

Research Article

Knowledge and practices towards antibiotic usage in upper respiratory tract infections among university students: A cross-sectional study in a Sri Lankan state university

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ABSTRACT

Purpose: Upper respiratory tract infections are a major cause of antibiotic overuse, contributing to antibiotic resistance, a global health crisis. This study aimed to assess knowledge and practices regarding antibiotic use in upper respiratory tract infections among undergraduates of a state university in Sri Lanka.

Methods: A descriptive cross-sectional study was conducted among 382 undergraduates at the University of Jaffna, Sri Lanka, from July 2019 to November 2020. Data were collected using a pretested self-administered questionnaire via Google Forms and analysed using descriptive statistics. Participants were classified as having poor or good knowledge based on their scores, which were determined according to a predetermined scale. The chi-square test was used to assess factors associated with antibiotic use for upper respiratory tract infections.

Results: A total of 314 students responded to the questionnaire, with a response rate of 82.1%. Most participants were female (64.0%) with a mean age of 23.12 ± 0.97 years. Poor knowledge regarding antibiotic use in upper respiratory tract infections was observed in 56.5%. Faculty of study ($p < 0.001$) was significantly associated with knowledge, as students enrolled in disciplines categorized under health sciences had better knowledge. Majority of the students (81.2%) reported having upper respiratory tract infections in the past three months, and 42.0% self-medicated with antibiotics. While 71.3% completed the prescribed antibiotic course, 40.1% shared antibiotics with friends or family members.

Conclusion: Undergraduate students participating in this study demonstrated insufficient knowledge of antibiotic use for upper respiratory tract infections, with faculty affiliation playing a significant role. While most adhered to prescriptions, gaps in understanding and practices remain.

Keywords: antibiotics, upper respiratory tract infections, undergraduates, knowledge, practice



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INTRODUCTION

Across the world, the emergence of bacterial strains resistant to antimicrobial agents is becoming increasingly severe over time, posing a significant public health threat. (1) The antibiotic resistance crisis is particularly problematic in low- and middle-income countries, including Sri Lanka. The emergence and spread of drug-resistant pathogens threaten the ability to treat common infections and to perform life-saving medical procedures. (2) Antibiotic resistance is strongly associated with the irrational use of antibiotics and results in therapeutic failures, leading to prolonged and more severe illness episodes, higher costs, and increased rates of mortality and morbidity. (3)

Upper respiratory tract infections are among the most common illnesses observed, with individuals experiencing these infections between two and five times per year. These infections represent a significant cause of antibiotic misuse, contributing to the development of antibiotic resistance. (4) Upper respiratory tract infections are predominantly viral in origin and self-limiting, making the use of antibiotics often unnecessary, as antibiotics selectively inhibit or kill bacteria. (5) However, globally, upper respiratory tract infections account for 60% of all antibiotic prescriptions in general practice, and more than 50% of individuals with upper respiratory tract infections are still treated with antibiotics, receiving an average of two to three prescriptions annually. (6-7) A recent study in Sri Lanka reported that antibiotic prescriptions for upper respiratory tract infections were common in Sri Lankan hospitals. (8)

The knowledge and practices of the general public regarding antibiotic use for upper respiratory tract infections play a critical role in combating antibiotic resistance. This is particularly significant in low and middle-

income countries where antibiotics can be demanded or purchased over the counter at pharmacies. (9) University students, as representatives of the educated adult population, have the potential to significantly influence the appropriate use of antibiotics for upper respiratory tract infections. By fostering extensive knowledge of antibiotic usage, educated adults can play a pivotal role in mitigating antibiotic resistance, influencing their peers, and promoting a community standard that prioritizes appropriate treatment for upper respiratory tract infections and the rational use of antibiotics.

Although several studies have assessed antibiotic use in high-income countries (10–12), very few studies have been conducted in Sri Lanka. (13) Furthermore, there has been a lack of comprehensive research on antibiotic use among Sri Lankan university students. (14–16) Considering the high burden of infectious diseases in Sri Lanka and the limited research on this topic, it is crucial to understand the knowledge and practices related to antibiotic use for upper respiratory tract infections among university students.

