regarding antibiotic resistance and usage among the future prescribers which can help us arrive at a conclusion with respect to their educational needs and the aspects which are deserving of our attention as well as plan for any future educational intervention for them.

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