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UNDERSTANDING NON-MEDICAL STUDENTS' PERSPECTIVES ON ANTIBIOTIC USAGE: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Adequate knowledge on antibiotic usage among the public helps prevent patients from requesting doctors for antibiotics for self-limiting infectious diseases, thus contributing to minimising the development of antibiotic resistance. We aimed to assess knowledge and attitude regarding antibiotic usage among the non-medical students. **Methods:** A cross-sectional study was conducted among the non-medical students studying in any discipline other than health-care professional courses and aged 18 years and above. A pre-tested semi-structured questionnaire was used to collect data. For every correct answer, a score of 1 was assigned and 0 for a wrong answer. Data was analysed using SPSS V 25 and represented as mean, standard deviation, frequency and percentage. **Results:** A total of 428 participants consented and filled the form and the mean age was 22.71 (± 2.38) years. Of the participants, 72.2% were male, and majority (30.1%) were from a Law & Business education background, followed by Finance & Economics (27.6%). Good knowledge and positive attitude were observed among 81.1% and 56.8% of the participants, respectively. Most participants correctly recognise antibiotics' effectiveness against bacteria (91.6%) and understand antibiotic resistance as a national and familial concern (over 90%). Misconceptions persist among 75.9% as they believe antibiotics are effective against viral infections, and 76.6% consider their use as acceptable for mild cold. **Conclusion:** Our results show high knowledge (81.1%) among non-medical students with 56.8% demonstrating a positive attitude. Though understanding is good among students, targeted interventions are needed to address misconceptions.

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INTRODUCTION

The discovery of antibiotics and its widespread use have resulted in decreased mortality and morbidity. (1) Microorganisms develop resistance to the drugs meant to kill them due to drug resistance. They carry the resistant gene with every new generation, becoming more dominant till the drug is ineffective. Irrational use i.e., underuse, overuse or misuse of antimicrobials have resulted in the emergence of antimicrobial resistance (AMR). AMR makes effective treatment ineffective, leading to persistent infections with an increased risk of spreading to others. This, in turn, may result in increased hospital stays, increased nosocomial infections leading to mortalities. (2) Also, factors like patients' demands, doctors' personal experience, and purchasing antibiotics without a doctor's prescription have contributed to antibiotic resistance.

The majority of people consider antibiotics as their drug of choice for simple cold and flu, unaware of the implications. (3) More than 700,000 deaths reported per year due to superbugs or multidrug-resistant bacteria. (2) Many infections are no longer cured due to drug resistance, resulting in prolonged treatment and a greater risk of death. Hence, on World Health Day 2011, World Health Organization (WHO) called for immediate action by governments, health professionals, and others to slow down the spread of drug resistance and urging to preserve medication for future generation under the theme "Antimicrobial resistance: no action today, no cure tomorrow". (4) Measures like developing policies to combat drug resistance, pharmacists avoiding over the over-the-counter dispensing of drugs, and doctors prescribing the drugs only when needed, reduce drug resistance. Adequate knowledge on antibiotic usage among public help prevent patients from requesting doctors for antibiotics for self-limiting infectious diseases. With this background, we intended

to conduct a study to assess the knowledge and attitude regarding antibiotic usage among the non-medical students.

Objectives: To assess knowledge and attitude regarding antibiotic usage among the non-medical students.

METHODOLOGY

A community-based cross-sectional study was conducted for 8 months (July 2024 to March 2025) among the non-medical students'. Students studying in any discipline other than health-care professional courses and aged 18 years and above, were included. A pre-tested semi-structured questionnaire was used to collect data. The questionnaire comprises sociodemographic details, 6 knowledge questions and 7 attitudinal questions. A Google form was created and circulated among the students using convenience sampling. For every correct answer, a score of 1 was assigned and 0 for a wrong answer. Those who have scored more than the mean value were considered to have good knowledge and attitude, and less than the mean value as poor knowledge and attitude.

