



Original Article

Awareness and Knowledge of Antibiotics and Antimicrobial Resistance among Beneficiaries Attending the General Outpatient Clinic of a Tertiary-level Hospital in India

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Received: 16 December 2023

Accepted: 29 January 2024

Published: 08 March 2024

DOI

10.25259/JCH_1_2023

Quick Response Code:



ABSTRACT

Background: Antimicrobial resistance (AMR) is one of the leading causes of worldwide mortality, directly responsible for 1.27 million deaths in 2019. Irrational antibiotic usage is widely reported in the literature and is the most important cause of AMR.

Objectives: The objective of this study was to assess awareness and knowledge of antibiotics and AMR among patients attending the general outpatient department (GOPD) of a tertiary-level hospital.

Material and Methods: This was a single-center, hospital-based, and descriptive study of cross-sectional design conducted in 2022. All patients aged 18 years or more attending GOPD on the data collection days were eligible to participate. One hundred and seventeen patients were interviewed using a structured schedule, following a systematic sampling design and maintaining standard ethical practice. Besides descriptive statistics, Chi-square tests were used to check for association between variables. All analyses were conducted by the Statistical Package for the Social Sciences version 23.

Results: Mean age of the participants was 39.1 years (standard deviation \pm 12.3), with 50.4% male. Awareness of antibiotics was 69.2%, while awareness of AMR was a mere 14.5%. Knowledge on antibiotics was higher for antibiotic use rather for antibiotic action. Higher awareness of antibiotics was for the male gender, higher education, and those who were single and currently working. Healthcare providers were the source of knowledge for this population.

Conclusion: Awareness and prescription use of antibiotics was high with two out of three aware respondents having correct knowledge on the use of antibiotics. Low awareness of AMR may not sustain the good practice of prescription use of antibiotics.

Keywords: Antimicrobial drug resistance, Awareness, India, Outpatient clinic

INTRODUCTION WITH OBJECTIVES

The World Health Organization (WHO) has declared antimicrobial resistance (AMR) as one of the top 10 global public health threats to humanity. Without effective antimicrobials, the success of modern medicine in treating infections, including those during major surgery and

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cancer chemotherapy would be compromised. Misuse and overuse of antimicrobials are the main drivers in the development of drug-resistant pathogens.¹ Globally, AMR is one of the leading causes of death directly responsible for approximately 1.27 million deaths and associated with 4.95 million additional deaths in 2019.² The cost of AMR to the economy is enormous, impacting higher rates of death and disability, prolonging illness, longer hospital stays, and the need for more expensive medicines.¹ It is estimated that failing to address AMR will cost the world's economy US\$ 100 trillion by 2050.³

AMR awareness raising, education, and behavior change of communities against non-prescription AMR use are included in the WHO core package of AMR interventions.⁴ There is a further recommendation that the rate of antibiotic prescription in general practice (GP) should not exceed 27% of all prescriptions.⁵ Studies from Ghana report antibiotic usage in GP between 50 and 82%.^{6,7} Recent estimates on GP antibiotic usage in India are lacking in published literature, but irrational prescription of antibiotics appears to be high.⁸ A multisite, multicountry study reports high awareness of AMR among providers, which ironically did not result in reduced antibiotic prescribing.⁹ Patients are important stakeholders in antibiotic usage and acquisition of AMR; however, 55.6% of respondents in a study from Pakistan had poor knowledge of AMR.¹⁰ Hence, this study was planned to assess awareness of AMR and antibiotic usage among patients attending the general outpatient department (GOPD) of a tertiary-level hospital.

MATERIALS AND METHODS

This was a descriptive study of cross-sectional design. The study was conducted from May to July 2022 at the GOPD of Kolkata Medical College Hospital. All patients aged 18 years and above, attending GOPD during the data collection period were eligible to participate in the study. Seriously sick patients, those unable to understand and respond to questions due to language, psychological, hearing or speech problems, and unwilling patients were excluded from the study.

Sample size

A Biennial National Household Survey conducted in Thailand (2019) among the population aged 15 years or more reported 24.3% correct knowledge of antibiotic usage and AMR.¹¹ Considering this as prevalence (as this study used a similar tool to the present study) α error of 5% and 8% absolute error, the sample size was 111.¹²

Sample design

Systematic random sampling design was followed for the study. Participants were recruited from male and female GOPD of Kolkata Medical College Hospital. With a conservative estimate of daily attendance of 150 patients for each outpatient department (OPD) and a target of 20 recruitments per day, every 8th patient registered for GOPD was to be interviewed until the minimum sample size was reached.

