

Understanding about antibiotics and its usage in the community- A pilot study

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Abstract

Background: To evaluate the knowledge about antibiotics, to estimate the extent of self-medication practice, and to study some of the factors influencing this practice. **Methodology:** This was a descriptive, comparative, cross sectional study conducted in Katraj area of Pune City. 20 families each of low and high income group were included in the study. Study was carried out in the month of May-June 2019. The data collection started after obtaining ethics committee approval and informed written consent of the respondent. Specifically designed, structured questionnaire was used for data collection. The questionnaire was filled up by trained personnel by interviewing one respondent, per family, responsible for caring of the health of the family. Questionnaire consisted of three sections- first on socio-demographic details, second was to understand their knowledge of antibiotics and third was on the details of self-medication practices of the family. Data analysed with SPSS 25.0 software. **Results:** Only few of the respondents could explain the term antibiotics and some could name Streptomycin and amoxicillin as antibiotics. It was observed that self-medication of antibiotics was a common practice across both income groups, but it was higher in high income group. Approx. 75% of the participants believed that antibiotics can cause adverse reactions out of which 70% had ADRs due to AMA self-medication. 65% obtained antibiotics from previous doctor's prescription. Most individuals in the low socio economic community obtained antibiotics through prescription. **Conclusion:** Self-medication of antibiotics is high in the society across income groups. Education of the community is urgently required to reduce this practice and the dire implications of self-medication of antibiotics.

Key words: Antimicrobial resistance, self-medication

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INTRODUCTION

Antibiotics or antimicrobial agents (AMAs) are the substances obtained from the microorganisms and used to kill other microorganisms in low concentrations with minimal effect on the host cells. Advent of this group of agents, brought accolades to modern medicine by reducing infections. During initial phase of development of antibiotics, many organisms were highly sensitive to them and so, control of infection was rapid and complete.

This reduced the occurrence of many epidemics. Eventually, with widespread use of AMAs, organisms acquired changes which reduced their sensitivity to AMAs.¹ This is called bacterial resistance. This adverse effect, therefore, is related to frequency of use of antimicrobials. So, to sustain the sensitivity of organisms to antimicrobial agents, we need to reduce their use and when put to use, do it rationally. Rational use of antibiotics starts from right selection of antimicrobial agent, using them in right dose and duration and also affordable to the recipient and the community in general.² We need to use AMAs to control infections. What we need to avoid is its excessive and irrational use.³ Antimicrobial resistance is rapidly increasing and posing problem worldwide. Infections are commonplace in developing country like ours and so is the use of antimicrobial agents. More the use of antimicrobials, more is the development of resistance. Hospitals, where these agents were used in large numbers, were the source of development of antimicrobial resistance.^[4] A study has shown that resistance has already spread in the

community and many resistant strains are now found in the community,⁵ suggesting increase in the use of antimicrobials in the community. Though the rational use of antimicrobials revolves round the patients, prescribers and dispensers are equally involved. Rather selection, deciding the dose and duration of antimicrobials is the purview of the prescriber. Control needs to be exercised on the prescribing patterns of doctors which led to the development of standard treatment guidelines for various infections. To control the availability of antimicrobial agents at the pharmacy outlets, Government has come up with regulations to curb the dispensing of antimicrobial agents without any prescription. Despite these measures, antimicrobials appear to be dispensed at the pharmacy outlets with a request from patients without the prescription.⁶ To obtain drugs without the prescription is self-medication by the users. Self-medication of AMAs is reported from many countries including affluent countries where the dispensing of medication is tightly regulated.⁷ It is reported to be influenced by many factors. If self-medication happens in the populous country like ours, development of AMA resistance would be rapid and widespread. So, the present study was undertaken to evaluate the self-medication of antimicrobial agents in the community and factors responsible for it.

