

## A questionnaire-based survey on use of antibiotics among the southwest Maharashtra population

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### Abstract

**Introduction:** Awareness about the use of antibiotics and its resistance is necessary to minimize the threat of emerging resistance. A questionnaire-based survey was conducted to analyse this knowledge among the studied population.

**Objectives:** To bring awareness of antibiotics use, its disposal and to initiate medicine take-back program in the community.

**Materials and Methods:** The present community-based descriptive, cross-sectional study with Mon purposive convenient sampling methods for sample collection performed on 650 families (2200 participants), from southwest Maharashtra population. The data was collected by giving questionnaires to the participants, related to antibiotics, its safety and disposal methods in English and local language designed by the author and confirmed by the institutional research committee. The data was analysed by descriptive analysis of all the variables to obtain frequency and percentage.

**Result:** Ignorance about antibiotics and its resistance was seen in 76.9% population, 61.5% population believed antibiotics were harmless, 65.9% population continued the full course of antibiotics as prescribed, 81.4% population were not instructed by doctors about the hazards of not taking full course of antibiotics prescribed and 66.1% took antibiotics without prescription. 70.5% participants reported sharing antibiotics with others. Unawareness of antibiotics disposal was seen in 60% population who threw them in the trash as it is. Unused or unwanted medicines were collected by the investigator and either disposed of or reused (if in good condition) for needy patients. At the end of the visit, participants were instructed on proper use of antibiotics.

**Conclusion:** The antibiotics knowledge in the studied population was low. Instructions were given to bring awareness regarding the use of antibiotics, its resistance and proper disposal.

**Keywords:** Antibiotics, Resistance, Public health, Antimicrobial resistance, Questionnaire.

### Introduction

Antibiotics were seen as wonder drugs in the mid-20th century. The period from the 1950s to 1970s was considered as the golden era for the discovery of novel antibiotic classes.<sup>1</sup> Enormous and irresponsible use of the antibiotics has contributed significantly to the advent of resistant bacterial strains.<sup>2</sup> Today, antibiotic resistance is a global threat. Each year in the U.S. at least 2 million people are infected with antibiotic-resistant bacteria and at least 23,000 people die as a result.<sup>3</sup> According to World Health Organisation (WHO) the age standardised mortality due to infectious disease in India in 2008 was 377 per 100 000 persons which is highest in south Asia.<sup>4</sup> Antibiotic resistance happens when germs like bacteria and fungi develop the ability to defeat the drugs designed to kill them. As a result, these medicines become ineffective and resistant strains spread to others. These microorganisms that develop resistance to antimicrobials are referred to as superbugs.<sup>5</sup>

Novel resistance mechanisms are emerging and spreading globally, threatening our ability to treat common infections and resulting in prolonged illness and also death. Antimicrobial resistance (AMR) often occurs through genetic level mutations in bacteria. However, this process of AMR is accelerated due to misuse and overuse of antibiotics in humans, animals and agriculture as growth promoters and has put every nation at risk.<sup>6</sup> WHO<sup>4</sup> has warned that a post-antibiotic era will result in frequent infections where small injuries may result in death. Alert to this crisis, the World Health Assembly in May 2015 adopted a global action plan, to improve awareness and understanding of antimicrobial

resistance by effective communication, education and training, to strengthen knowledge and evidence base through surveillance and research, to reduce incidence of infection through effective sanitation, hygiene and infection prevention measures, to optimizing the use of antimicrobial medicines in human health and to increase investment in new medicines and its research, diagnostic tools, vaccines.<sup>7</sup>

We are standing at the edge of the antibiotic era. If proper measures are not taken today, we will soon enter the post-antibiotic era where no antibiotics will be available to treat common infections. There is a correlation existing between the usage of antibiotics and resistance where populations who use lower amount of antibiotics develop lower amount of resistance toward bacteria.<sup>8</sup> Resistance is a serious problem leading to serious difficulty in treating bacterial infections.<sup>9</sup> The problem of resistance is compounded in developing countries like India due to multiple reasons which include self-medication without prescription, over-the-counter sale of antibiotics, inadequate regulation of antibiotics, high cost of medical consultations, and dissatisfaction with medical practitioners.<sup>10,11</sup>

Evidence from the literature suggests that the knowledge regarding antibiotic resistance in population is still scarce.<sup>12</sup> The need for educating patients and the public is essential to fight the antimicrobial battle. The objectives of our study aimed 1) to study and bring awareness of antibiotic use in the community 2) to bring awareness and demonstrate the proper method of disposal of unused antibiotics in the community 3) to initiate medicine take-back program in the community. We hoped the results of the study would guide us to take a few

measures to help reduce antibiotic resistance and be part of the global action plan by WHO for preventing AMR.