RESULTS

Mean age (SD) of the participants was 22.71 (± 2.38) years. Among them, 81.6% were aged 21 to 25 years, with 14% aged between 18 to 20 years and 4.4% aged 26 years and older. 72.2% of the participants are male, and 30.1% were from a Law & Business education background, whereas 27.6% were from Finance & Economics. 23.8% from Arts & Social Sciences and 17.8% from Engineering & Technology (Table 1). Most participants reported that doctors provide inadequate counselling regarding antibiotic usage and resistance (53.5%). Around 34.1% said they had never received any counselling, while 12.4% confirmed that the doctors had counselled them appropriately (Fig 1). A majority (91.6%) of the participants correctly recognise that antibiotics are effective against bacteria with 13.6% strongly agreeing and 78% agreeing. About effectiveness against viruses, 75.9% (8.4% strongly agree and 67.5% agree) believe antibiotics are effective against viruses and 71.3% (3.3% strongly agree and 86% agree) believe antibiotics as best for most cases of mild cold and cough.

Table 1. Sociodemographic details of the participants (n=428)

Variables	Category	Frequency	Percent
Age (in completed years)	18 to 20	60	14
	21 to 25	349	81.6
	26 and above	19	4.4
Gender	Females	119	27.8
	Males	309	72.2
Education	Arts and social sciences	102	23.8
	Engineering and technology	76	17.8
	Finance and economics	118	27.6
	Law and business	129	30.1
	Other degree	3	0.7

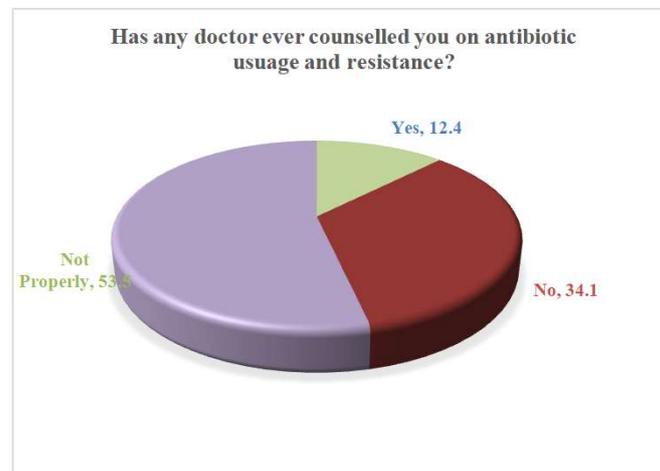


Fig. 1. Distribution of participants based on ever been counselled on antibiotic usage & resistance by a doctor

Table 2. Distribution of participants based on the knowledge questions (n=428)

