Frontiers in Health Informatics www.healthinformaticsjournal.com
ISSN-Online: 2676-7104
2024; Vol 13: Issue 3 Open Access

A COMPARATIVE STUDY OF SELF-MEDICATION BEHAVIORS WITH ANTIBIOTICS AMONG MEDICAL AND NON-MEDICAL COLLEGE STUDENTS OF SOUTH PUNJAB

Shahla Naeem,
Assistant Professor, Family and Community Medicine Department, King Faisal University, Al Hofuf, Kingdom of Saudi Arabia. Email: shahlanaeem010@gmail.com.

Muneeba Syed,
Quaid-e-Azam Medical College Bahawalpur, Email: muneebasyed6@gmail.com

Muhammad Ismail Mughal,
Medical Officer, Nishtar Medical University Multan, Email: ismailmughalbwp97@gmail.com

Ali Siftain,
Lecturer, Government College University, Faisalabad, Email: alisiftain@gcuf.edu.pk

---

Cite this paper as: Shahla Naeem, Muneeba Syed, Muhammad Ismail Mughal, Ali Siftain, (2024), A Comparative Study Of Self-Medication Behaviors With Antibiotics Among Medical And Non-Medical College Students Of South Punjab. *Frontiers in Health Informatics*, *13(8) 4871-4879*

ABSTRACT

BACKGROUND: All over the world, self-medication is common, which facilitates procedures but increases risks such as antibiotic resistance. Social media-influenced college students show concerning self-medication behaviors. Students from undergraduate level of medical, nursing, and non-health sciences schools participated in this cross-sectional study to evaluate their attitudes, knowledge, and self-medication practices.

MATERIALS AND METHODS: Approaching undergraduate students those were 19 years of age or older, this descriptive cross-sectional survey was conducted at educational institutions between 2023 and 2024. Socio-demographics data, antibiotic self-medication, and the knowledge related to it and collected through validated questionnaire. To improve the statistical power, the sample size was 755. For data analysis, SPSS version 26 was used.

RESULTS: Analysis of data revealed that a significant percentage of students use antibiotics as a form of self-medication. Convenience was the main concern for medical students, while cost-cutting and mistrust of physicians were the main concerns for non-medical students. Throat soreness was the most often reported self-medication complaint. While non-medical students sought advice from local stores, medical students used textbooks to find the information they needed. Surprisingly, medical students used medicines mostly based on their prior knowledge and experiences, while non-medical students frequently bought antibiotics from stores, leaving them open to incorrect diagnosis and treatment.

CONCLUSION: This emphasizes how crucial it is to put particular treatments into place to teach the students risky self-medication behaviors.

KEYWORDS: Medical students, Non-Medical Students, Undergraduate students, Antibiotics, Self-Medication.

INTRODUCTION

Self-care is widely recognized globally for empowering individuals to take responsibility for their health and build confidence in managing their well-being [1]. However, this approach has also contributed to an increase in unregulated self-medication, now considered a subset of self-care [2]. Self-medication is defined as the practice of individuals independently consuming medication without professional medical consultation, regardless of whether the drug was previously in their possession or specifically obtained for this purpose [3].

It has been observed that the use of over-the-counter (OTC) medicines for self-medication is growing in popularity globally. Focusing mainly on the target population and country, the progression rate of self-medication varies from 12.5% to 95.9% worldwide [4].

The market value of self-medication was estimated to be USD 87.5 billion in 2022 and is projected to reach USD 200.5 billion by 2032. According to estimates, the market for self-administered medications makes up over 8% of the global pharmaceutical business [5]. Self-medication has advantages and disadvantages of its own. It is economical, lessens the strain on the public health system [6].

Self-medication can save time spent on doctor's appointments, provide relief for acute medical issues, save lives, and offer a cost-effective option for treating common medical conditions [7]. However, inappropriate self-medication can result in resource wastage, increased pathogen resistance, and other significant risks [1][8]. A recent survey revealed that approximately 60% of individuals in Pakistan admitted to practicing self-medication. The most frequently used drugs for this purpose include antipyretics, antiallergics, antacids, and antibiotics [9].

