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Knowledge, attitude and practices on antibiotics and antibiotic resistance, among patients attending the Outpatient Department of a tertiary care hospital in Sri Lanka

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Abstract

Background and Objectives: Antimicrobial Resistance (AMR) is considered an imminent *"silent"* pandemic of current times. Therefore, understanding the level of knowledge and prevalent practices of antibiotic misuse are important to establish targeted educational and other interventional programmes.

Methods: This was a cross sectional descriptive study conducted among 450 patients who attended the Outpatient Department of Teaching Hospital, Peradeniya, Sri Lanka. An interviewer administered type questionnaire was used to evaluate knowledge of the patients regarding the drivers of AMR, and to assess the prevalence of common malpractices regarding the usage of antibiotics. For the knowledge section, marks were given out of 10.

Results: Out of 450, 92 (20.4%) scored 5 or over 5 while 358 (79.6%) scored below 5. Seventy-two (16%) failed to score any marks. The mean score was 2.87 (SD 2.1) and median was 3. The obtained scores ranged from 0 to 9. Common misconceptions identified were that antibiotics were active against the common cold and antibiotics are effective against viruses.

Conclusion: Awareness and knowledge regarding antibiotics and antibiotic resistance was poor within our study population. Hence, there is a need of immediate correction through a collaborative effort of healthcare practitioners and national policymakers.

Keywords: AMR, knowledge, practice, patients, Sri Lanka

INTRODUCTION

Antimicrobial resistance (AMR) has emerged as a major public health threat. New mechanisms of resistance are emerging and disseminating globally, challenging the ability to treat common infections [1]. Antibiotic consumption has increased 65% between 2000 and 2015 throughout

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the world and doubled in low and middle-income countries [2].

AMR occurs in nature as an adaptation; however, misuse of antibiotics facilitates the speed of emergence and spread of resistance [3]. A multitude of factors expedite the rate of emergence and spread of AMR, and these include inaccurate and unregulated use of antibiotics [4], use of antibiotics for other purposes such as growth promoters, over the counter availability and antibiotics, and availability of counterfeit or poor-quality antimicrobials [5].

AMR negatively affects the treatment outcome of infections as well as other medical interventions, leading to increased morbidity, mortality and prolonged hospital stays. AMR has a negative impact not only on the health of individuals or public health, but also on the economy of countries [6].

It is estimated that the direct and indirect annual cost attributed to AMR in Thailand is $29 million and $151 million, respectively [7]. Further, the estimated healthcare cost associated with antibiotic resistance per year in United States in 2014 was nearly $2.2 billion [8]. Sri Lanka has a National Strategic Plan for Combating Antimicrobial Resistance [9]. However, the attention it gets from health sector, other stake-holders and the public leaves much to be desired. Lack of knowledge about antibiotic use and resistance can increase the possibility of misusing antibiotics by individuals, which in-turn contributes to the emergence and spread of AMR [10]. As understanding the level of knowledge and prevalent practices of antibiotic misuse are important to establish targeted interventional programmers, this study aimed to assess the understanding on antibiotics and antibiotic resistance among attendees at an Out-patient Department (OPD) in Sri Lanka.

METHODOLOGY

This was a cross sectional descriptive study conducted among patients attending the OPD of Teaching Hospital, Peradeniya, Sri Lanka. All patients attending the OPD were included and recruited through convenience sampling after informed written consent was obtained while the severely ill and patients with acute psychiatric conditions were excluded. Ethical clearance for the study was obtained from the Ethics Review Committee, Faculty of Medicine, University of Peradeniya, Sri Lanka.

An interviewer administered questionnaire was designed based on an available questionnaire to evaluate knowledge of the patients regarding antibiotics, the drivers of AMR, and to assess the prevalence of common malpractices regarding the usage of antibiotics [11]. Face validity of the questionnaire was established by two experts. Questionnaire was translated to Sinhala and Tamil and administered using the native language of the participant by an investigator who was a native speaker for that language.

The questionnaire consisted of multiple-choice questions and, agree, disagree, neutral type questions on antibiotics and antibiotic resistance, as well as open ended question to define antibiotic resistance. Answers to open ended questions were transcribed by the interviewer using the exact words used by the subjects. Other questions were statements, followed by multiple answers on a scale, ranging either from strongly agree to strongly disagree (for knowledge related questions) or always to never (for practice and attitude related questions).