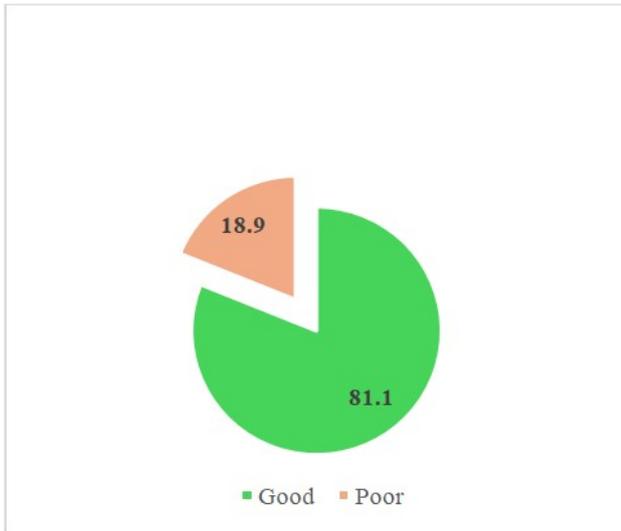
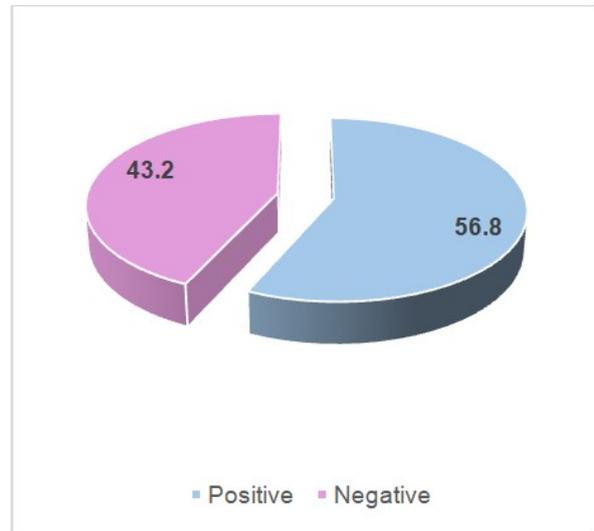
Knowledge questions	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
Antibiotics are effective against bacteria.	58 (13.6)	334 (78)	29 (6.8)	4 (0.9)	3 (0.7)
Antibiotics are effective against viruses	36 (8.4)	289 (67.5)	43 (10)	44 (10.3)	16 (3.7)
Antibiotics are best for most of mild cold and cough	14 (3.3)	291 (68)	84 (19.6)	25 (5.8)	14 (3.3)
Bacteria can become resistant to antibiotics	48 (11.2)	339 (79.2)	30 (7)	10 (2.3)	1 (0.2)
Viruses can become resistant to antibiotics	38 (8.9)	340 (79.4)	38 (8.9)	5 (1.2)	7 (1.6)
Antibiotic resistance is an issue in this country	53 (12.4)	339 (79.2)	29 (6.8)	6 (1.4)	1 (0.2)

A total of 428 participants filled the form and data was extracted into an excel sheet and analysed using SPSS V 25 (IBM SPSS Statistics for Windows, version 22 (IBM Corp, Armonk, N.Y, USA). Data was represented as mean, standard deviation, frequency and percentage.

On antibiotic resistance, 90.4% (11.2% strongly agree and 79.2% agree) report that bacteria can develop resistance, and 88.3% (8.9% strongly agree and 79.4% agree) acknowledge that viruses can also become resistant to antibiotics. The issue of antibiotic resistance in a country is agreed upon by 91.6% (12.4% strongly agree and 79.2% agree) of the participants. (Table 2)

Table 3. Distribution of participants based on the attitude questions (n=428)

Attitude questions	Strongly agree	Agree	Don't know	Disagree	Strongly disagree
Antibiotic resistance issue can affect my family	50 (11.7)	343 (80.1)	29 (6.8)	4 (0.9)	2 (0.5)
Inappropriate antibiotic usage by myself can contribute to antibiotic resistance	44 (10.3)	334 (78)	36 (8.4)	12 (2.8)	2 (0.5)
Do you think there is proper counselling and education regarding antibiotic resistance	48 (11.2)	117 (27.3)	35 (8.2)	182 (42.5)	46 (10.7)
It is ok to take antibiotics if am suffering from mild cold for a faster recovery	15 (3.5)	313 (73.1)	50 (11.7)	33 (7.7)	17 (4)
Is it ok to buy an antibiotics without a prescription to avoid the problem of booking an appointment with a doctor	4 (0.9)	130 (30.4)	28 (6.5)	210 (49.1)	56 (13.1)
Is it ok to keep antibiotics stored for future use without the advice of doctors	2 (0.5)	109 (25.5)	40 (9.3)	216 (50.5)	61 (14.3)
If antibiotics is prescribed for certain day by doctor, is it ok to stop it if symptom improves	2 (0.5)	38 (8.9)	27 (6.3)	288 (67.3)	73 (17.1)

**Fig. 2. Distribution of participants based on knowledge category****Fig. 3. Distribution of participants based on attitude category****Table 4. Distribution of students based on degree with knowledge and attitude category**

