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# Antibiotic abuse: A cross-sectional study on knowledge, attitude, and behaviour among undergraduate students of western Nepal

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## Abstract

**Background:** Antibiotic abuse has drawn the attention of public health experts, stakeholders, and medical science due to the substantial economic loss that it causes to individuals and nation.

**Objectives:** To assess the knowledge, attitude, and behaviour on antibiotic abuse among undergraduate level students of Pokhara, Nepal.

**Methods:** This analytical cross-sectional study was conducted after ethical clearance in 361 undergraduate level students of Pokhara, Nepal from 2022 November to 2023 January. Convenience sampling technique was utilised for data collection. Data were analysed primarily by Chi-square test to find the associated factors using SPSS v.21.

**Results:** A total of 361 respondents participated, and 61.77% were female. Most of the respondents (67.31%) were from health sciences, while 32.68% of the respondent was of non-health sciences. The mean age of the respondents was 20.97 ± 1.56 years. More than half of the respondents had inadequate knowledge and unfavourable attitude towards antibiotics while the prevalence of self-medication was found to be 72.6%.

**Conclusion:** This study recommends for further large-scale research to understand the current state of antibiotic use and misuse among general population. Self-medication rate was high regardless of perceived knowledge and positive attitude. So, this study urges for the need of behavioural interventions that aims at raising awareness and establishing effective use of antibiotics.

**Key words:** Antibiotic abuse; Self-medication; University students.

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## INTRODUCTION

Inappropriate use of lifesaving drugs is among the key factors for the treatment failures with increased mortality rates.[1] Unless effective measures are taken, a substantial amount of death could occur globally due to antibiotic resistance.[2] The rampant use ofantibiotics, inadequate knowledge of Antimicrobial Resistance (AMR) and poor health system puts developing countries at higher risk of various health problems.[3]

In various studies, it has been found that taking an inappropriate dosage of antibiotics can result in the development of resistant bacteria thereby leading to super infections.[4,5] Nayak et al. highlighted the necessity of further studies among health professionals to strengthen the curriculum on antibiotics use and self-medication practices in Nepal.[6] Fewer concerns are

focused on medical students (MS) and non-medical students (NMS), despite the fact that their knowledge, attitude and behaviour regarding the use of antibiotics have a tremendous impact on the consequences associated with antibiotic use. Only a few studies have been conducted among nursing and dental students in Nepal.[7] Thus, this study is designed to evaluate the knowledge, attitude, and behaviour about the proper use of antibiotics among the undergraduate students who represent the educated class in the society.

## METHODOLOGY

An analytical cross-sectional survey was conducted among 361 undergraduate students of Pokhara, Kaski, Nepal from 2022 November to 2023 January after getting ethical approval from Institutional Review Committee of Madan Bhandari Academy of Health Sciences, Hetauda, Makwanpur, Nepal (IRC-005-079). Ethical approval was also taken from the colleges prior to the data collection. Declaration of Helsinki (2013) was followed during whole of study period. Consent form was written in the understandable language stating the study's objective, nature of participant's involvement and confidentiality of the data. They were informed that they have right to quit the survey at any point they feel difficulty. They were made clear on the confusing parts and finally written informed consent form was taken.

The study was conducted using convenience sampling technique among health sciences students, management students, Arts and Engineering students. All students of the selected classes were the study sample. However, the survey did not include students who were absent or dropped out.

The data were collected using a structured questionnaire developed based on literature review and expert opinions to assess knowledge, attitude, and behaviour towards antibiotics among the university students. Based on an earlier questionnaire developed by Vallin et al, this questionnaire consisted of knowledge, attitude, and behaviour. Knowledge was assessed with five items (Score, 0-5; median, 3) which was further dummied as inadequate; median value below 3 and adequate; ≥ 3. The internal consistency (Cronbach's alpha) of the scale was 0.56.

