KNOWLEDGE OF ANTIMICROBIAL RESISTANCE AMONG UNDERGRADUATE MBBS STUDENTS IN A TERTIARY CARE TEACHING HOSPITAL, ASSAM

Original Research Article

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Abstract

Background: Antimicrobial resistance is of great public health concern globally, as well as in India. Irrational use of antimicrobials particularly antibiotics across human, animal and agriculture farming practices are giving rise to an increasing number of new resistant strains every year. As a result treatment of basic infections is proving to be difficult, including routine medical and surgical procedures, resulting in prolonged duration of hospital stay of patients, high economic burden, and increasing morbidity, mortality. Medical students are the future prescribing physicians. An adequate knowledge about AMR among them is important to contribute towards rational practice of use of antibiotics and to create awareness in the community. The objective is to assess the knowledge of AMR among undergraduate medical students in a tertiary care teaching hospital in Jorhat, Assam. **Materials and Methods:** The study design is a cross sectional study carried out for a period of four months in a teaching hospital of Jorhat, Assam. A pre designed online questionnaire were distributed to the students through. An informed consent was obtained prior to the study and on the basis of maintaining confidentiality and anonymity. The data collected online were compiled in MS excel sheet and results expressed using descriptive statistics in percentages. **Result & Conclusion:** Out the total 136 participants, (95.6%) students are aware of the term AMR and (90.4%) know AMR is a public health problem. There were misconceptions in a limited number of students relating to knowledge of use of antibiotics in certain conditions the study finding showed adequate knowledge regarding factors promoting and prevention of AMR. (92.6%) students said they would like to be educated more about AMR.

INTRODUCTION

Antimicrobial resistance (AMR) is a global threat. AMR alone kills more people than cancer and road traffic accidents combined together. It is estimated that by the year 2050, Asia will have 4.7 million deaths that could be directly attributed to AMR.[1]

There are many factors attributing to AMR .25%-75% of antibiotic prescriptions are inappropriate, 50% of people worldwide fail to take medicines correctly. About 80% of antibiotics are used in the community and the rest are used in hospitals worldwide. According to WHO, the high rate of inappropriate use of antibiotics causes an increased risk of adverse side effects, high costs of therapy and a higher rate of antimicrobial resistance of community pathogens.[1,2]

India is considered 'the AMR capital of the world as it is one of the largest consumer of antibiotics in the world. The infectious disease burden being the highest here, inappropriate and irrational use of antimicrobial agents against these diseases, have led to an increase in the development of antimicrobial resistance.[1-3] The dual problem of emergence of newer multi-drug resistant (MDR) organisms causing diagnostic and therapeutic challenges and the burden of tuberculosis, malaria pathogens etc becoming more drug resistant is the one of the most challenging task in India.[4]

AMR specially antibiotic resistance is compounded by lack of awareness about appropriate antibiotic use among general public, limited access to quality and timely laboratory services in resource constraint settings. The administration of broad-spectrum antibiotics as an "empirical treatment" by many physicians in the outpatient department is an important determinant leading to emergence of resistant strains in resource constraint settings in India.[1,3]

As per literature search, antibiotics used in food animals is projected to increase by 82% by 2030

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further challenging the AMR threat in the country. Animal manure used in soil and inadequate treatment of effluents containing antibiotic residues from pharmaceutical industry, healthcare facilities and farms are other important contributors in increasing AMR burden in India and worldwide.[5,6]

With this emerging threat, a global consensus was felt that antimicrobial resistance poses a profound threat to human health. Hence in May 2014, the World Health Assembly requested the development of a global action plan (GAP) on antimicrobial resistance, in resolution WHA67.25.

In this context, the Government of India developed a National Policy on AMR containment in early 2011. The National Action Plan-AMR 2017 in India prioritised six objectives out of which one is focussed primarily on increasing awareness, education and training to improve the knowledge and behaviour in target populations – namely stakeholders in human health, animal health and agriculture.[1,2] This need to focus on awareness building, both in consumers and providers was highlighted after findings of a multi-country public awareness survey conducted by WHO in 2015 . Further several literature reviews across different countries including India, have reported a widespread knowledge gap on AMR among medical students as well as health care professionals.

In Assam, very limited studies on knowledge and awareness of AMR among undergraduate MBBS students have been carried out. As medical students are the future prescribing physicians and stakeholders, an adequate knowledge of rational use of antibiotics can prevent AMR in the community. Therefore, the present study was carried out to assess the knowledge of AMR among the undergraduate medical students of a tertiary care teaching hospital in, Jorhat Assam.

