Awareness Regarding Antimicrobial Use and Antimicrobial Resistance among Health Care Professionals and Lay Persons

Tilesh Turankar1, Shilpa A. Gaidhane2, Priti Abhay Karadbhajane3, Sonali G. Chaudhari4, Abhay M. Gaidhane5, Shantanu Raju Sawale6

1, 2, 3, 4, 5, 6 Department of Medicine, JNMC, DMIMS, Wardha, Maharashtra, India.

ABSTRACT

BACKGROUND
Globally antimicrobial resistance is rising, and the Indian scenario is also similar to antimicrobial awareness. The study literature on awareness regarding antimicrobial resistance in public is less in quantity. This study was designed to determine the awareness of antimicrobial resistance and appropriate antimicrobial use among health care professionals and laypersons.

METHODS
This cross-sectional study was performed at a rural tertiary care hospital in Central India and included junior residents, interns and nurses, patients, and their relatives. Survey tool and data questionnaire were provided to participants in English and Marathi.

RESULTS
Total 384 people were enrolled as study participants. Health care professionals have more ideas than laypersons regarding antimicrobial use and antimicrobial resistance. Comparison of knowledge of antimicrobial resistance among hospital staff, patients and their relatives was done. The quantitative measurement of awareness of antimicrobial resistance took place with the help of this study. We were able to find out the prevalence of awareness of antimicrobial use and antimicrobial resistance.

CONCLUSIONS
This study showed a comparison between study participants for knowledge about antimicrobial resistance and antimicrobial use regarding factors like education, hand hygiene, income and those working in fields like agriculture, hospital, etc. There is a need to frame policies to prevent excessive use of antimicrobials and increase awareness about the knowledge of antimicrobial resistance in common people. If the knowledge of infection prevention and control (IPC) is well-known to everyone, the antimicrobial resistance will not be left for the treatment.

KEY WORDS
Antimicrobial Resistance, Health Care Provider, Awareness of Antimicrobial Overuse.

Corresponding Author:
Dr. Shilpa A. Gaidhane,
JNMC, DMIMS, Wardha,
Maharashtra, India.
E-mail: drshilpagaidhane@gmail.com
DOI: 10.14260/jemds/2022/107

How to Cite This Article:

Submission 03-09-2020, Peer Review 15-03-2022, Acceptance 21-03-2022, Published 08-04-2022.

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BACKGROUND

"Antimicrobial resistance refers to unresponsiveness of a microorganism to antimicrobial agents, and is akin to the phenomenon of tolerance seen in the higher organism".,[1] Nearly 600,000 people are losing their lives to antimicrobial resistance (AMR) per year and another 10 million are predicted to die by 2050. Mortality secondary to cancer and road traffic accidents is the same as antimicrobial resistance alone. [2] Due to antimicrobial resistance, there is not only an increase in morbidity and mortality rate but also a tremendous increase in financial burden. This leads to a rising economic load due to AMR to health systems that are already struggling with chronic underfunding.[1] Today over-the-counter (OTC) drugs are being widely used among the general public in India without knowing their repercussions. [2] Inappropriate antimicrobial use is a menace to society worldwide which results in the rise and spread of antimicrobial resistance in hospitals and community settings. [3] Moreover in India, the majority of the population resides in a rural area where there is a scarcity of doctors and other health care professionals resulting in inappropriate antimicrobial use. [8] Furthermore, India has the highest infectious disease burden in the world. Consequently, there is a major role of antimicrobials to decrease morbidity and mortality by infectious diseases. [4] Hence, the knowledge of appropriate use of antimicrobials and antimicrobial resistance (AMR) is required in developing countries like India, which is scarce. [6] To prevent antimicrobial resistance, future directions for India were pointed out by N Taneja et al. [1] A few directions were to educate the laypersons at the community level about antimicrobial resistance and to prevent over-the-counter antimicrobial use among them. Moreover, the authors recommended re-educating the health care professionals for appropriate antimicrobial use and improving antimicrobial prescription practices among health care professionals. There are very few studies on awareness of antimicrobial resistance in the rural population of Central India. Hence we wanted to study to obtain knowledge and awareness of antimicrobial usage and antimicrobial resistance among health care providers (HCPs) and laypersons in rural tertiary care hospitals.

Objectives

- To determine the awareness of antimicrobial use and antimicrobial resistance among healthcare professionals (resident doctors, Interns and nurses).
- To determine the awareness regarding antimicrobial use and antimicrobial resistance among laypeople (patient and the person accompanying patient) attending a rural hospital of Central India.