	Good Knowledge	Poor Knowledge	Positive Attitude	Negative Attitude
Arts and social sciences	84 (82.4%)	18 (17.6%)	59 (57.8%)	43 (42.2%)
Engineering and technology	65 (85.5%)	11 (14.5%)	48 (63.2%)	28 (36.8%)
Finance and Economics	96 (81.4%)	22 (18.6%)	56 (47.5%)	62 (52.5%)
Law & Business	100 (77.5%)	29 (22.5%)	79 (61.2%)	50 (38.8%)
Others	2 (66.7%)	1 (33.3%)	1(33.3%)	2(66.7%)

More than 90% (11.7% strongly agree, 80.1% agree) think that antibiotic resistance can affect my family. Participants rightly think that their own inappropriate antibiotic usage contributes to the resistance (88.3%). Around 38% (11.2% strongly agree, 27.3% agree) feel that there is adequate counselling and education about antibiotic resistance, while 53.2% (42.5% disagree and 10.7% strongly disagree) disagreed. A large number of participants, i.e., 76.6% (3.5% strongly agree & 73.1% agree) think that its acceptable to take antibiotics for a mild cold for faster recovery. Only 31.3% (0.9% strongly agree & 30.4% agree) think as it is ok to buy antibiotics without a prescription to avoid a doctors appointment, while 62.2% disagree. 26% agree while 64.8% disagree for storing antibiotics for future usage without a doctor's advice. Few, 9.4% (0.5% strongly agree & 8.9% agree) think its ok to stop antibiotics when symptoms improve, whereas 84.4% disagree (Table 3). Mean (SD) knowledge among participants was 3.85 (± 0.84), and Mean (SD) attitude was 4.42 (± 1.19). 347 (81.1%) exhibited good knowledge, whereas only 56.8% had a good attitude (Fig 2,3). The distribution of good knowledge across various disciplines was relatively uniform, ranging from 77.5% to 85.5%, with Engineering and Technology (85.5%) and Arts & Social Sciences (82.4%) performing better than Law & Business (77.5%) and Finance & Economics (81.4%). Whereas, positive attitude showed greater variability where, highest in Engineering and Technology (63.2%) and Law & Business (61.2%),

with notably lower in Finance & Economics (47.5%) and Arts & Social Sciences (57.8%).

DISCUSSION

Our study aimed to assess the knowledge and attitude regarding antibiotic usage among the non-medical students. Findings of our study reported that the mean age (SD) of the participants was 22.71 (± 2.38) years, majority were in the age group of 21 to 25 years (81.6%), 72.2% of the participants are male, and 30.1% were from a Law & Business education background, followed by 27.6% were from Finance & Economics. A study by Bawazir A et al, among non-medical university students reported the mean age of 20.2 (± 1.8) with majority (36.8%) were in the age group of 19-20 years.[5] In our study, 34.1% said they had never received any counselling regarding antibiotic usage and resistance while only 12.4% confirmed that the doctors had counselled them appropriately. Whereas study in Cyprus shows that advice on appropriate usage of drugs was received by 91.6% of the participants from a medical professional. (6) The difference highlights the communication gap that exists between the patient and the doctor, service provider and the pharmacist. The Mean (SD) score knowledge and attitude among participants were 3.85 (± 0.84) and 4.42 (± 1.19) respectively. Overall, 81.1% exhibited good knowledge, and 56.8% had a positive attitude. In contrast, Bawazir, A

