

A Pilot Research to Better Understand How Antibiotics are Used in the Community: A Study from Central India

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Abstract

Background: Antibiotics, also known as antimicrobial agents (AMAs), are chemicals derived from bacteria that are used in small doses to kill other microbes with little harm to the host cells. By lowering infections, this series of agents helped advance contemporary medicine.

Aims and Objectives: to assess the level of knowledge regarding antibiotics, gauge the prevalence of self-medication, and investigate some of the variables affecting this practice.

Methodology: This study, which was carried out in Central India, was descriptive, comparative, and cross-sectional. The study included 40 families from low- and high-income groups, respectively. The study took place over the course of six months. After receiving the respondent's informed written consent and the ethics committee's clearance, the data gathering process began. The data was gathered using a structured questionnaire that was specially created. A trained individual interviewed one responder per household who was in charge of looking after the family's health in order to complete the questionnaire. The questionnaire had three sections: one on sociodemographic information, one on their knowledge of antibiotics, and one on the specifics of the family's self-medication habits. Data were analyzed using SPSS 25.0.

Results: Few respondents could define the term "antibiotics," however some could name specific antibiotics like streptomycin and amoxicillin. Antibiotic self-medication was found to be a widespread practice in both income categories, but it was more prevalent in the high-income group. Approximately 75% of the individuals thought that antibiotics could have negative side effects, of which 70% reported ADRs as a result of using AMA for self-medication. 65 percent of people got their antibiotics via a previous doctor's prescription. The majority of people in low socioeconomic areas got their antibiotics on prescription.

Conclusion: Antibiotic self-medication is widespread among all socioeconomic categories in society. It is absolutely necessary to educate the public about this behavior and the grave consequences of self-medicating with antibiotics.

Keywords: Antimicrobial resistance, self-medication

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Introduction

Antibiotics, also known as antimicrobial agents (AMAs), are chemicals derived from bacteria that are employed in small amounts to kill other microbes with little harm to the host cells [1]. By lowering infections, this series of agents helped advance contemporary medicine. Many organisms were particularly sensitive to antibiotics throughout the early stages of their development, which made infection control quick and effective. This lessened the frequency of several epidemics [2]. As AMA use became more common, organisms eventually underwent modifications that lessened their susceptibility to AMAs. The term for this is bacterial resistance [3]. Because of this, the negative effect is linked to how frequently antibiotics are used. In order to maintain organisms' sensitivity to antimicrobial agents, we must limit their usage and, when it is necessary, utilize them wisely [4]. 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. We need to use AMAs to control infections. What we need to avoid is its excessive and irrational use [5]. 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 [6]. Hospitals, where these agents were used in large numbers, were the source of development of antimicrobial resistance.

A study has shown that resistance has already spread in the community and many resistant strains are now found in the community, suggesting increase in the use of antimicrobials in the community [7]. 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 [8]. Despite these precautions, it appears that people without a prescription request antimicrobial be given out at the drugstore locations. Drugs obtained without a prescription are used by individuals for self-medication. Numerous nations, especially wealthy nations where the distribution of medications is strictly regulated, have recorded cases of AMAs being self-medicated. It is said to be affected by a variety of things. In a large country like ours where self-medication is common, AMA resistance would spread quickly [9].

Aims and Objectives: The goal of the current study was to assess the community's use of antimicrobial drugs for self-medication and the contributing factors.

Material and Methods

Sample Size: The sample size was determined based on the frequency of antibiotic abuse in India. The sample size was 768. Since this was a pilot project, data from the low and high socioeconomic groups were collected from 10% of the sample size, or a total of 40 households.

Study design: This cross-sectional, descriptive, and comparative study was carried out in India. Following permission from the ethics committee, the study was launched. Based on the family's socioeconomic status (SES), a stratified random sample was taken. B G Prasad's socioeconomic categorization, which was updated in 2019, was used to categorize the population. Social class I and II

families were categorized as having high socioeconomic status (HSEG) and those who didn't as having low socioeconomic status (LSEG). Each group had 40 randomly chosen families. Prior to the data collection, a written consent was obtained from the subject. The participants were given detailed information about the research endeavour before the questionnaire was administered.

Study questionnaire: An organized survey was created, and it underwent content and face validity validation by consulting an epidemiology expert. An individual who was in charge of taking care of the family was chosen for an interview. Volunteers received training on how to conduct the interview and fill out the Google forms. The questionnaire had two parts in addition to the sociodemographic information about the study participants. In the first part, the participants'

Results

knowledge of antimicrobial agents, such as what are antibiotics, the names of some antibiotics, some usage details, and knowledge about their adverse reactions, was covered. The second section covered whether or not antibiotics were used without a prescription, the sources of guidance, the frequency and justifications for using them, the dosage and duration, the intentional switching of antibiotics, and the negative effects related to their usage.

Statistical analysis

Statistical analysis was performed on the data using SPSS 25.0.

For quantitative variables, descriptive statistics like mean and standard deviation.

Using the chi square test, the relationship between two qualitative variables was evaluated.