MATERIALS AND METHODS

Study Setting: A Tertiary care teaching hospital of Jorhat, Assam

Study Design: An observational Cross-sectional study

Study Population: Undergraduate Medical students of 1st year, 2nd year and 3rd year MBBS of tertiary care teaching hospital, Jorhat, Assam.

Duration of Study: 4 months (Oct 2021 to Jan 2022)

Study tool and data collection: A predesigned structured questionnaire was prepared in google forms app and the link for the questions was distributed to all students through a common online platform and emails maintaining anonymity and confidentiality of the responses. Prior to sending the link, an informed consent was obtained in verbal from all students in the classroom. a reminder message was sent after a week for next two weeks till adequate number of responses were obtained. Only those forms where students responded to all questions were included in the final analysis. Student participation was voluntary.

The semi structured questionnaire was formed according as per objectives defined. The questionnaire consisted of four segments. The first segment contained information of the study participants age, gender and year of MBBS as shown in [Table 1]. The next segment consisted on awareness about Antimicrobial Resistance, source of information on AMR as shown in table 2 and the 3rd segment consisted of questions to assesses knowledge on use of antibiotics in certain diseased conditions. The 4th segment of questionnaire assessed the knowledge of factors promoting and preventing AMR and on the students perception towards acquiring more knowledge with regards to AMR. The questionnaire for the study was prepared referencing from a Multi-country public awareness survey conducted by World Health Organization 2015.[7]

The responses collected from google forms were analyzed using MS excel sheets. The results obtained were presented in tabular forms and expressed in percentages

Ethics: The study was carried out obtaining permission from the Institutional Ethics Committee of the teaching hospital.

Definitions adopted:[2,4,5]

Antimicrobials are antibiotics, antivirals, antifungals and antiparasitic medicines that are used to prevent and treat infections in humans, animals and plants. (WHO) Antimicrobial Resistance (AMR) occurs when bacteria, viruses, fungi and parasites change over time and no longer respond to medicines making infections harder to treat and increasing the risk of disease spread, severe illness and death (WHO).

Rational use of drug – is the correct use of drug with appropriate indication i.e. the reason to prescribe the drug should be based on sound clinical consideration Apart from this the duration and administration of drug should also be done appropriately.

Overuse of antibiotic: is defined as use of antibiotics without prescription or buying from a pharmacist, taking the same antibiotic for another episode of same illness, use of antibiotic for rapid recovery of illness like fever with no evidence of any infection.

Inadequate use of antibiotic: not taking antibiotic in the prescribed dose, not completing the full course of antibiotics for the given duration.

RESULTS

The present study titled "Knowledge of Antimicrobial Resistance among undergraduate Medical students in a tertiary care teaching hospital, Jorhat, Assam" was carried out among 136 MBBS students from 1st year, 2nd year and 3rd year MBBS respectively. The findings of the study are stated as follows:

[Table 1] majority of the participants 71(52.2%) are females. 60 (44.1%) belonged to the 21 to 23 years age group. Majority 49 (36.1%) of the students

participants are from Third professional MBBS year.

In [Table 2], 130 (95.6%) students are aware of the term AMR and its harmful effects and 123 (90.4%) know it as a public health problem. 98(75.4%) of the student respondents derived their knowledge from their MBBS curriculum followed by exposure to mass media and social media 30 (23%).

[Table 3] shows that 80 (58.8%) students responded that antibiotics should not be used for treatment of common cough and cold as they do not contribute to speedy recovery. Alternatively 56(41.2%) students responded that antibiotics speed up recovery of cough and cold. Majority132 (97.1 %) had knowledge of use of antibiotics in Urinary tract infections, (95.6%) malaria, (92.6%) for sexually transmitted infections and 120 (88.2%) for wound infections respectively. However, 62(45.6%) of students responded of antibiotics in measles, 23(16.8%) for body aches and headaches.

[Table 4] with regards to knowledge of factors promoting antibiotic resistance, 134 (98.5%) responses are for overuse of antibiotics, 124 (91.2%) said inadequate use of antibiotics, 109 (80.1%) use of antibiotics in the field of agriculture and animals, 59 (43.38%) spread of bacteria in health care settings, 56(41.17%) lack of effective tools to diagnose timely bacterial infection

[Table 5] In relation to knowledge of preventive measures of AMR among the 136 MBBS students, 133 (97.79%) responded that people should maintain hand hygiene, 129(94.85%) doctors should prescribe antibiotics only when indicated and 119(87.5%) and 84 (61.76%) responses are for development of new antibiotics by pharmaceutical companies and timely vaccination for children respectively. Out of the 136 respondents, 126 (92.6%) students said they would like to have more education on the subject of antimicrobial resistance and 10(7.4%) said they do not know.