et al, reported sufficient knowledge in 59.1% , and a positive attitude in 60.0%, regarding antibiotic resistance. (5). Other literature have reported similarly limited understanding with 59% in United Arab Emirates (UAE) and 61.1% in Malaysia shows showing less knowledge antibiotic resistance. (7,8) The study among the general public also demonstrated average knowledge (52.29 %), but moderate attitudes (67.84 %) (9) A majority (91.6%) of the participants rightly mentioned that antibiotics are effective against bacteria, and a similar result was seen in a study done in Bangladesh, where 80% of the participants were aware of antibiotics' efficiency in treating bacterial infections.(9) Additionally, 89.26% of non-health science students correctly mentions antibiotics are effective in the treatment of bacterial infections. (10) In a study by Nguyen N V et al, few(7%) could define antibiotics correctly as medicines that kill bacteria or prevent the growth of bacteria or prevent infection. (11) About the effectiveness of antibiotics against viruses, 75.9% of participants mistakenly believed that antibiotics are effective, demonstrating a significant misconception. This finding aligns with a study done among the general public, where over 90 % were unaware that antibiotics are ineffective against infections caused by viruses. Approximately one-third of the public in the Republic of Cyprus believed that viral infections respond to antibiotics. (6,9) This widespread misconception highlights the lack of education regarding the antibiotics. On antibiotic resistance, 88.3% acknowledge that viruses can become resistant to antibiotics, and 90.4% report that bacteria can also develop resistance. World Health Organisation (WHO) multi-country survey revealed that, 76% respondents believe that body becomes resistant to antibiotics rather than bacteria. (12) Most of the community members do not see antibiotic resistance as personal even though they know about the existence of antibiotic resistance. (13)

In our study, 91.6% participants agreed antibiotics resistance as a national issue. More than 90% acknowledge that antibiotic resistance can affect their family. 88.3% admit their own inappropriate antibiotic usage contributes to the resistance. Around 38% feel that there is adequate counselling and education about antibiotic resistance, while 53.2% disagreed. A substantial 76.6% of participants think that it's acceptable to take antibiotics for a mild cold to faster recovery. This misconception reflects in a study done in Primary health care centers of Bahrain, where 56.3% believed that antibiotics are used in the treatment of mild cold and flu and 57.5% agreed that taking antibiotic medication during mild cold and flu helps them I faster recovery, while 51.8% agreed that taking antibiotics can prevent the complications of mild cold and flu. (14) Even study among trainee nurses also aligns with the results, where nearly 40% believed that taking antibiotics will help to prevent mild cold from worsening and make recovery faster. (15) On our study, only 31.3% think it is ok to buy antibiotics without a prescription while 62.2% disagree. 26% agree while 64.8% disagree for storing antibiotics for future usage without a doctor's advice. A similar result was seen in study by Tiong TW et al, where 72 % of respondents believed that, surplus or unused antibiotics should not be stored for future use or given to someone else. (9) Positive attitude was highest in Engineering and Technology (63.2%) and Law & Business (61.2%), with notably lower in Finance & Economics (47.5%) and Arts & Social Sciences (57.8%). Comparable study reflect similar trends where students in technical and business fields often exhibit more favourable attitudes toward antibiotic stewardship compared to those in purely social sciences disciplines. (5)

CONCLUSION

Our data reflects that while non-medical university students exhibit high knowledge of antibiotic use-81.1% classifying as having good knowledge, attitudes toward appropriate antibiotic practices lag, with only 56.8% demonstrating a positive attitude. Although most participants correctly recognise antibiotics' effectiveness against bacteria (91.6%) and understand antibiotic resistance as a national and familial concern (over 90%), misconceptions persist as 75.9% believe antibiotics are effective against viral infections, and 76.6%

consider their use as acceptable for mild cold. While knowledge is consistently robust across academic disciplines, attitudes vary significantly—highest among Engineering and Technology and Law & Business students and the lowest among those studying Finance & Economics and Arts & Social Sciences. These findings suggest that although understanding about the antibiotics is good, targeted interventions are needed to address pervasive misconceptions and foster responsible antibiotic use through improved counselling and tailored attitudinal campaigns.

Recommendations: Health care providers should effectively address the about the usage and misconceptions. Use of Information, education & counselling (IEC), infographics to create awareness among students and public about antibiotics

Limitations: Practice among the students was not assessed.

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Conflict of Interest: Nil

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