Therefore, this study aimed to assess the knowledge and describe the practices of undergraduates at the University of Jaffna, Sri Lanka, regarding antibiotic use for upper respiratory tract infections.

METHODS

This was an institution-based descriptive cross-sectional study conducted among undergraduate students of the University of Jaffna, Sri Lanka, from July 2020 to November 2021. The study included undergraduates of all eight faculties of the University of Jaffna, namely the Faculty of Medicine, Faculty of Allied Health Sciences, Faculty of Arts, Faculty of Management Studies and Commerce, Faculty of Science,

Faculty of Engineering, Faculty of Agriculture, and Faculty of Technology.

For the purposes of this study, undergraduate students enrolled in the Faculty of Medicine and the Faculty of Allied Health Sciences were categorized as "health science students," while those enrolled in the Faculty of Arts, Faculty of Management Studies and Commerce, Faculty of Science, Faculty of Engineering, Faculty of Agriculture, and Faculty of Technology were classified as "non-health science students."

Sample size and sampling technique:

The sample size for this study was calculated based on a previous study conducted in Pakistan, which reported a prevalence of antibiotic usage in upper respiratory tract infections among university students as 34.25%. (17) Using this prevalence of 0.34, a 95% confidence level (corresponding to a Z-value of 1.96), and a margin of error of 5%, the required sample size was estimated to be 344. To account for a potential 10% non-response rate, the total sample size was adjusted to 382. (18)

Among the 2,586 second-year undergraduate students at the University of Jaffna, stratified random sampling was employed to select participants from each course. First-year students were excluded from the study as they were newly enrolled and lacked sufficient exposure to their respective courses. Similarly, third-year students, who were considered final-year students in some courses, were excluded due to their involvement in research projects or industrial training, which made access difficult.

The proportion of students from each course, relative to the total number of second-year students was calculated and multiplied by the required sample size to determine the number of participants to be selected from each course. Using the registration numbers of second-year students at the faculty level,

unique identifiers were assigned to each student, and the required number of participants was then randomly selected using a random sampling generator. Students who opted not to participate, as well as those on extended vacations (exceeding two months) or on medical leave during the data collection period, were excluded from the study.

Study instrument

The data were collected using a self-administered questionnaire distributed via Google Forms through email. The email addresses of students were obtained from the Assistant Registrar of each Faculty with the approval of the respective Deans. The questionnaire was developed in English, based on a review of existing literature. (18–22)

The questionnaire comprised three sections, collecting participants' socio-demographic information, assessing their knowledge regarding antibiotic use for upper respiratory tract infections, and evaluating their practices related to antibiotic use in the treatment of upper respiratory tract infections.

Tool validity and reliability

The content validity of the tool was assessed by three experts from the disciplines of Community Medicine and Pharmacy. A pre-test was then conducted at the University College of Jaffna, Sri Lanka, involving 25 students to evaluate the face validity. Based on the feedback received from these students, the questionnaire was revised in collaboration with the study team to enhance clarity and relevance, while ensuring that the modifications did not compromise the study objectives.

Data collection

Data collection commenced following the approval of the Ethics Review Committee, Faculty of Medicine, University of Jaffna. Subsequent to obtaining ethical clearance, permission to collect data via email was

granted by the Vice-Chancellor of the University of Jaffna and the Deans of the respective Faculties.

The data were collected from the selected undergraduate students using a Google Form distributed through email. Participation was voluntary, and informed consent was obtained prior to the distribution of the questionnaire. Initially, a consent form was emailed to the selected students, and only after their consent was confirmed, the questionnaire was sent via email.

Confidentiality and privacy of the participants were strictly maintained throughout the data collection process. The completed questionnaires were stored on a password-protected computer to ensure data security and participant anonymity.

Data analysis

The collected data were entered into the Statistical Package for Social Sciences (SPSS, version 23) and analyzed based on the specific objectives of the study. In the knowledge section, a score of one was assigned for correct answers, while a score of zero was given for incorrect answers or 'don't know' responses. The overall knowledge score was calculated as a percentage. Knowledge levels were classified as 'good knowledge' or 'poor knowledge' based on predetermined cut-off points. The knowledge section had a total of seven points, with scores ranging from 4 to 7 classified as 'good knowledge' and scores from 0 to 3 categorized as 'poor knowledge.'