Data collection

Data were collected by interviews using a pre-designed, structured, and content-validated schedule. All interviews were conducted before medical consultation in the waiting area of the OPD. Informed consent from respondents was sought before the interviews. The variables of interest were respondents' awareness of antibiotics, their reported usage, and awareness of AMR.

Statistical analysis

All analysis was performed on the Statistical Package for the Social Sciences (SPSS) version 23 (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.). Summary measures for continuous variables were calculated, and frequency and proportions were calculated for nominal variables. Associations of the outcome variable were checked with nominal variable categories by Chi-square test.

Ethical approval

The study protocol was approved by the Institutional Ethics Committee of Medical College Kolkata. Ethical standards as per the Helsinki Declaration were maintained in the study.

RESULTS

A total of 117 completed schedules were analyzed. The mean age of the respondents was 39.1 years with a standard deviation of 12.3 years and ranged from 18 years to 63 years. There was nearly equal distribution of respondents by gender, and 58.9 % of respondents were educated up to the primary level or lower. The background characteristics of respondents are shown in Table 1.

The awareness of antibiotics, their use, and correct knowledge related to antibiotic use is shown in Table 2. Nearly, 70% of respondents were aware of antibiotics, and almost all have used at least one antibiotic within the past 12 months. Most of them used antibiotics as prescribed by a doctor. Higher responses for correct knowledge were obtained for items

related to the use of antibiotics relative to the action of antibiotics.

Awareness of AMR was quite low, with only 14.5% of respondents being aware of AMR. Among them, most knew of AMR to be acquired by pathogens [Table 3].

Table 1: Distribution of respondents according to their background characteristics (*n*=117).

Variable categories	Number	Percentage
Age groups (in years)		
18–30	39	33.4
31–45	37	31.6
≥46	41	35.0
Gender		
Male	59	50.4
Female	58	49.6
Residence		
Urban	78	66.7
Rural	39	33.3
Religion		
Hinduism	86	73.5
Islam	31	26.5
Education		
<Primary	21	17.9
Primary	48	41.0
Secondary	15	12.8
Higher secondary and above	33	28.3
Occupation		
Working	63	53.8
Not working	54	46.2
Marital status		
Currently married	53	45.3
Single	64	54.7

Awareness of antibiotics was likely to be associated with gender, education, occupation, and marital status. Male gender, education of secondary or higher level, and respondents who were currently working and unmarried had higher awareness of antibiotics [Table 4]. For this study population, healthcare providers were reported to be the primary source of information.

DISCUSSION

AMR is one of the major public health problems, especially in developing countries like India where high infectious disease burden, relatively easy availability, and higher consumption of medicines led to a higher incidence of inappropriate and irrational use of antimicrobial agents against these diseases culminating in an ever-increasing development of AMR.¹³ As self-medication and poor compliance are reported to be major contributors to the development of AMR, the present study aimed to assess the awareness and knowledge of AMR among beneficiaries attending a tertiary-level government hospital. The results of our study show that nearly 70% of the respondents were aware of the term “antibiotics,” and almost all (97.5%) have used at least one antibiotic within the past 12 months. Antibiotic resistance has been attributed majorly to discontinuation of treatment when symptoms subside before the pathogen is eliminated.¹⁴ However, in the present study, the majority had correct knowledge about the use of antibiotic regimens in prescribed doses and duration. Many gaps in knowledge were noted regarding the action of antibiotics and their expiry date. About 28.4% of respondents answered that the common cold is cured by antibiotics, while 12.3% said that fever is

Table 2: Distribution of respondents according to their awareness and knowledge of antibiotics.

	Number	Percentage
Awareness of antibiotics (<i>n</i> =117)		
Heard of antibiotics	81	69.2
Used antibiotics in last 12 months	79	97.5
Last use of antibiotic was as per prescription	67	84.8
Trust antibiotics more if prescribed by doctors than over-the-counter	37	45.7
Correct knowledge for the statements on antibiotic use (<i>n</i> =81)		
Common cold is cured by antibiotics	23	28.4
Diarrhea is cured by antibiotics	38	46.9
Fever is cured by antibiotics	10	12.3
Antibiotics are effective against virus	22	27.2
Antibiotics are effective against bacteria	40	49.4
Left-over antibiotics can be used in the future for similar illnesses without medical consultation	56	69.2
Antibiotics have an expiry date	17	21.0
Antibiotics can be stopped with improvement in symptoms even when the course is not completed	62	76.5
Antibiotics can be taken in lower dosages to prevent side effects	55	67.9