Attitude toward antibiotic use was examined with eight items (Score, 0-8; median, 5), which was further dummied as unfavourable attitude; median value less than 5 and favourable attitude; median ≥5. The internal consistency (Cronbach's alpha) of the scale was 0.73. The construct and content validity of the attitude scale was also conducted using the same steps of the knowledge scale. The content validity of the scale was established using a panel of three judges competent in the field of antibiotic who were requested to assess the relevance of the content used in the questionnaire. The data collected were analysed using IBM SPSS Statistics for Windows, version 21 (IBM Corp., Armonk, N.Y., USA)

## RESULTS

The findings show that nearly two-third (64.81%) of the respondents belonged to the age group of 19-21 years (Table 1). The mean age of the respondents was 20.97 ± 1.56 years. Nearly two out of three (61.77%) of the total respondents were female and more than two-thirds (67.31%) of the respondents were of Health and Allied Sciences.

More than one-third (39.9%) of respondents were incorrect about the antibiotic target while majority (92%) of them were incorrect about antibiotic use in cold. Majority (71.2%) responded that antibiotics could cause side effects, but more than half of the respondents said that they could terminate the antibiotic therapy without completing the course in case of feeling better (Table 2).

With regards to leftover antibiotics, more than half (56.8%) of the respondents agreed to save antibiotics forfuture use while 54.8% agreed leftover antibiotics should be taken back to the pharmacy. A negative attitude was recorded in response to the statement: "a persistent cough (longer than one week) alwaysneeds to be treated with antibiotics to heal" as (52.6%) of therespondents incorrectly agreed to it. More than two third (77%) of students think that it is not appropriate to self-medicate antibiotics for diarrhea and half of (51%) them agreed that antibiotic resistance is a big problem in Nepal (Table 3).

More than half of the respondents (53.2%) had inadequate knowledge about and nearly three-fifth (56%) had unfavourable attitude toward use of antibiotics (Table 4).

Of the total students 75.06% of students reported that they consumed antibiotics, the majority of which was due to fever(53.2%), bacterial infection (21.1%) and cold (15.7%). More than one-third (34.8%) of the respondents took antibiotics once in the past 12 months, and about 30.3% took it two tofive times. About half (49.3%) of the respondents said that they completed the antibiotic course while about 35% did not do the same. Self-medication being one of the important indicators of antibiotic abuse the study revealed that prevalence of self-medication was 72.6%. Further this study assessed the factors associated with self-medication (Table 5).

**Table 1: Socio-demographic variables (N=361)**

| Variables | Frequency | Percentage (%) |
|---|---|---|
| Age of the respondents (Range = 19-24; Mean ± Standard Deviation = 20.97 ± 1.56) | | |
| 19-21 years | 234 | 64.81 |
| 22-24 years | 127 | 35.18 |
| Education programme | | |
| Health and allied Sciences | 243 | 67.31 |
| Non health | 118 | 32.68 |
| Sex | | |
| Male | 138 | 38.22 |
| Female | 223 | 61.77 |
| Places to get medical care | | |
| Hospital | 173 | 40.2 |
| Clinic | 34 | 47.9 |
| Ayurved | 145 | 9.4 |
| Others | 9 | 2.5 |

**Table 2: Respondents' knowledge towards use of antibiotics (N=361)**

| Items | Correct n (%) | Incorrect n (%) |
|---|---|---|
| 1. Antibiotics are supposed to kill (Bacteria) | 217 (60.1) | 144 (39.9) |
| 2. Antibiotics make one recover faster when having a cold | 29 (8) | 332 (92) |
| 3. Antibiotics often cause side effects e.g., diarrhea, stomach upset | 257 (71.2) | 104 (28.8) |
| 4. Antibiotics cause harm on the body's gut microbiota | 44 (12.1) | 317 (87.8) |
| 5. One can terminate a partially completed antibiotic therapy after feeling better | 243 (67.3) | 118 (32.7) |

**Table 3: Respondents' attitude towards use of antibiotics (N = 361)**

| Items | Agree n (%) | Disagree n (%) |
|---|---|---|
| 1. Leftover antibiotics can be saved for future use or to give to someone else | 205 (56.8) | 156 (43.2) |
| 2. Leftover antibiotics should be taken back to the pharmacy | 198 (54.8) | 163 (45.1) |
| 3. It is good to be able to acquire antibiotics from relatives or acquaintances | 182 (50.4) | 179 (49.6) |
| 4. It is good to buy antibiotics from pharmacies without a prescription | 147 (40. 7) | 214 (59.3) |
| 5. The body can usually fight mild infections on its own without antibiotics | 230 (63.7) | 131 (36.3) |
| 6. A persistent cough (>1 week) always needs to be treated with antibiotics | 190 (52.6) | 17 1 (47. 7) |
| 7. It is appropriate to take antibiotics for diarrhea on my own | 278 (77) | 83 (23) |
| 8. Today, antibiotic resistance is a big problem in Nepal | 184 (51) | 177 (49) |