To assess the associations between socio-demographic factors and the level of knowledge regarding antibiotic use in upper respiratory tract infections, the chi-square test and Fisher's exact test were used. A p-value of less than 0.05 was considered statistically significant.

Practices regarding antibiotic use were analyzed using descriptive statistics. The

responses to each question in the practices section were summarized individually in terms of frequency and percentage.

RESULTS

A total of 314 students responded to the questionnaire, with a response rate of 82.1 %. Table 1 illustrates the socio-demographic characteristics of the participants. The majority of the participants were, within the age category 21-23 years (71.7 %), female (64.0 %), and unmarried (97.1 %).

Table 2 presents the findings on participants' knowledge of antibiotic use in upper respiratory tract infections and antibiotic resistance. Participants were assessed based on seven statements, with a total possible score ranging from 0 to 7.

A significant proportion of the study participants demonstrated a lack of awareness, with 51.9% being unaware that antibiotics cannot be purchased without a prescription from a doctor. Furthermore, 57.3% were unaware that a prescribed course of antibiotics should not be discontinued prematurely, even if symptoms improve.

Regarding knowledge of antibiotic resistance, only 41.4% of participants correctly identified the concept and its implications (Table 2). Additionally, only 2.5% of participants answered all seven statements correctly, demonstrating comprehensive knowledge of antibiotic use in upper respiratory tract infections. In contrast, 10.5% (33 students) responded incorrectly to all seven statements, indicating a complete lack of knowledge regarding antibiotic use and resistance (Table 3).

Upon assessing the participants' knowledge regarding antibiotic use, the majority (56.5%) were found to have insufficient knowledge, while 43.5% demonstrated adequate knowledge.

Table 1. Students' Socio-Demographic characteristics (N=314)

Socio-Demographic factor		Frequency	Percentage (%)
Age	21-23 years	225	71.7
	24-26 years	89	28.3
Gender	Male	114	36.0
	Female	200	64.0
Marital status	Unmarried	305	97.1
	Married	9	2.9
Ethnicity	Sinhalese	71	22.6
	Sri Lankan Tamil	210	66.9
	Sri Lankan Moor	33	10.5
Religion	Buddhism	68	21.7
	Hinduism	177	56.4
	Christianity	36	11.5
	Islam	33	10.4
Faculty	Health science	63	20.1
	Non-health science	251	79.9

Table 2. Students' knowledge on antibiotic usage in upper respiratory tract infections (N=314)

Statements regarding the antibiotic use in URTIs (Correct response)	Responses	Frequency	Percentage (%)
Antibiotics speedup the recovery of acute URTIs (No)	Correct	79	25.2
	Incorrect	235	74.8
Antibiotics cure bacterial infections (Yes)	Correct	154	49.0
	Incorrect	160	51.0
Antibiotics cure viral infections (No)	Correct	155	49.1
	Incorrect	159	50.9
Taking antibiotics for URTIs from a pharmacy without doctor's prescription (No)	Correct	151	48.1
	Incorrect	163	51.9
Using leftover antibiotics of URTIs in future from a previous course (No)	Correct	178	56.7
	Incorrect	136	43.3
Stopping the prescribed course of antibiotics for URTIs if the symptoms are improved (No)	Correct	134	42.7
	Incorrect	180	57.3
Inappropriate use of antibiotics leads to antibiotic resistance (Yes)	Correct	130	41.4
	Incorrect	184	58.6

*URTI: Upper Respiratory Tract Infections

The relationship between demographic characteristics and the level of knowledge regarding antibiotic use in upper respiratory tract infections is presented in Table 4. The analysis revealed that the participants' faculty of study was the only demographic characteristic that showed a statistically significant association with their level of knowledge ($p < 0.001$).

Among health science students, 82.3% demonstrated good knowledge, while only 17.7% had poor knowledge. In contrast, among non-health Science students, only 33.9% exhibited good knowledge, whereas

66.1% were classified as having poor knowledge.