Basic demographic information including age, sex and highest educational level achieved was also collected. Four hundred and fifty participants were recruited from 06.08.2018 to 06.10.2018. Percentages were calculated for correct and incorrect answers. Associations between educational levels, sex and correct answers were calculated using Chi-square test or Fisher's Exact test. Ages for the groups giving correct and incorrect answers were compared using Mann Whitney U test. For questions on knowledge, "undecided" or "neutral" was also considered as an incorrect answer. A total mark was given out of 10 as a knowledge score. One stem was given one mark for a correct answer and zero for a wrong answer. We descriptively analysed the mark distribution. Marks were compared across the sexes and educational levels (Mann Whitney U test and Kruskal Wallis test). For statements on attitudes and practices, percentages of responses were calculated.

RESULTS

Among the 450 participants, 269 (59.8%) were females. Participants' ages ranged from 14 to 89 years ([mean: 38.85 (SD±15.74)]. Majority have had secondary education (n=317, 70.0%) and nearly half of the participants were unemployed (n=230, 51.1%) (Table 1).

Table 1: Socio-demographic details of study participants

Category		n (%)
Sex	Male	181 (40.2%)
	Female	269 (59.8%)
Age	≤ 20 years	60 (13.3%)
	21 – 30 years	111 (24.6%)
	31 – 40 years	71 (15.8%)
	41 – 50 years	91 (20.2%)
	51 – 60 years	71 (15.85)
	61 – 70 years	38 (8.44%)
	71 – 80 years	5 (0.01%)
	> 80 years	3 (0.01%)
Educational level	Never schooled	6 (1.3%)
	Primary education	74 (16.4%)
	Secondary education	315 (70%)
	University education	55 (12.2%)
Occupation	Unemployed	230 (51.1%)
	Employed	185 (41.1%)
	Student	35 (7.8%)

Two hundred and fifty-nine participants (57.6%) had not heard about antibiotic resistance while 191 (42.4%) had heard the term before. Of the 191 who had heard about antibiotic resistance, 67 (35.1%) stated that they cannot define the term. Rest of the 124 answers was categorized to 8 common themes (Table 2). Nineteen of the 124 (15.3%) defined antibiotic resistance as bacteria becoming resistant to antibiotics while 22 of the 124 (17.7%) defined it as a failure of antibiotic. Rest of the answers varied from totally irrelevant answers to host becoming resistant to antibiotics.

The proportion of males having heard the term antibiotic resistance (n=70, 38.7%) did not differ significantly that of females (n=121, 45.0%), (p=0.21, Chi square test). The proportion of people having heard the term antibiotic resistance was significantly associated with the educational level of the participants (p<0.005, Fishers Exact test).

When the probable definition of antibiotic resistance was asked using multiple-choices, 140 (31.1%) stated that the host (human) becomes resistant to bacteria, 124 (27.6%) stated that antibiotics became resistant to the bacteria and 97 (21.6%) stated that they had no idea while only 89 (19.8%) stated that the bacteria exhibit resistance to the antibiotic (Table 2). The proportion of males giving the correct answer (n=36, 19.9%) did not differ significantly from that of females (n=53, 19.7%) (p=1, Chi-square test). The proportion of participants giving correct answer was significantly different among the different education levels (p=0.026, Fisher's Exact test). However, post-hoc analysis with Bonferroni correction found that the difference was between those with or undergoing university education and those with secondary education while there was no difference between the university educated group and those who never schooled or with primary education.

Table 2: Themes of participant definitions of antibiotic resistance

Theme	n (%)*
Host become resistant to bacteria	23 (18.5%)
Failure of antibiotics	22 (17.7%)
Bacteria become resistant to antibiotics	19 (15.3%)
A phenomenon which is beneficial to human	17 (13.7%)
Totally irrelevant answer	17 (13.7%)
Antibiotics become resistant to bacteria	11 (8.9%)
A phenomenon which is harmful to human	9 (7.3%)
Antibiotics work against bacteria	6 (4.8%)

*% is given out of total responses (124)

Only 216 (48%) participants stated that antibiotics are active against bacteria. Only 68 (15.1%) participants gave the correct answer when they were asked whether the antibiotics can cure a cold (Table 3).