**Table 4: Knowledge and attitude category towards use of antibiotics (N = 361)**

| Category | Frequency | Percentage (%) |
|---|---|---|
| Knowledge about use of antibiotics (Median,3; Min-Max, 0-5) | | |
| Inadequate knowledge (<3) | 192 | 53.2 |
| Adequate knowledge (≥ 3) | 169 | 46.8 |
| Attitude towards use of antibiotics (Median,5; Min-Max, 0-8) | | |
| Unfavourable attitude (<5) | 202 | 56 |
| Favourable attitude (≥5) | 159 | 44 |

**Table 5: Respondents' behaviour towards use of antibiotics (N = 361)**

| Items | n (%) |
|---|---|
| 1. Have you ever taken Antibiotics? (n = 361) | |
| Yes | 271 (75. 06) |
| No | 90 (24.93) |
| 2. Reason of taking antibiotic (n = 271) | |
| Cold | 42 (15.7) |
| Flu | 11 (4.0) |
| Fever | 144 (53.2) |
| Bacterial Infection | 58 (21.1) |
| Other | 16 (6.0) |
| 3. How many times did you consume antibiotics in the past 12 months? (N = 271) | |
| None | 95 (34.9) |
| Once | 94 (34.8) |
| 2 to 5 times | 82(30.3) |
| 4. Do you always complete the antibiotic course? (n = 271) | |
| Yes | 134 (49.3) |
| No | 94 (34.8) |
| I canot remember | 43(15.8) |
| 5. Did you make your recent purchase of antibiotics based on a doctor's prescription? (N = 271) | |
| Yes | 196 (72.1) |
| No | 58 (21.5) |
| Donot Know | 17 (6.4) |
| 6. I have experience of acquiring prescribed antibiotics from a pharmacy (N = 271) | |
| Agree | 777 (55.6) |
| Disagree | 467 (33.4) |
| Do not Know | 153 (11.0) |
| 7. I have experienced antibiotic prescription for myself (N = 271) | |
| Agree | 197 (72.6) |
| Disagree | 74 (27.4) |
| 8. I usually know how antibiotics should be taken (n = 271) | |
| Agree | 127 (47.0) |
| Disagree | 82 (30.2) |
| Do not Know | 62 (22.8) |
| 9. Doctors run a thorough examination of whether a patient needs antibiotics or not (N = 271) | |
| Agree | 143 (52.8) |
| Disagree | 87 (32.1) |
| Do not know | 41 (15.1) |
| 10. Doctors prescribe antibiotic when a patient expects it (N = 271) | |
| Agree | 105 (38.9) |
| Disagree | 121 (44.5) |
| Do not know | 45 (16.6) |

**Table 6: Association of different variables with self-medication (N=361)**

| Variables | Self-medication | | p-value | UOR (95% CI) |
|---|---|---|---|---|
| | Yes | No | | |
| 19-21 years | 148 (63.2) | 86 (36.8) | <0.001 | 0.19 (0.10-0.36) |
| 22-24 years | 114 (89.8) | 13 (10.2) | | Ref |
| Health and allied science | 157 (64.6) | 86 (35.4) | <0.001 | 4.42 (2.34-2.34) |
| Non-Health | 105 (89) | 13 (11) | | Ref |
| Male | 51 (36.95) | 87 (63.04) | | Ref |
| Female | 48 (21.52) | 175 (78.47) | 0.001 | 2.13 (1.33-3.42) |
| Inadequate knowledge | 106 (55.2) | 86 (44.8) | | Ref |
| Adequate knowledge | 156 (92.3) | 13 (7.7) | <0.001 | 9.73 (5.16-18.34) |
| Unfavourable attitude | 11 (6.14) | 168 (93.85) | | Ref |
| Favourable attitude | 88 (48.35) | 94 (51.64) | <0.001 | 0.070 (0.036-0.13) |