MATERIAL AND METHODS

Sample Size

Sample size was calculated on the basis of prevalence of misuse of antibiotics in India.⁸ Sample size was 384. This being pilot study, 10 % of sample size i.e. total 40 families were considered for data collection from low and high socioeconomic group.

Study design

This descriptive, comparative, cross sectional study conducted in Katraj area of Pune City. Study started after obtaining ethics committee approval

[BVDUMC/IEC/29]. Stratified random sampling based on socioeconomic status (SES) of family was done. For socioeconomic classification of the population, B G Prasad's socio-economic classification updated in 2019 was used.⁹ Families in social class I and II were considered in high socioeconomic status (HSEG) group and remaining in low socioeconomic status (LSEG) group. 20 families were randomly selected from each group.

An informed written consent was taken prior to the data collection. Before the application of the questionnaire, detail information about the research project was provided to the participants.

Study questionnaire

A structured questionnaire was prepared and it was validated (content and face validity) by consulting epidemiological expert. One member who was responsible for caring of the family was selected for interview. Volunteers were trained to carry out the interview and to enter the information in the google forms. Apart from socio-demographic details of the study participants, the questionnaire had two parts- in first part, the knowledge of participants of antimicrobial agents-like what are antibiotics, naming of some antibiotics, some of practice details and knowledge about its adverse reactions were included. In the second part, whether antibiotics were used without prescription, sources of advice, frequency and reasons for antibiotic use, dose and duration of antibiotics, deliberate change in antibiotic, adverse effects associated with its use were included.

Data analysis

The data was analysed using SPSS 25.0 statistical software.

Descriptive statistics like mean and standard deviation for quantitative variables.

The association between two qualitative variables was assessed using chi square test.

RESULTS

Table 1: Sociodemographic details

		LSEG	HSEG
Gender	Female	25%	45%
	Male	75%	55%
Age Category	<30 years	40%	40%
	30 - 39 years	15%	20%
	40 - 59 years	45%	40%
Level of Education	Primary Education	30%	
	Secondary Education	30%	5%
	University Graduate	40%	95%
Monthly Income (Rs/ month.)	≤ 19,900 /-	65%	
	20,000-29000 /-	35%	
	30,000-39,000 /-		20%
	> 40,000 /-		80%
Health Insurance		30%	85%

75% of respondents from LSEG were male members, indicating that the onus of health care in LSEG lies on male members of the family. Whereas, male and female distribution was almost equal in HSEG. Age distribution of family members amongst LSEG and HSEG was similar. Most of the respondents (95%) from HSEG were graduate whereas in LSEG, only 40% were graduate. Monthly income of 65% of LSEG respondents was below Rs. 20,000/- month and 80% of HSEG had income more than Rs. 40,000/ month. 85% from HSEG and only 30% from LSEG individuals had opted for health insurance. So, apart from income, the major difference between HSEG and LSEG was that of education and the presence of health insurance.

B| Knowledge about antibiotic

Almost all the participants were aware of the term antibiotic. Only one person from LSEG was unaware about this term.

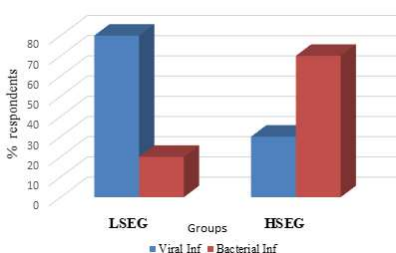


Figure 1: Participants opinion about the indications of antimicrobial Use

Total 16 individuals from the LSEG felt antibiotics were used for viral infection, 3 responded to bacterial infection and 1 person thought it was given for fever. From the HSEG, 11 individuals knew that antibiotics are used for bacterial infection, 7 said they were used for viral infection and according to 3 respondents they were used for both the types of infections.