## Materials and Methods

### Study design

Community based descriptive, cross-sectional study with Mon purposive convenient sampling methods for sample collection.

### Sample size

Selected area of community, about 650 families (2200 participants)

### Inclusion criteria

Family member more than 15 year of age

### Exclusion criteria

Those families who are not ready to take part in the study.

### Plan of work

Study conducted in DY Patil Medical College Kolhapur by II year MBBS students in department of Pharmacology after taking permission from IEC (Institutional ethical committee).

### Activities done during the study

**To study and bring awareness of antibiotic use in community:** First all II year MBBS students (130) were made aware of antibiotic resistance, reasons and measures to decrease chance of developing antibiotic resistance by taking a lecture by faculty. Pretested structured questionnaire was prepared and it was validated by taking experts opinion and pilot study. Each student visited 5 houses in the selected community. During each visit student gave a questionnaire prepared to the family members and asked to fill it. Questioner consist of questions in English and local language, related to antibiotic use its safety, its disposal method etc. Lastly students educated the family for proper use of antibiotics.

**To demonstrate proper method of disposal of unused antibiotics:** Demonstration of proper method of disposal of unused antibiotics in community will help us to reduce chances of development of antibiotic resistance.

**To initiate medicine take back program in community:** Our aim to initiate the medicine take back program in community, where we collected the unused antibiotics from the houses during visit and were properly disposed(if spoiled or expired) and antibiotics in good condition were collected and used for poor and needy patients who cannot afford costly antibiotics.

**Data collection and analysis:** Questionnaire data collected was analyzed. Descriptive analysis was performed on all the variables to obtain the frequency and percentage.

## Results

After collection of data, 2,200 Questionnaire were analysed. Among them 1,185 were female responders and 1,015 were male responders.

### Public perception of the use of antibiotics

The present study showed that 76.9% (n=1690) of the study population was unaware of antibiotics and its resistance. 23.1% (n=510) of participants were aware of antibiotics and antibiotic resistance. Of the total, 61.5% (n=1350) population believed antibiotics were not harmful and among these, females 55.6% (n=750) were less likely to perceive antibiotics as harmful compared to males. The study showed that 65.9% (n=1450) population were known to continue the full course of antibiotics as prescribed by doctors, and females were more likely to continue the course 58.6% (n=850) compared to males 41.4 % (n=600). We found that 81.4% (n=1790) population were not instructed by doctors about the hazards of not taking the full course of the antibiotics prescribed. Around 66.1% (n=1455) of study participants self-medicate (over the counter or OTC) antibiotics i.e. take antibiotics without doctor's prescription. Females showed a higher tendency towards OTC antibiotics 56.7% (n=825). OTC antibiotics were mainly taken for common cold and body-ache and the most common reason for not taking doctor's prescription was high consultation fees. Nearly 70.5% (n=1550) of the participants reported sharing antibiotics with family members and others, of whom males showed more tendency of sharing the antibiotics 54.8% (n=850).

### Awareness of disposal of unused antibiotics

In this study, 60% of the study population were unaware about antibiotics disposal and threw unused antibiotics in the trash. The proper method of disposal of unused drugs was demonstrated to the population.

### Medicine take-back program for community

Unused and unwanted antibiotics were collected during the visit. If medicines were spoiled or expired, they were properly disposed. Antibiotics in good condition were handed over to consultants and used to treat poor and needy patients who cannot afford costly antibiotics.

### Awareness of the use of antibiotics for community

At the end of the visit, participants were instructed on the proper use of antibiotics and told to take antibiotics only when the doctor prescribes them, take the full course of antibiotics, avoid self-medication of antibiotic, not to take antibiotics for viral infection (common cold, sore throat, etc), not to share antibiotics with others and that unnecessary use of antibiotics may cause harm (resistance).