Antibiotics are medications used to treat bacterial infections [10]. These life-saving drugs work by either eliminating bacteria or inhibiting their growth. However, antibiotic resistance (ABR), characterized by the reduced effectiveness of antibiotics against certain bacteria, has emerged as a critical global concern. The primary contributors to this issue are the overuse and misuse of antibiotics [11].

In recent years, antibiotic resistance has become a significant global public health threat, jeopardizing the ability to combat infectious diseases and undermining advances in medicine. Currently, it is linked to at least 700,000 deaths annually worldwide, with projections indicating this number could rise to 10 million deaths per year by 2050, with Asia accounting for a substantial proportion of the burden [12].

Antibiotics are widely used in low- and middle-income countries (LMICs) due to poor sanitation, limited access to alternative treatments, and a lack of diagnostic tools. However, their impact on health outcomes is often underestimated [12][14].

Self-medication with antibiotics (SMA) has been recognized as a significant contributor to the rise in antibiotic resistance. While inappropriate usage, insufficient dosages, and noncompliance with prescription guidelines are the primary drivers of resistance, SMA exacerbates the problem [12][14].

Among college students, there is a notable reluctance to seek professional medical advice, treatment, or healthcare services. Instead, many rely on the internet, driven by the widespread influence of social media. This behavioral shift raises concerns about self-diagnosis and self-medication practices, particularly regarding antibiotic use [15].

Given their potential in clinical setting to become future leaders, where they could apply their

knowledge and positively affect patients' attitudes and behaviors about SMA, special emphasis must be paid to how medical students behave with regard to SMA practices. Our study was designed to examine the SMA practices of students in medical and non-medical disciplines because there aren't many comparative studies.

MATERIALS AND METHODS

Study was conducted at Quaid-e-Azam Medical College, Bahawalpur. Institutional Review Board provided the approval to carry out the study. Four medical colleges, two nursing colleges, and thirteen non-health sciences institutions - eight engineering and technology institutions and five institutions affiliated with multidisciplinary universities that offer courses in the humanities, sciences, and social sciences were the sites of this descriptive cross-sectional study. The research was carried out between the duration of August 2023 and February 2024. Regardless of the undergraduate program's stream, all undergraduate students who were 19 years of age or older and enrolled in their first through fifth years were included. Every student who consented to take part in the study was included. The formula was used to get the sample size needed for this investigation.(18) "N" stands for the sample size, "Z" for the standard normal deviation, which is usually chosen at 1.97 for a 95% confidence interval, "P" for the presumed prevalence, and "E" for the allowable margin of error in this equation. Given the paucity of research on undergraduate students' self-medication of antibiotics, a 50% prevalence rate (P-value = 0.05) was used to optimize variability. The acceptable margin of error (E), 5% was determined to be (P-value = 0.05). These variables were then entered into the calculation, which produced an initial estimate of the sample size of roughly 384 individuals. The estimated sample size was changed to 576 after accounting for a design effect of 1.5. To boost the study's statistical power, it was determined to gather responses twice the estimated sample size (n=576) in an effort to get more representative data.

For online data collection Google Forms were used. All participants' data was collected using a self-created, pre-validated questionnaire with both open-ended and closed-ended items. Using a Google form, to the study participants the research information sheet and informed consent form were made available. This document provided an overview of the study's goals and possible public health implications, as well as an introduction to the research team. Participants were told that participation was completely optional, that they could stop at any time without facing any consequences, and that their answers would be kept private and confidential. It was also conveyed that the information would be combined and released as a whole. For any questions, the study team's contact details were given. They were required to sign an informed e-consent form after logging in with their Google account by clicking on it, and then the quiz would show up on the screen. Multiple submissions by a student were blocked by logging into a personal Google account. This survey consisted of 44 questions divided into three pieces. The questionnaires were to be filled out independently by the respondents.