METHODS

This cross-sectional study was conducted at a rural tertiary care hospital in Central India. It was done among health professionals (like junior residents, interns, nurses), laypeople (patient and the person accompanying patient) attending the Medicine OPD and their non-sick relatives coming along with them. Daily medicine OPD caters to approximately 200 patients per day. There are 48 junior residents in one batch per year in our medical college. All three batches were considered for our study amounting to 144. There are nearly 170 interns per year. Nurses from the medicine IPD wards were recruited for our study.

Sample Size

Based on a study describing antimicrobial prescription practices, we assumed a prevalence of irrational antimicrobial usage (overuse and inappropriate choice of antimicrobials for treatment of viral infections) among healthcare professionals of 50 % with alpha = 5 %, design effect of 1 %, and 5 % acceptable margin of error. The minimum sample size was calculated as 384. The sampling frame was subsequently stratified among the four groups of healthcare providers - 96 junior resident doctors, 96 interns, 96 nurses, and 96 laypersons (patient and the attending person).

Selection Criteria

1. Health-care professionals like junior resident doctors, interns, nurses working in a rural tertiary-care hospital.
2. Laypersons (patient and the accompanying person) attending Medicine OPD in a rural tertiary-care hospital.
3. The laypersons (patient as well as the accompanying person) should be conscious, oriented and should be able to understand the proforma.
4. Subjects willing to participate in the study.

Survey Tool

A self-administered World Health Organization questionnaire was used to assess knowledge and awareness of antimicrobial use and antimicrobial resistance. [5] This survey tool was provided to health care providers and laypersons, to obtain the knowledge related to antimicrobial use and factors causing awareness in the Wardha district of Maharashtra, India. [5] World Health Organization questionnaire covers 13 questions assessing the knowledge of participants in the domain of i) uses of antimicrobials, ii) knowledge of antimicrobials iii) knowledge of antimicrobial resistance and iv) environmental factors leading to antimicrobial resistance.

Ethics

The study was started after seeking approval from the Institutional Ethics committee. The subjects meeting the eligibility criteria were informed about the study and included in the study after receiving written informed consent. The participants were assured of the confidentiality of data.

Data Collection

Background information regarding the participant's age, gender, education, address, occupation and per capita income
were noted. The self-administered world health organization questionnaire was pre-tested before data collection. World Health Organization Questionnaire was handed to the HCPs and they were asked to mark appropriate answers. The questionnaire was given on one-to-one basis to HCPs. The data collection was done in an excel sheet. For the layperson, Marathi translated WHO questionnaire was used for data collection. In the case of an illiterate layperson, they were interviewed orally in the local language and the answers were recorded. Both the options were provided to subjects to overcome literacy difficulties.

**Data Analysis**

The data was analysed with the help of STATA version 4 software. The main outcome variables were the proportion of health care professionals and a layperson aware of antimicrobial use and antimicrobial resistance. Estimate of the outcome variable was presented with a 95% confidence interval. Test of significance was used wherever appropriate. The level of significance was set at a P-value < 0.05.

Significance was calculated about the difference in the awareness between healthcare professionals and laypersons. T-test was applied for the significance of the difference between healthcare professionals and laypersons regarding awareness. By using the WHO questionnaire, we may be able to generate the knowledge of awareness about antimicrobial resistance and factors responsible for it across the study participants. The multivariate logistic analysis was done to find out the independent risk factor for the awareness of antimicrobial resistance.

**Implications**

The study may help-
- To determine the proportion of inappropriate antimicrobial use
- To create an awareness among HCPs.
- The policymakers to frame policies to prevent irrational use of antimicrobials.

**RESULTS**

This study was conducted at a rural tertiary care hospital in Central India. A total of 96 interns, 96 junior residents, 96 nurses and 96 laypersons took part in the study. Their knowledge, attitude regarding antimicrobial usage and antimicrobial resistance were assessed by using a questionnaire. Proportions and percentages were used for expressing results. The study was done among those who were willing to participate in the study. From our study, it was expected that the knowledge of junior residents about antimicrobial use and antimicrobial resistance should probably be more than nurses, interns and laypersons because they are studying this topic for many years and must have gone through various workshops regarding this conducted at various institutions or symposiums. It was also expected that nurses would have more ideas than laypersons regarding antimicrobial use and antimicrobial resistance.