Table 1: Demographic characteristics of the study participants

Characteristics	Number	Percentage
Gender		
Male	65	47.8
Female	71	52.2
Age (in years)		
18 to 20	28	20.5
20 to 22	60	44.1
22 to 24	48	35.4
Education		
MBBS Phase 1	42	30.8
MBBS Phase 2	45	33.1
MBBS Phase 3	49	36.1

Table 2: Awareness about Antimicrobial Resistance among medical students

Knowledge about antimicrobial resistance	Responses (n =136)	
	Yes	No
Do you know about antimicrobial resistance and its harmful effects ?	130 (95.6)	6 (4.4)
Antimicrobial resistance is a public health problem	123 (90.4)	13 (9.6)
Source of knowledge of AMR (n=130)		
MBBS syllabus	98	75.4
Media (including social media)	30	23.1
Peers and college seniors	02	1.5

Table 3: Distribution of MBBS students according to their knowledge of use of Antibiotics.

Does use of antibiotics help in speedy recovery of common cough and cold	Number	Percentage
Yes	56	41.2
No	80	58.8
In which of the following conditions should antibiotics be used (multiple responses)		
UTI (urinary tract infection)	132	97.1
Skin /Wound Infection	120	88.2
Fever	62	45.6
STI (sexually transmitted infection)	126	92.6
Malaria	130	95.6
Measles	56	42.2
Body Aches/Headaches	23	16.8
HIV/AIDS	60	44.1

Table 4: Distribution of knowledge about factors promoting AMR among MBBS students.

Knowledge about factors promoting Antibiotic resistance (multiple response)	Number	Percentage
Overuse of antibiotics*	124	91.2
Inadequate use of antibiotics	134	98.5
Lack of effective diagnostic tools to detect bacterial infection	56	41.17
Spread of bacteria in health care settings	59	43.38
Use of human antibiotics in agriculture (including food producing animals)	109	80.14

Table 5: Distribution of knowledge about factors for prevention of AMR

Parents should make sure that all children's vaccination are upto date.	Number 84	% 61.76
People should maintain hand hygiene regularly .	133	97.79
Doctors should prescribe antibiotics only when indicated	129	94.85
Pharmaceutical companies should develop new Antibiotics	119	87.5
4(C) Would you like more education on antimicrobial resistance	Yes No % 126 (92.6)	No / Do not know 10 (7.4)

☐ (Multiple response table)
*Inadequate use of antibiotic: not completing the full course, dose of antimicrobial not taken as prescribed

Overuse of antibiotics- Using the same antibiotic for treating another person suffering from same symptoms or ailment, buying from a pharmacy without consulting a physician.

Inappropriate practise of antibiotics by a physician includes prescribing of antibiotics when not indicated, inappropriate selection, dose and length of duration of antibiotic prescribed wrongly.

DISCUSSION

This study aimed at assessing the knowledge of antibiotics among medical students of all years. Our findings showed that medical students in the Phase 3 MBBS students had more knowledge than first year MBBS students.

Out of the 136 undergraduate MBBS respondent in the present study, majority 71(52.2%) are females, 49 (36.1%) students were from the 3rd year MBBS,60 (44.1%) belonged to the 21 to 23 years age group. This is similar to a study finding reported by Dr. Bharani Krishna Y et al,[8] (2015) where 74% of student respondents were females. Tajuddin Shaik et al,[9] in their study among undergraduate students in a tertiary care dental hospital of South India reported that majority 125 (96.13%) participants were fifth-year medical students who voluntarily participated in the study.

With regards to knowledge, the present study finding shows high (95.6%) awareness in students about AMR and its harmful effects and (90.4%) consider it a public health problem. Similarly, Arun Kumar Sharma et al,[10] (2022), Ajmer, in their study reported a high awareness (100%) of antibiotic resistance among 225 undergraduate medical students and (77.25%) responded that it is a global health threat. An adequate knowledge of AMR (88.3%) was also reported among Medical, Dental and B .Sc Nursing students in an observational cross sectional study conducted by Rupendra K. Bharti et al,[11] (2020) in Shimla, Northern India . A descriptive cross-sectional study finding by Mohan B. Sannathimmappa also reported high (98.4%) awareness on AMR and (92.8%) believe that it is a major global health concern.[12]

Our study finding reported majority (75.4%) derived their knowledge from their MBBS curriculum followed by exposure to mass and social media 30 (23%). Around (58.8%) of the students responded correctly that antibiotics should not be used for treatment of common cough and cold as they do not contribute to speedy recovery. Around (41.2%) responded that antibiotics can be used for treating cough and cold. This may be attributed to students ranging from 1st year MBBS to 3rd year MBBS and their varying degree of understanding and exposure on this importance of AMR.