cured by antibiotics. About 21% of people could correctly answer about the expiry date of antibiotics. Similar levels of knowledge have been reported from Sweden, the Netherlands, and Australia; however, in Britain and USA, it was higher.¹⁵⁻²⁰ In studies conducted in Middle East Asia, like Iraq and Jordan, 33.3% and 47.3% of the public, respectively, had poor levels of knowledge about antibiotics.^{21,22} These misconceptions can increase the indiscriminate use of antibiotics and lead to the emergence and spread of resistant bacterial strains.^{23,24} In the present study, confusion among study participants was also noted regarding whether antibiotics are effective against bacteria or viruses (49.4 % vs. 27.2%), which was similar to the findings reported in previous studies.^{15,21} As pointed out by Shehadeh *et al.*, this could be because many people did not

understand the differences between bacteria and viruses and believed that antibiotics work against both, which subsequently led to unnecessary use.²² André *et al.* have discussed the benefit of using the terminology “bacteria” and “virus” instead of “microbes” while explaining the prescribing decision to the patient regarding antibiotics to avoid this ambiguity.¹⁵

A considerable proportion of the study sample (85.5%) was unaware of AMR. Among those who had heard about AMR, more people believed that AMR is acquired by pathogens (94.1%) rather than humans and animals (52.9% and 76.5%, respectively). This belief may be influenced by the inability of people to understand clearly the biological mechanism of resistance.¹⁵

In the present study, education was noted to be associated with a higher level of knowledge about antibiotics, which runs in agreement with the findings in many previous literature.^{15,25-27} Other factors found to be associated with awareness about antibiotics were gender, occupation, and marital status. This may be because male respondents who were currently working had more access to sources of information related to antibiotics than the comparison groups.

The study findings helped us to identify knowledge gaps that can be used in formulating interventions leading to the judicious use of antibiotics and help in the containment of AMR.

Table 3: Distribution of respondents according to their awareness and knowledge of AMR.

	Number	Percentage
Awareness of AMR (n=117)		
Heard of AMR	17	14.5
Correct knowledge for the statements on AMR (n=17)		
AMR is acquired by humans	9	52.9
AMR is acquired by animals	13	76.5
AMR is acquired by pathogens	16	94.1

AMR: Antimicrobial resistance

Table 4: Association of antibiotic awareness with background characteristics.

Variable	Awareness Number (%)	Pearson Chi-square (DF)	Asymptotic significance (2-sided)
Age group			
18–30	25 (64.1)	3.8 (2)	0.15
31–45	23 (62.2)		
≥46	33 (80.5)		
Gender			
Male	49 (83.1)	10.7 (1)	0.001**
Female	32 (55.2)		
Religion			
Hinduism	61 (70.9)	5.3 (1)	0.07
Islam	20 (64.5)		
Residence			
Rural	31 (79.5)	2.9 (1)	0.09
Urban	50 (64.1)		
Education			
≤Primary	38 (55.1)	16.74 (1)	0.002**
Secondary or higher	43 (89.6)		
Occupation			
Working	50 (79.4)	11.7 (1)	0.02*
Not working	31 (57.4)		
Marital status			
Currently married	30 (56.6)	7.2 (1)	0.007**
Single	51 (79.7)		

DF: Degrees of freedom

Limitation

The study findings are to be interpreted in the light of sampling from a single government-run, tertiary institute. Multisite studies with wider geographical reach could provide a more accurate picture.

CONCLUSION

Awareness and prescription use of antibiotics was high with two out of three aware respondents having correct knowledge on the use of antibiotics. Awareness of AMR, however, was very low, and poor communication about this threat may not sustain the good practice of prescription use of antibiotics.

Ethical approval

The research/study approved by the Institutional Review Board at Medical College Kolkata, number MC/KOL/IEC/NON-SPON/1277/02/22, dated 22/02/22.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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How to cite this article: Datta M, Mukherjee P, Ghosh S. Awareness and Knowledge of Antibiotics and Antimicrobial Resistance among Beneficiaries Attending the General Outpatient Clinic of a Tertiary-level Hospital in India. *J Compr Health*. 2024;12:44-9. doi: 10.25259/JCH_1_2023