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%

Male members of the LSEG made up 75% of the respondents, which suggests that they are responsible for the family's health care. In contrast, the distribution of men and women in HSEG was nearly equal. The age breakdown of the families in the LSEG and HSEG was comparable. Only 40% of responders in LSEG were graduates, compared to 95% of those in HSEG. In the LSEG, 65% of respondents

reported monthly incomes of less than Rs. 20,000, while in the HSEG, 80% reported monthly incomes of more than Rs. 40,000. Only 30% of people in the LSEG group and 85% of those in the HSEG had chosen health insurance. Therefore, the two main differences between the HSEG and LSEG, aside from money, were level of education and availability of health insurance.

Knowledge about antibiotic: The term "antibiotic" was known to almost all of the participants. Only one member of LSEG was not familiar with this word.

A total of 32 participants from the LSEG believed that antibiotics were used for viral infections, 6 for bacterial infections, and 2

for fever. 22 respondents from the HSEG were aware that antibiotics are used to treat bacterial illnesses, 14 stated they were used to treat viral infections, and 6 indicated they were used to treat both bacterial and viral 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 could 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 the LSEG, 66.7% of participants reported that nausea

and vomiting were the most frequent side effects, 16.7% reported that they can result in diarrhea, and 16.6 reported that rash was a side effect of AMAs. Only 21% of participants in the LSEG were able to name a few antibiotics, compared to 79% of those in the HSEG.

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

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%

In LSEG, 75% and 95% of participants had started self-prescribing antibiotics, respectively. About 70% of patients never modified the dosage or duration of their antibiotics during therapy, 25% did so occasionally, and about 5% did so constantly. From USEG, 55% never adjusted their medication's dose or duration, 40% occasionally did, and 5% constantly attempted.

60% of LSEG participants had self-medicated for convenience, and 40% had done so to save money. Only 5% of respondents in HSEG said they did it to cut costs; the majority (95%) said they did it for convenience. In the LSEG, 55% got it based on a previous prescription, 40% got it based on a community pharmacist's advice, and 5% got it based on a friend's referral. Only 10% of respondents from the

HSEG obtained their medications from the pharmacist; 70% got them on a previous doctor's prescription. The remaining 10%, which is significant, got their knowledge from online sources. From both groups, the majority purchased the medication from a local pharmacy, while 5% recycled previously used medications.

It has been observed that 10% of individuals who obtained their information from the internet chose to buy their prescriptions online from HSEG. After finishing the course, 35% from LSEG and 60% from HSEG discontinued taking AMAs. However, for those who were still present, the symptom absence was enough to cease the drug. After utilizing AMAs, 70% from LSEG and 20% from HSEG experienced negative effects.

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%	-

Antibiotic information-Around 55% of people regularly verified how to use an antibiotic; of these, 10% from the LSEG group did not fully comprehend the instructions, 45% did so just partially, and

approximately 45% did so completely. 70% of the HSEG were always examined, and 30% were occasionally intended to be antibiotics. 20% of people only partially understood how to use the antibiotics,

while 80% did. In the end, 50% from LSEG and 45% from USEG thought it wasn't a good practice, 35% from LSEG and 45% from USEG thought it was acceptable, and 15% from LSEG and 10% from USEG agreed that it was a good practice.

Discussion

Pathogens' development of antimicrobial resistance has become a serious health issue. It has grown so much that it is now a threat to human health. Healthcare expenses, morbidity, and death are all caused by infections brought on by resistant organisms, which are very difficult to treat [10]. Antimicrobial resistance is a natural process that results from the usage of AMAs. But with the rising and illogical usage of AMAs, this accelerates. Given that there aren't many new agents in the pipeline, it's crucial to prevent the emergence of resistance to the antimicrobials that are already in use. Thus, antimicrobial drug resistance has significant societal repercussions, particularly for people who are economically disadvantaged and have limited access to healthcare [11-14]. Social, economic and community practices are often underappreciated, and even ignored by many, as contributing to the major and ever-growing global AMR problem. In the present study we tried to evaluate socioeconomic category wise knowledge of antibiotics, its use and self-medication practices [15-18].

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. 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 [19-21]. 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. 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.

We found that amoxicillin and norfloxacin were the most commonly used antibiotics [22]. This matches in a study in Sindh, Saudi Arabia and Europe, penicillin and macrolides were found to be the most commonly used antibiotics. 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. 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 [23].

Figure 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. 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. 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 [24].

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. Strict guidelines for switching of antimicrobials are laid down for practitioners. 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%. 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. 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. It is very important that precise diagnosis is made, and the causative organisms identified before initiating the treatment with antimicrobials [25]. 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. It is very important to realise that with antimicrobials 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 looking at the use of antibiotics have observed a similar finding. It's risky to discontinue therapy before the full course has been completed since it can breed resistant bacteria and decrease the likelihood that a patient's infection will be cured. Reducing the course of therapy can decrease a patient's probability of fully recovering and contribute to the

development of antibiotic resistance. The data collection period for this study lasted more than three months and recall bias

Antibiotic self-medication was shown to be widespread in both groups, but more so in HSEG. Starting with the choice of antibiotics, there were issues with adjusting the dose and duration, switching to another agent, and stopping treatment before the course was finished. Importantly, both groups had the false impression that these medications were used to treat viral infections. Therefore, corrective action is urgently needed, and community awareness campaigns must start.

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