Table 2: Knowledge about antimicrobial Use

Items		LSEG	HSEG	
Knowledge about AMA	Higher doses result in faster recovery	10%	20%	
	Switching antibiotics enhance drug effects	10%	05%	
	Switching antibiotics reduce adverse reactions	20%	30%	
Adverse reactions	Injection better than oral medication	60%	45%	
	Antibiotics could produce adverse reactions	75%	80%	
	Common ADRs of antibiotics			
	Nausea and Vomiting	66.7%	57.9%	
	Diarrhoea	16.7%	33.2%	
	Rash	16.6	8.9%	

20% of participants from HSEG thought that higher doses result in faster recovery whereas higher number of participants from LSEG believed that switching the antibiotics enhance the efficacy of AMAs. More than 20% participants from either group thought that switching antibiotics can reduce adverse effects. 60% from LSEG and 45% from HSEG believed that injections work better than oral medications. More than 75% respondents of both the groups knew that antimicrobials can cause adverse reactions. From HSEG, 57.9 % participants think that nausea and vomiting were the common adverse reactions observed with AMAs while 33.2% said it was diarrhoea and 8.9% felt that they could produce rash. In LSEG 66.7% said nausea and vomiting were the common adverse reactions, 16.7 % said they can cause diarrhoea and 16.6 number of people felt rash was produced with AMAs.

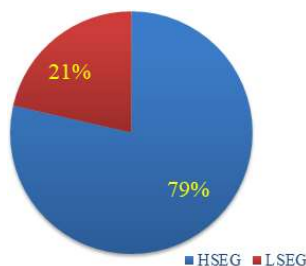


Figure 2: Knowing names of Antibiotics

As seen in above figure, 79% participants from HSEG were able to name some antibiotics whereas from LSEG only 21% were able to do it.

C) Self-Medication Behaviour

Data was analysed to determine the patterns of self-medication, compliance and awareness regarding antibiotic medication.

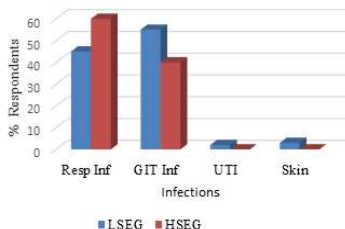


Figure 3: Indications of use of antimicrobials

Respiratory and gastrointestinal infections were the common causes of AMA use. Around 40% used antibiotics for respiratory infection, 55% participants used it for gastro infection, in LSEG. Whereas from HSEG, 57% used AMAs for respiratory infections and 37% for GI infections.

Table 3: Aspects of Self medication Behaviour

Antibiotic use	Options	LSEG	HSEG
Self Medication		75%	95%
Reasons	Convenience	60%	95%
	To reduce the cost	40%	5%
Selection	Previous prescription	55%	70%
	Recommendations of Pharmacist	40%	10%
	Recommendations of friend	5%	10%
	Netizen (information from internet)	0%	10%
Changing dose/duration	Always	5%	5%
	sometimes	25%	40%
	Never	70%	55%
Procurement	Pharmacy	95%	85%
	Left over	5%	5%
	Online	0	10%
Stoppage of AMA	Disappearance of symptoms	60%	40%
	Antibiotic run out	5%	-
	Completion of course	35%	60%
Adverse reactions		70%	20%

Approximately 75% had taken to self-prescribing of antibiotics in LSEG and 95% in HSEG.

Around 70% never changed the dose and duration of the Antibiotics during the treatment, 25% sometimes and around 5% always changed the dose and duration during the treatment from LSEG. From USEG 55% never changed, 40% sometimes changed and 5% always tried to change the dose and duration of medication. From LSEG, 60% had self-medicated for convenience and 40% to reduce the cost. Most of the respondents in HSEG (95%) had done it for convenience and only 5% to reduce the cost.