Table 3: Correct answer percentage for knowledge on antibiotics and antibiotic resistance

Question	Answer taken as correct	Correct answer n(%)	Neutral or wrong answer n(%)
Antibiotics are active against bacteria	Agree or strongly agree	216 (48%)	234 (52%)
Any antibiotic is active against any bacteria	Disagree or strongly disagree	168 (37.3%)	282 (62.7%)
Antibiotics are active against viruses	Disagree or strongly disagree	62 (13.8%)	388 (86.2%)
Antibiotics are active against fungi	Disagree or strongly disagree	71 (15.8%)	379 (84.2%)
Antibiotics can cure a cold	Disagree or strongly disagree	68 (15.1%)	382 (84.9%)
Antibiotics can speed up recovery from a cold	Disagree or strongly disagree	59 (13.1%)	391 (86.9%)
Antibiotics can cure any diarrhea	Disagree or strongly disagree	68 (15.1%)	382 (84.9%)
Antibiotics can speed up recovery from any diarrhea	Disagree or strongly disagree	68 (15.1%)	382 (84.9%)
Antibiotic resistance will be a problem in near future	Agree or strongly agree	247 (54.8%)	203 (45.2%)
Inappropriate use of antibiotics influences the emergence of resistance	Agree or strongly agree	256 (58.9%)	185 (41.1%)

Only 92 (20.4%) out of 450 participants scored 5 or over 5 marks and the majority, 358 (79.6%) scored below 5 marks and 72 (16%) scored 0 marks. The average score was 2.87 (SD±2.1) and the median was 3. The scores ranged from 0 to 9.

The knowledge score of males [mean 2.75 (SD±2.07); median 3] and females [mean 2.95 (SD±2.11); median 3] did not differ significantly (p=0.26, Mann-Whitney U test). The knowledge scores among those who never schooled [mean2.33(SD±2.25); median 2], those who had primary education [mean 1.77 (SD±1.97); median 2], those who had secondary education [mean 2.98, (SD 2.05); median 3] and those who had university education [mean 3.78(SD±1.9); median 4], differed significantly (p<0.001, Kruskal Wallis test). Pair-wise comparisons revealed that the differences were between those with primary and secondary education, and primary and university education.

Participants were questioned about the practices that may influence antibiotic resistance and answers are summarized in Table 4.

Table 4: Summary of responses related to attitudes and practices

Question	Always (n %)	Sometimes (n %)	Never (n %)
Do you seek medical care when you have upper respiratory symptom			
Sneezing	44 (9.8%)	212 (47.1%)	194 (43.1%)
Runny nose	54 (12%)	214 (47.6%)	182 (40.4%)
Sore throat	65 (14.4%)	198 (44%)	187 (41.6%)
Do you seek medical care when you have loose motions?	74 (16.4%)	200 (44.4%)	176 (39.1%)
Do you demand antibiotics from the doctor when you have loose motions?	8(1.8%)	32 (7.1%)	410 (91.1%)
Do you complete the full course of antibiotics?	224 (49.8%)	163 (36.2%)	63 (14%)
Do you use leftover antibiotics from a previous time?	22 (4.9%)	87 (19.3%)	341 (75.8%)
Do you volunteer to give antibiotics that you were prescribed to someone else?	7 (1.6%)	65 (14.4%)	378 (84%)
Do you ask for over the counter antibiotics from pharmacists?	13 (2.9%)	80 (17.8%)	357 (79.3%)
Are you told by the doctors that you are given antibiotics?	72 (16%)	132 (29.3%)	246 (54.7%)

DISCUSSION

Present study provides information regarding the level of knowledge and prevalence of malpractices beliefs and norms that can act as drivers of AMR.

When it comes to the awareness among the study population regarding AMR, majority of the participants 57.6% had not heard the term antibiotic resistance. A similar study conducted in Sudan has revealed that 30% respondents have heard about antibiotic resistance [12].

However, only 19.8% managed to identify the correct answer on being given multiple-choices on the definition of antibiotic resistance. This was much lower than the findings in other studies. Kim So Sun et al have identified 65% of subjects with correct knowledge on antibiotic resistance among public in South Korea [13]. Another study conducted in UK has found that 81% in the affluent areas and 57% in the deprived areas know what antibiotic resistance is [14]. Further, our open-ended question revealed that even among those who had heard about antibiotic resistance, only a few had actually understood the concept.