But in a cross-sectional questionnaire-based study by Rajitha Maddala et al,[13] (2020) in Andhra Pradesh showed almost (91%-96%) of MBBS students responded correctly that antibiotics do not speed up recovery of cough and cold which is contrary to the present study findings.

From [Table 3] showing multiple responses, majority132 (97.1 %) of the students responses were for use of antibiotics in Urinary tract infections, (95.6%) for treating malaria, (92.6%), in sexually transmitted infections and 120 (88.2%) for wound infections respectively which suggests that students are aware of effectiveness of use of antibiotics in specific disease conditions in the present study.

[Table 4] which is again a multiple response, majority (98.5%) responded that inadequate use of antibiotics, (91.2%) overuse of antibiotics, and (93.4%) lack of effective tools to diagnose timely bacterial infection, (80.1%) use of antibiotics in the field of agriculture, in animals are the common factors promoting antibiotic resistance. On their perception towards antimicrobial teaching ,126 (92.6%) responded that they would like to have more education on the subject of antimicrobial resistance

Suparna Chatterjee et al,[14] 2022 in a cross-sectional observational study among clinicians majority being junior residents across five tertiary care teaching medical colleges India reported from their study findings that around (71.93%) felt overuse in hospitals, incorrect dosing/duration (67.98%) and inadequate diagnostic support (14.84%) are some of the important factors contributing to prescribing antibiotics in patients by physicians.

Similarly, a qualitative study on antibiotic use in rural setting of West Bengal by Mohit Nair et al,[15] (2019) reported findings that majority of allopathic physicians due to lack of adequate testing facilities or time prescribed empirical antibiotics. The study also reported influence of factors like unhygienic hospital conditions, suspected infections, patients demands etc on AMR. The WHO 5,6 has mandated an urgent need to build laboratory capacity to ensure reliable and rapid test results on which to base prescribing decisions and measures for the prevention and control of infections.

From a study report in Assam around (98%) veterinarians responded of having no written policy

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for use of veterinary health products, and (58%) no on-site diagnostic facilities. Hence there is an increasing concern about the role of livestock production in the emergence of antimicrobial resistance (AMR) and its consequent effects on human exposure.[16]

Consecutively, with regards to knowledge of preventive measures of AMR, as shown in Table 4(b), 133(97.79%) of our student responded that people should maintain hand hygiene, 124(94.85%) said antibiotics should be used when prescribed by a physician, followed by (87.5%) felt pharmaceutical companies should develop new antibiotics while (61.76%) responded timely vaccination of children could prevent AMR. Hand hygiene and hospital infection control measures plays an important role in preventing transmission of infection and resistant pathogens. In this respect, Indian Council of Medical Research (ICMR) has developed evidence-based treatment guidelines for treatment of common syndromes and for guiding the treatment and proper usage of antimicrobials.[17,18]

In our present study, out of the total 136 MBBS students (92.6%) students said they would like to have more education on the subject of antimicrobial resistance A similar finding was reported from a study in Mangalore, India conducted by Olivia Ritchie, et al,[18] (2017) where 88.2% of students said they would like more education on antibiotic selection at medical school .The World Health Organization (WHO) out of its five principles stated that the education of medical students on antimicrobial stewardship implementing rational antibiotic use plays a critical role in curtailing irrational antibiotic use . As MBBS students are the future prescribing physicians, the initiative for rational prescribing of antibiotics must start from the root level.[19,20]

Limitation of the study: The study was conducted as an online survey using self-administered questionnaire. Incomplete filling up of questionnaire, low student response were our study limitations. All parameters relating to knowledge of antimicrobial use could not be assessed due to limitation of time and resources.

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CONCLUSION

The present study findings highlights good knowledge among medical students and a positive attitude towards acquiring more knowledge on AMR. India has a National Action Plan on AMR containment thereby providing a platform for a more focussed approach to prevent and control AMR by the future physicians .

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