In feedback 100% said this activity of bringing awareness of antibiotic use and medicine take back program is going to help them in future.

**Table 1:** Questionnaire data of community

Item(Questions)	Yes (n=2200)	No (n=2200)
1. Do you know, what is antibiotic and antibiotic resistance	510(23.1%)	1690 (76.9%)
2. Do unnecessary use of antibiotics cause any harm to you	850(38.6%)	1350(61.5%)
3. Do you take all course of antibiotic as prescribed by doctor.	1450(65.9%)	750(34.1%)
4. Are you been instructed by doctors, the hazards if you don't take the full course of antibiotics	410(18.6%)	1790(81.4%)
5. Do you self medicate (OTC) antibiotics	1455(66.1%)	745(33.9%)
6. Do you give left over antibiotics to family members or others?	1550(70.5%)	650(29.5%)

**Table 2:** Interview with responders (feedback)

Item(Questions)	Yes (n=2200)	No (n=2200)
7. Do you find this activity is going to help you?	2200(100%)	-
8. Is this medicine take back program is going to help you?	2200(100%)	-

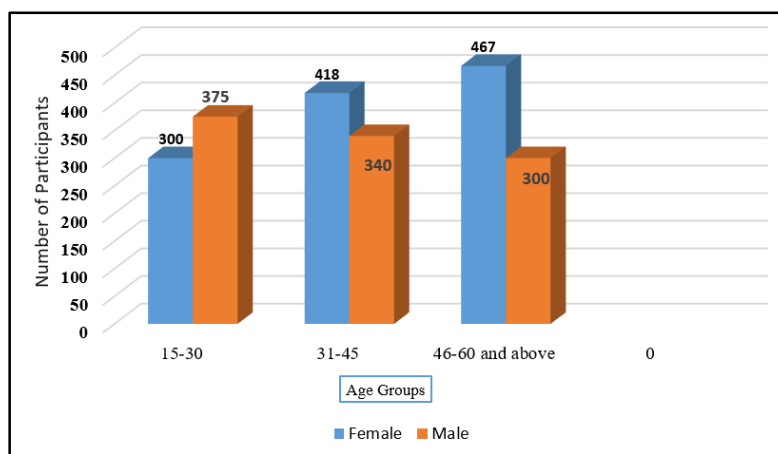
**Fig. 1:** Distribution of participants according to age and sex

Fig. 1 shows 53.9% (n=1185) were female and 46.1% (n=1015) were male. Patients were grouped in three groups according to age between 15-30(30.6%), 31-45(34.5%), 46 and above (34.9%),. Most of the participant female were in age group of 46 and above (39.4%) and males were in age group of 15-30(36.9%).

## Discussion

Antibiotic resistance is causing major health issues in India due to the high burden of infectious diseases, unregulated sale of antibiotics, financial incentives for healthcare providers to prescribe antibiotics, patient expectations, rising incomes, and limited public health response.<sup>13,10,11</sup> The medical curriculum does not adequately focus on rational antibiotic prescribing. Physicians have been reported to overprescribe antibiotics because of financial incentives and patient expectations.<sup>14</sup> Despite being costly, the consumption of antibiotics like carbapenems is increasing, possibly because of inappropriate prescribing and non-prescription sales.<sup>15</sup> Evidence from China shows that eliminating financial incentives leads to an immediate reduction in the prescription of antibiotics.<sup>16</sup> Self-administration of antibiotics bought without a prescription is also a serious concern.<sup>17</sup> Thus, the smart use of antibiotics is the key to control the spread of resistance.<sup>18</sup> Most of the major resistance control strategies recommend educating the general public to promote appropriate antibiotic use.<sup>19</sup>

In our study none of the family denied to take part in the activity. We have included family members more than 15 year of age, so that they can understand the importance and

actively participate in the study. In this study, we observed that 81.4% (n=1790) population were not instructed by doctors about the hazards of not taking the full course of antibiotics prescribed. Similarly, the study of Kotwani et al. highlighted the poor doctor-patient relationships and its implication on the inappropriate use of antibiotics. Both student teacher groups were not satisfied by the information provided by doctors on the use of medicines and antibiotics.<sup>20</sup> Health professionals however do play an important role in educating people about potential risk of antibiotics use, as people are more likely to trust and consider their therapeutic advice and medical knowledge. When a patient is diagnosed with an infection that needs to be treated with antibiotic drugs, the medical professional should provide proper instructions on its usage such as dose, frequency of dose, treatment course and the harmful effects of its misuse.<sup>21</sup>