Health care providers are an important group in controlling antimicrobial resistance. Increased morbidity and mortality due to antimicrobial resistance is adding a load to health systems in low-income countries, but it is producing a high economic burden, too. Though most of the health care providers are aware of antimicrobial resistance being a national problem, none is aware of the existence of any antimicrobial resistance awareness programs for antimicrobial resistance. By doing this study it was helpful to identify the gap of knowledge in health care providers and laypersons about the causes and factors contributing to antimicrobial resistance. Other studies have proven that less training time for physicians in pharmacology and infectious diseases spent have resulted in poor training. This poor training will not be helpful to manage antimicrobials and could be the underpinning factor driving the inappropriate prescribing. In recent times, gram-positive and negative bacterial infections have become difficult to treat with conventional antimicrobials. Most of the bacteria show multidrug resistance patterns. Biofilms are involved in antimicrobial resistance by creating obstacles in infection control. In primary care, viruses cause most infections, there is a particular problem taking birth which is overprescribing of the antimicrobials, general practitioners should be aware of this drug overprescribing problem.

The potent drivers for antimicrobial resistance include the use of different antibiotics in the health care system, agriculture / livestock, quality of drugs, standards of infection control, diagnostics and therapeutic system, sanitation setting and usable water quality. Health care providers should be aware of the above important factors related to antimicrobial resistance. Health care providers are most likely to prevent antimicrobial resistance in their practice and advice patients on the same if they are themselves aware of antimicrobial resistance. There will be challenges for the health care providers due to the current shortage of effective drugs, lack of successful prevention measures and only a few new antibiotics in the clinical pipeline. Therefore, health care providers should be equipped with knowledge of the development of novel treatment options and alternative antimicrobial therapies. Infection prevention and control (IPC) can be the most reliable intervention to fight against antimicrobial resistance. The staff in the research group should educate the health care providers with daily training and practice of infection prevention and control measures, which help them to cope with the sudden epidemic outbreak. In the high-risk department, the rate of transmission and the high incidence is more, so health care providers should pay more attention to infection prevention and control measures. There is a need to test the new innovative methods to monitor IPC practice that includes electronic and infrared technology.

The antimicrobial resistance might affect the relationship between patient-hospital care providers, accompanies complaints, and creates legal matters. Reduction or increase of facilities and staff in hospitals directly affects the status of antimicrobial resistance. Infrastructural changes at the facility level such as the accessibility to specific equipment, density of hand washing points, availability of single
occupancy rooms and more will affect the availability of data related to antimicrobial resistance.[14] There are two main control measures for the reduction of antimicrobial-resistant bacteria in hospital premises, improvement in accession in hand hygiene practices and reduction in the use of antibiotics. Some research estimated that hand hygiene can be proven as a milestone and reduces 40% of antimicrobial resistance health burden. Protocols need to be created with evidence-based including infection prevention and control practices except for hand hygiene.[15]

Research should rely on surveillance of clinical information of patients instead of data collected from microbiological tests or data gathered for other primary purposes. Surveillance will be pure syndrome based, valid and reliable. Research has to be focused on the factors related to the spread of infection such as staff workload, availability of staff and bed and allowance of the visitor to meet the patient and resistance from patient to bed. With the visitor, the load of microbes will increase unknowingly in the hospital and produce obstacles in treatment. The study of the interaction between the human and hospital microbiome should have to be an important topic for research and have to find the scientific reason and perfect solution for multi-drug resistance.[14]

Infection prevention and control training programmes should be evaluated in innovative ways such as e-learning and self-directed training modules. No study on the impact of these innovative training tools is held to date on the practice change and infection rate in healthcare facilities. Recruitment should be done with consideration of minimal standard requirements and training of infection prevention and control professionals.[14]

Knowledge of antimicrobial resistance of patients and families should be checked or education for control of infection in the hospital should be given via poster or training programme related to infection prevention and control. There is a need for a study to assess the factors such as statistical, economic, sociological, administrative which shows the barriers and challenges to control antimicrobial resistance and implement effective infection prevention and control programmes.[14]

CONCLUSIONS

As we all know antimicrobial resistance is one of the main public health problems worldwide, this questionnaire seemed to be a very useful tool for collecting data on knowledge of antimicrobial use and antimicrobial resistance among health care providers in a developing country. This study unveiled the awareness and knowledge regarding antimicrobial usage, antimicrobial resistance and factors eliciting antimicrobial resistance amongst the common person. Furthermore, the study unravelled some answers to the questions such as, is there any need for a formal source of information for use of antimicrobial and antimicrobial resistance to help health care providers and laypersons to improve their knowledge.

REFERENCES