Among LSEG, 55% obtained it based on the previous prescription, 40% on recommendations of community pharmacist and 5% on the recommendations of friends. 70% respondents from HSEG obtained medicines from previous doctor’s prescription, only 10% got it from the pharmacist. Importantly, remaining 10% obtained it from information available on the net. From both the groups, majority bought the medicine from community pharmacy and 5% from used the left over medicines. It is seen that those who got information from net, have probably opted to purchase medications on line, in HSEG (10%). 35% from LSEG and 60% from HSEG stopped AMAs after completing the course. But for remaining, disappearance of symptoms was sufficient to stop the medication.

70% from LSEG and 20% in HSEG had adverse reactions after using AMAs.

Table 4: Understanding the information about use of AMAs

	LSEG	HSEG
Checking Instructions on package insert		
Always	55%	70%
Sometimes	45%	30%
Understanding the information		
Fully	45%	80%
Partly	45%	20%
Not at all	10%	-

Checking of information about antibiotic-Around 55% always checked how to use the antibiotic intended out of which nearly 45% fully understood the instructions, 45% partly and remaining 10% didn't understand at all from LSEG group. From the HSEG 70% always checked, 30% sometimes about antibiotic intended. Around 80% fully understood, 20% partly how to use the antibiotics. At the end 50% from LSEG and 45% USEG believed it is not a good Practice, 35% from LSEG and 45% from USEG believed it to be acceptable and 15% thought it to be a good practice from LSEG and 10% from USEG are of same opinion.

DISCUSSION

Antimicrobial resistance in pathogens has become a major health problem. It has gained enormous magnitude to become a threat to human health. Infections caused by the resistant organisms are difficult to treat and are responsible for morbidity, mortality and healthcare costs. Development of antimicrobial resistance is a natural process arising out of use of AMAs. But this gets accelerated with increasing and irrational use of AMAs. The development of resistance to the existing antimicrobials is important in view of the fact that not many new agents are seen in the pipeline. So, resistance to available antimicrobial agents has major consequences for the society and especially for those who are economically marginalized and have the least access to health care.¹⁰ Social, economic and community practices are often underappreciated, and even ignored by many, as contributing to the major and ever-growing global AMR problem.¹¹ In the present study we tried to evaluate socioeconomic category wise knowledge of antibiotics, its use and self-medication practices. Though many scales are available for socioeconomic categorization of the population, B.G. Prasad's scale is widely used because of its ease of application. This classification uses per capita income to group the population, into five groups.¹² We considered group I and II as high socioeconomic group (HSEG) and others into low socioeconomic group (LSEG). Most of the families which we interviewed, had four or more people in one family. So, those families with income above Rs. 30,000/- per month were considered as HSEG and below this, were grouped into LSEG. Major differences

between these groups were that of education and presence of health insurance (Table 1). In addition, it was observed that mainly male members were the caregivers in LSEG whereas both male and female took care in HSEG. Male gender, lack of knowledge regarding antibiotic usage and resistance and cost reduction were significantly associated with the likelihood of self-medication, in LSEG. A similar trend was seen in Uttar Pradesh and Kerala.^{13,14} A probable reason could be to save the wage-earning hours. In the present study, respiratory and gastrointestinal infections were the major causes for which antibiotics were used (Figure 3). We found that amoxicillin and norfloxacin were the most commonly used antibiotics. This matches in a study in Sindh, Saudi Arabia and Europe, penicillin and macrolides were found to be the most commonly used antibiotics.^{15,16} When any medication is used, it is very important to have correct knowledge about its efficacy and adverse effects. Antibiotics are the agents used for treating bacterial infections and have no role in the treatment of viral infections.¹⁷ The replication of viruses is totally different from that of bacteria and drugs targeting bacterial growth system are ineffective in controlling viral infections. While they do not produce any lethal effect on viruses, they can develop resistance in the commensal bacteria. So, the use of AMAs in treating viral infections is absolutely unjust. Figure 1 shows that respondents from LSEG as well as HSEG were using AMAs for viral infections, though the use was more in LSEG. Though most of the respondents from either group were knowing about antibiotics, 80% respondents from LSEG failed to name any antibiotic (Figure 2). There were many gaps in the knowledge of antibiotics. 20% respondents from HSEG and 10% from LSEG felt that increasing dose of antibiotics can lead to faster recovery. Dose of any AMA is carefully fixed to maximise the killing of organisms.¹⁸ If the dose is reduced, the desired anti-bacterial effect may not be produced. This will mean that the infection may not be controlled. If higher doses are used, chances of occurrence of adverse effects increase. So, changing dose of AMA in any direction can be detrimental. It was observed that 30% respondents from LSEG and 45% from HSEG tried to change the dose of antimicrobials (Table 3). Another important gap was about switching of antibiotics. Switching antibiotics means exposing the infecting and other commensal organisms to multiple antibiotics, increasing the chances of developing multiple drug resistant strains.¹⁹ Strict guidelines for switching of antimicrobials are laid down for practitioners.²⁰ Changing antibiotics without proper information, could significantly increase chances of development of antimicrobial resistance. Many misconceptions seem to