The present study showed that 76.9% (n=1690) of the population studied were unaware of knowledge of antibiotics and its resistance. In stark contrast, only 9% of unawareness was seen in the Chinese population.<sup>22</sup> These variations may be due to the level of public health awareness, education, living standards and the economy of the country.<sup>18</sup> The awareness campaigns are one of the best tools to change the

way people use medicine, but in India there is lack of such awareness campaigns. In the studied population, 61.5% (n=1350) of the participants believed antibiotics were not harmful, and females 55.6% (n=750) were less likely to perceive antibiotics as harmful compared to males. In contrast to our findings, the study performed by Desai A. J. et al.<sup>18</sup> showed only 28% participants believed antibiotics were not harmful, while the studies of Andre et al.<sup>23</sup> and Vanden et al.<sup>24</sup> showed that 28% and 58% population respectively believed that antibiotics were not harmful. Such unawareness and misguided use is a danger to public health. Unawareness about the effect of antibiotics overuse, consumption of OTC antibiotics without prescription can cause serious resistance.<sup>25-27</sup> In this study, 66.1% (n=1455) participants self-medicated with OTC antibiotics i.e. consumed antibiotics without doctor's prescription. Women showed a higher tendency towards use of OTC antibiotics 56.7% (n=825), which agrees with the findings of Desai A. J. et al.<sup>18</sup> This study showed that OTC antibiotics were mainly taken for common cold and body-ache and the most common reason for not taking doctor's prescription was high consultation fees. Antibiotics should be used only to treat bacterial infections, as they are not effective against viral infections like the common cold, most sore throats and the flu. Repeated, widespread and improper use of antibiotics are primary causes of spread of drug-resistant bacteria.<sup>18</sup> In this study, 70.5% (1550) participants reported sharing antibiotics with family members and others, of whom males showed more tendency of sharing the antibiotics, 54.8% (n=850), a higher percentage as compared with previous studies.<sup>18,28</sup> In our study 90% people had completed higher secondary education and 86% had completed graduation.

In the present study, 60% population were unaware about proper antibiotics disposal and threw unused antibiotics in the trash as it is, similar to the study of Sonowal et al.<sup>29</sup> who showed 61% subjects were unaware about disposal of medicines. The participants were instructed that unwanted or expired antibiotic drugs are to be taken out of their containers and mixed with undesirable substances (coffee grounds, kitty litter, spoiled food), placed in an empty can or plastic bag or sealed in an opaque container and discarded in the trash on the same day the trash is collected, safely secured from children, pets and others. These are to be later incinerated or placed in government-approved solid waste landfills.<sup>30</sup>

After completion of data collection, we initiated a medicine take-back program for disposal (if spoiled or past the expiration date) or reuse of antibiotics in good condition for the poor and needy patients. The present study was performed on a small population and may not provide full information about the scale of the problem. More systematic efforts are required on a larger scale to assess and increase awareness among the general public and the professionals in healthcare facilities, livestock and aquaculture sectors alike, to reduce the misuse of antibiotics.

We are conducting this activity as best practice in department of pharmacology and include this activity in our curriculum and involve each batch of II year MBBS to do the

above activity every year. Thus within short period we can educate the larger area of population, Thus small steps today may help us to avoid major problems in future of antibiotic resistance.

### Conclusion

The present study showed unawareness among the population about antibiotics use, resistance, and disposal. The participants were educated about resistance, proper use and disposal of antibiotics. Medicine take-back program for disposal or reuse of antibiotics was initiated. Although the results of this study cannot be generalized to other areas of India. It can be a concern that needs to be addressed in other part of Maharashtra to bring awareness of antibiotics and be a part of global action plan for antibiotic resistance.

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### Conflict of interest

There is no conflict of interest

### Ethical approval

Institutional ethical approval was taken.

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