Of the 314 respondents, 255 (81.2%) reported having a history of upper respiratory tract infection within the past three months. Table 5 outlines the participants' practices regarding antibiotic use for upper respiratory tract infections. Notably, 33.4% of respondents reported occasionally obtaining antibiotics from pharmacies without a prescription for their upper respiratory tract infections, while 29.9% completed their prescribed antibiotic course for upper respiratory tract infections as directed by a doctor.

Table 3. Knowledge on antibiotic usage in upper respiratory tract infections (N=314)

Number of statements correctly identified	Frequency	Percentage (%)
Identified all seven statements correctly	8	2.5
Identified six statements correctly	33	10.7
Identified five statements correctly	43	13.7
Identified four statements correctly	51	16.2
Identified three statements correctly	50	15.8
Identified two statements correctly	61	19.5
Identified one statement correctly	35	11.1
Did not identify any of the statements correctly	33	10.5

Table 4. Relationship between socio-demographic factors and students' level of knowledge on antibiotic use in upper respiratory tract infections

Socio-demographic factors	Level of knowledge		Statistical test and significance level
	Good knowledge n (%)	Poor knowledge n (%)	
Age			
21-23 years	90 (40.7)	131 (59.3)	Chi-square test $p = 0.114$
24-26 years	45 (50.6)	44 (49.4)	
Gender			
Male	52 (46.4)	60 (53.6)	Chi-square test $p = 0.442$
Female	83 (41.9)	115 (58.1)	
Marital status			
Married	3 (33.3)	6 (66.7)	Fisher's exact test $p = 0.736$
Unmarried	132 (43.9)	169 (56.1)	
Faculty			
Health science	51 (82.3)	11 (17.7)	Chi-square test $p < 0.001$
Non-health science	84 (33.9)	164 (66.1)	

Table 5. Students' practices related to antibiotic usage in upper respiratory tract infections

Practices related to antibiotic use in upper respiratory tract infections	Always n (%)	Occasionally n (%)	Never n (%)
I get antibiotics for URTIs from pharmacy without prescriptions	27 (8.6 %)	105 (33.4 %)	182 (58.0 %)
I complete my antibiotic course as prescribed by the doctor for URTIs	94 (29.9 %)	130 (41.4 %)	90 (28.7 %)
I suggest antibiotics which cured my URTIs to my friends in similar conditions	31 (9.9 %)	112 (35.7 %)	171 (54.5 %)
I share antibiotics with my friends or family members for URTIs that I had in the past	24 (7.6 %)	102 (32.4 %)	188 (59.9 %)
I keep leftover antibiotics to be used for URTIs in the future	29 (9.2 %)	71 (22.6 %)	214 (68.2 %)

*URTI: Upper Respiratory Tract Infections

DISCUSSION

This study investigated undergraduate students' knowledge and practices regarding antibiotic usage for upper respiratory tract infections in a Sri Lankan state university. With the increasing prevalence of acute upper respiratory tract infections among undergraduates due to their high transmissibility, (19) there is a critical need to gather essential data for effective medication management, particularly concerning antibiotic use. Additionally, as undergraduate students represent the educated adult population, their having an adequate understanding of antibiotic usage in upper respiratory tract infections is crucial, as it can significantly influence the rational use of antibiotics in the future.

In this study, the majority of participants were female (64.0%), consistent with findings from similar studies conducted previously. (16, 17, 20, 21) Furthermore, most participants were unmarried (97.1%), aligning with other studies where the majority of respondents were also single. (17, 23) The age range of participants in this study was 21–26 years, comparable to another study conducted in Sri Lankan state universities, where 76% of students were aged

between 20 and 25 years. (14)

The study revealed that a significant proportion of participants (56.5%) had poor knowledge regarding antibiotic use in upper respiratory tract infections. This indicates persistent knowledge gaps among students, underscoring the need for educational campaigns in Sri Lankan state universities to promote rational antibiotic use in upper respiratory tract infections. This finding is consistent with a study conducted among Thai students, where 66% of participants demonstrated inadequate knowledge of antibiotic use. (21) In contrast, a study in Trinidad and Tobago found that 60% of participants scored high on antibiotic knowledge for upper respiratory tract infection management, (20) while a study in the United Arab Emirates reported that 59% of university students had satisfactory knowledge regarding antibiotic usage for upper respiratory tract infections. (23)