be present regarding use of antimicrobials. Self-medication practises are prevalent across the globe. In a recent report from Delhi, self-medication for various ailments is reported to be 84%. Studies conducted in India reported self-medication of AMAs ranging from 33% to 78%.²¹ In the present study, self-medication was found to vary amongst socioeconomic groups- LSEG it was 75% and in HSEG it was 95% (Table 2). A study from Puducherry also observed similar type of results about self-medication.²² Our results were similar to the studies conducted in Kerala, Puducherry, rural Maharashtra and rural Uttar Pradesh. Though convenience is the major reason for opting for self-medication, 40% respondents from LSEG had to do it for cost constraints'. While using anti-microbials, the most important step is its selection.²³ It is very important that precise diagnosis is made and the causative organisms identified before initiating the treatment with anti-microbials. As far as possible, narrow spectrum antibiotics, which will target the organisms under consideration, should be chosen. So, this is the job of doctors. Cough could be the manifestation of simple ailment like common cold to serious disease like pneumonia. In these conditions, the organisms vary and so the drug of choice. Naturally therefore, understanding of the disease conditions and knowledge of antimicrobials is required for proper treatment.²⁴ It is very important to realise that with anti-microbials infection and not the symptom is treated. So, getting the antibiotic without consulting doctor would be problematic and considered irrational. If antimicrobials are used when not indicated or broader spectrum antimicrobials are used in place of narrow spectrum, chances of development of anti-microbial resistance can increase many folds. One important finding of this study was that 10% of respondents from HSEG selected antibiotics with the information from the net and also procured the drug from the on-line sources. So, there was no intermediary agency to explain the drug use. Moreover, it was found that though many respondents from HSEG tried to read the information on the package insert, 20% of them could not understand it completely (Table 4). Chances of improper use of AMAs would definitely be high in such situations. Though 35% from LSEG and 60% from HSEG completed the course, remaining people opted to stop the antibiotics once symptoms reduced. Stopping the treatment before completion of the course of antibiotics was also evident from the fact that 5% had left over medications in their household. Surveys investigating antimicrobial use have reported similar observation.²⁵ Stopping the treatment without completing the course is a dangerous practice which not only reduces the chance of curing the infection

in a particular patient but also can serve as a source of resistant organisms. Reducing the duration of treatment can reduce the chances of complete cure in a particular individual and can be the cause of antimicrobial resistance. The limitations of this study the data was collected for over 3 months and recall bias may have been present. Doctor's previous prescriptions were not cross-checked.

CONCLUSION

It was observed that self-medication of antibiotics was common in both the groups, more so in HSEG. Starting from selection of antibiotics, problem existed in changing the dose and duration, switching over to the other agent and discontinuing without completing the course. Importantly, there was wrong belief that these agents are used in the treatment of viral infections, in both the groups. So, there is urgent need for corrective steps and community awareness programmes need to initiate.

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