Further, only about half of the population (48%) knew that antibiotics are active against bacteria whereas majority of the study population thought that antibiotics are also active against the viruses (86.2%) and fungi (84.2). This finding has been similar across other studies too. According to the published data, 69% respondents agreed that antibiotics can kill virus in a study carried out in Korea [13]. In another study in the UK, 35%-43% of the population thought that antibiotics kill viruses [15]. In addition to that, more than 80%of the study population believed that diseases that are mainly of viral origin like cold, diarrhea can be cured by antibiotics. Similar findings have been identified in a study carried out among Pharmacy Undergraduate students in Sri Lanka [16]. As seen from our results and results of numerous other studies, the misconception of antibiotics being active against viral infections appears to be deeply rooted in the community, not only in Sri Lanka but globally. Convincing the community to unlearn this concept will need to be a consorted global effort.

With the scoring system we used, we identified that only 92 (20.44%) of the 450 study participants had a score of equal to or more than 5 marks out of 10. This indicates that the overall knowledge on antibiotic use and AMR among our study population is poor. While knowledge scores have been used by others too, [17] a direct comparison is not possible as the study population, questionnaire used and the scoring systems used were different. As expected, we found that there was a higher scores among the participants with a university education. However, their mean score was also only 3.78 out of 10, indicating that it is also poor. This emphaises the need to educate all strata of the society on antibiotic use and resistance.

Despite the low knowledge score, more than 70% of our study population was educated up or above secondary education. This highlights the importance of having additional health educational activities on emerging issues.

However, majority of the participants stated that they never use leftover antibiotics from a previous time (75.8%), and never be volunteer to give antibiotics that they were prescribed to someone else (84%), and never ask for over the counter antibiotics (79.3%); which are the correct practices and are encouraging. However only 49.8 % always completed the full course of antibiotics.

An international patient survey of non-compliance with antibiotics for acute infections has reported 22.3% of admitted non- compliance [18]. However, the non- compliance rates varied widely between countries. It was 44.0% in China and 9.9% in the Netherlands [18].

A review on patient compliance with antibiotic treatment for respiratory tract infections has identified several causes for the non-compliance with antibiotic therapy [19]. Patient's level of education, instructions by the clinicians, short term therapy, low quality antibiotics, infrequent doses were the factors influencing compliance among patients treated with antibiotics for respiratory tract infections [19].

In a study on knowledge, attitude and practices of antibiotics use among parents presenting to a tertiary care hospital in India, 28% of parents correctly identified that antibiotics are used against bacterial infections while only 15.5% parents knew the meaning of the term antibiotic resistance. Majority of the respondents (73.6%) knew that unnecessary use of antibiotics could harm the child and 85.2% parents stated that they don't use leftover antibiotics from the previous prescription for the next time without doctor's consult [20]. These results are in congruence with our findings.

One limitation of our study was that participants were recruited conveniently. Further, the number of participants who had not schooled was very low,

leading to unexpected results in the post-hoc analysis of knowledge comparisons.

CONCLUSION

In conclusion, awareness and knowledge regarding antibiotics and antibiotic resistance was poor within our study population irrespective of their age, sex and educational background, and some of their practices are encouraging given the low level of knowledge. However, there is an immediate need to educate the public on antibiotics and antibiotic resistance in a tangible manner that would lead to effective change in behavior.

Abbreviations

Antimicrobial Resistance - AMR
Statistical Package for the Social Sciences –SPSS
Standard Deviation – SD
Outpatient Department –OPD
United Kingdom – UK
Urinary Tract Infections – UTIs

Author declaration
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Authors' contributions: VL conceptualized the study, all authors were involved in data collection, data analysis and interpretation. GV was involved in analysis of data and writing the paper. All authors read and approved the final manuscript.

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Availability of data and materials
The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Ethics approval and consent to participate
Approval for this study was obtained from the ethical review board of the Faculty of Medicine, University of Peradeniya (2017/EC/39). Informed written consent was obtained from the participants.

Conflicts of Interest: No conflicts of interest declared by the authors

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