In the current study, only 25.2% of respondents correctly identified that antibiotics cannot be used to treat symptoms of acute upper respiratory tract infections. This finding aligns with studies conducted among Chinese university students (25.7%) and Thai students

(24.7%), where similar response rates were observed. (21, 24) Furthermore, 51.9% of respondents in this study falsely believed that antibiotics for upper respiratory tract infections could be obtained from a pharmacy without a doctor's prescription. This highlights the urgent need to enhance awareness among university students about the risks of acquiring antibiotics without prescriptions and the necessity of enforcing relevant legislation in Sri Lankan pharmacies. Similar findings were reported in a study where 44.9% of participants incorrectly identified the regulations regarding purchasing antibiotics without a prescription. (21) However, a previous study conducted among Sri Lankan pharmacy undergraduates reported that 92.5% correctly stated that antibiotics cannot be acquired without a prescription. (14)

This study also found that 41.4% of participants had correct knowledge of antibiotic resistance, which contrasts with findings from a study among Sri Lankan pharmacy undergraduates, where 57% demonstrated good knowledge of antibiotic resistance. (14) These results suggest a critical need to educate all Sri Lankan undergraduates on the seriousness of antibiotic resistance.

Among the socio-demographic factors examined, only the faculty of study demonstrated a statistically significant association with the level of knowledge regarding antibiotic use in upper respiratory tract infections. Health science students were found to have better knowledge compared to non-health Science students ($p < 0.001$). This finding is consistent with a study conducted in the United Arab Emirates, where medical students scored significantly higher than non-medical students ($p < 0.001$). (25) This difference may be attributed to health science students having greater exposure to scientific knowledge and health-related information through their academic curriculum compared to non-health science students. Similar results

were reported in a study conducted among Chinese university students, where medical students demonstrated better knowledge than non-medical students. (24) These findings underscore the need for comprehensive educational interventions, such as workshops and seminars, to enhance knowledge on antibiotic use and resistance among non-health science students at the university level.

Regarding the practices of antibiotic use for upper respiratory tract infections, this study found that 58.0% of participants obtained antibiotics with a doctor's prescription. This contrasts with findings from a study among Sri Lankan pharmacy students, where a higher percentage (77%) purchased antibiotics with a prescription. (14) Additionally, 71.3% of participants in this study reported completing their prescribed antibiotic course, a result comparable to a study conducted among university students in Pakistan, where 68.2% completed the full course of antibiotic treatment. (17)

The findings of this study revealed inappropriate antibiotic usage practices for upper respiratory tract infections among undergraduates and highlighted persistent knowledge gaps. These results emphasize the need to address these gaps through targeted educational initiatives to improve the rational use of antibiotics among Sri Lankan undergraduates.

LIMITATIONS

This study has certain limitations that must be acknowledged. The actual practices regarding antibiotic usage for upper respiratory tract infections among participants were not directly observed by the researchers. Instead, the data were self-reported by the students, which may have introduced reporting bias or inaccuracies. Additionally, the generalizability of the findings is limited, as the study was conducted in a single state university in Sri Lanka.

Consequently, the study population may not be representative of all university students in Sri Lanka.

CONCLUSION

In conclusion, this study revealed that undergraduate students had insufficient knowledge regarding antibiotic use for upper respiratory tract infections, with their faculty affiliation significantly influencing their knowledge levels. While most participants obtained antibiotics with a doctor's prescription and adhered to completing the prescribed course, gaps in understanding and practices remain. Raising awareness among university students is crucial to addressing the risks of self-medication, ensuring adherence to prescribed antibiotic regimens, and mitigating the serious consequences of antimicrobial resistance. Targeted educational interventions are essential to fostering rational antibiotic use and reducing the prevalence of improper practices.

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AUTHOR'S DECLARATION:

The authors declare that all persons listed as authors have read and given approval for the submission of this manuscript.

CONFLICTS OF INTEREST:

The authors declare that they have no conflict of interest.

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