# p-value from Pearson's chi square; statistically significant at *p <0.05

## DISCUSSION

Nepal as a developing country has gone through some rapid development and managed to overcome some of the challenges within the health sector. Yet, studies to assess the knowledge, attitude and behaviour towards antibiotic use are very few, which is not enough for policy development.[8] Hence this study is one of the few attempts in the Nepalese literature to assess the status of undergraduate students regarding antibiotic use in Nepal. The knowledge level of respondents in this study is inadequate in compared to previous studies conducted in other countries like: Tobago, Malaysia and Trinidad but better than Ethiopia and Lithuania.[9,10] Since adequate knowledge plays vital role in translating into a positive attitude, so adequate knowledge among the respondents is of paramount importance for community awareness about appropriate use of antibiotics.[11] Knowledge about the purpose of using antibiotics should be known and is essential as it indicates basic knowledge about use of antibiotic which further helps in prevention of irrational consumption. But, more than one-third (39.9 %) of respondents were incorrect about the antibiotic target. This misconception is higher than the studies in Sweden, Ethiopia, UK and less than the study Jordan (67%).[12,13] More than half of the respondents reported they can terminate the antibiotic without fulfilling the full course in case of feeling better. In Jordan, Syria, Saudi Arabia, Pakistan, Taiwan, and Nigeria about 42% to 60% people halt antibiotic consumption after the symptoms disappear.[4,15] Thus, the negligence in completion of antibiotic course may place the people at the risk of development of resistance. As, antibiotics are ineffective in cough and cold, majority (92%) of the respondents responded it incorrectly which is similar to the study conducted in Nigeria, Jordan, Sweden, Ethiopia, Taiwan, and Kuwait.[15-16] Inadequate knowledge among the undergraduate students suggests that this proportion could be more than among the general people, who are not much well educated. This assumption is supported by previous study conducted among African Americans which revealed that the lack of proper knowledge about the use of antibiotics increased the likelihood of misuse and non-compliance of antibiotics.[17] Thus this study recommends for the development of educational programs to raise the awareness level among university students regarding the misuse of medicines and its link in the rise of antibiotic resistance.[18]

Self-medication practice influences health care seeking behaviour of individuals. Although the majority of respondents reported that antibiotic resistance is a big problem in Nepal, self-medication yet occurs at an alarmingly high rate. This study reported 72.6% of respondent practicing self-medication which is similar to Yemen but only lower than Syria (81%) and Palestine (87%).[19-22] In contrast to this, the prevalence of self-medication in countries like: US, Honduras, Tobago and Trinidad ranges from 14% to 26%.[23] The noticeable prevalence is of European countries where the scenario is more improved as self-medication rate is only 5%.[24] In this study, respondents of health and allied sciences are more likely to self-medicate than non-health sciences. It is an important finding and suggests more study to be conducted as it indicates that self-medication rate is also high regardless of perceived knowledge and positive attitude which is similar to the study conducted in Jahangirnagar University, Dhaka, Bangladesh.[26]

In this study, the high percentage of antibiotic use was recorded which is lower than Italy, Jordan, and Syria but

comparatively higher than that of Malaysia and European countries.[27] High rate of self-medication in Nepal could be due to the highburden of infectious diseases in areas with poor sanitation and hygiene. One reason could be the expectation of the patients which makes doctors more likely to administer antibiotics under pressure.[28] According to this study findings, about one-third of the respondent had distrust about treatment and did not agree that doctors ran a thorough examination prior to prescribing. To prevent the antibiotic abuse, this study urges the need for pharmacies to adhere the guidelines to abandon selling of antibiotics without a valid prescription. This study also suggests Drug Department Administration for the strict nationwide inspection and engagement of public in community-based dialogues to decrease the irrational use of antibiotics.[29]

## CONCLUSION

The study concluded that the frequency of antibiotic use was high and non-compliance to fulfilling the antibiotic course is of paramount importance among students. This study recommends for further large-scale research to understand the current state of antibiotic use and misuse among general population. Self-medication rate was high regardless of perceived knowledge and positive attitude and more importantly the prevalence was high among health and allied science. Thus, this study urges for the need of behavioural interventions that aims at raising awareness and establishing effective use of antibiotics.

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