SPSS version 26 was used for analysis of the data. Microsoft Excel was used to extract the data from the Google form replies in.xlsx format. Responses that were found to be incomplete were removed from the final dataset. Following data organization and presentation in the form of tables, the results were examined for statistical significance using standard online statistical tools19 and Microsoft Excel. Where appropriate, for continuous data the student's t-test was used and the Chi-square test/Fisher's exact test for quantitative data. Confidentiality was maintained by securely storing all pertinent data. Nowhere was the identity of the volunteers disclosed.

RESULTS

Participants in the study consented to participate in, 355 out of 400 non-medical students (89.9%) and 555 out of 603 medical students (98.6%). We removed individuals with a parent who is a

doctor from the final analysis since this suggests that drugs are being given under professional supervision and cannot be properly categorized as self-medication. Lastly, the study included 525 students from medical streams and 395 students from non-medical streams. The average age for the medical and non-medical groups was similar, at 20±1.77 and 22.63±6.14 years, respectively. There were more female nursing students in the medical group. In the past year, 43.6% of medical students and 37.8% of non-medical students reported self-medication (p = 0.669).

Table 1 : No. of Medical and Non-Medical Student

Students	No. of Students	Total
Non-Medical	355(89.9%)	400
Medical	555(98.6%)	603

Among non-medical students, there were 84 males and 95 females (p<0.001), while among medical students, there were 113 males and 175 females who self-medicated (p = 0.005). Furthermore, self-medication was more common among medical students in later years (p = 0.025). The majority of kids used their own medications once or twice. Additionally, it was discovered that the frequency of SMA with antibiotics was unaffected by the educational stream.

Table 2 : No. of Males and Females among medical and non-medical with p-value

Students	Males	Females	P-Value
Non-Medical	84	95	<0.001
Medical	113	175	0.005

Significantly more medical students selected "convenience of getting an antibiotic," while significantly more non-medical students selected "cost saving" and "lack of trust in doctors" as their primary motivators for practicing SMA. Although the difference was negligible, throat pain was the most frequent complaint for which SMA was performed in both groups. SMA was performed by substantially more medicos for bodily pains and significantly more non-medicos for nasal congestion (p<0.001).

When compared to non-medical groups, the medical group on the academic experience and advice of friends (p<0.001), whereas the non-medical group's students depended on suggestions from nearby pharmacies for SMA (p<0.001).

A sizable portion of students in the medical group cited prescriptions, antibiotic kinds, and pharmacist trust as the primary considerations for selecting an antibiotic (p<0.001). On the other hand, a considerably greater proportion of non-medical students cited cost, symptoms, and recovery time as the primary considerations when choosing an antibiotic (p<0.001).

Further elaborating on the findings, local pharmacies were a popular source of antibiotics (83.7% of non-medical students vs. 88.7% of medical students), whereas 5.26% of medical students and 9.8% of non-medical students used online websites or e-pharmacies. Remarkably, 14.2% of students who were not medical students reported as using a registered medical practitioner's services (0.4% in medicos, p<0.001). Thirteen percent of medical students and twenty-one percent of non-medical students said they had never tried to read the package insert (p = 0.002). 36.7% of medical students and 45.4% of non-medical students "always" reviewed the instructions.

In terms of comprehension, 10.28% of medical students and 11.7% of non-medical students said they did not grasp the instructions at all. The instructions were fully understood by 47.5% of non-medical students and 55.3% of medical students (p=0.015), but 34.2% of non-medical

students and 34.7% of medical students partially understood them.
Non-medical students were significantly more likely to ask the person at the pharmacy for dosage information (49.4%) than medical students (30.4%, $p < 0.002$). Additionally, 7.9% of medical students and 23.5% of non-medical students used the internet to look for dosage information ($p<0.001$). Finally, for 45.8% of medical students and 33.9% of non-medical students, academic or prior experience influenced dosage selections ($p = 0.013$). According to the study, 15.2% of non-medical students and 7.09% of medical students reported constantly adjusting the dosage during treatment, whereas 39.8% of non-medical students and 45.8% of medical students acknowledged to occasionally changing the dosage ($p = 0.002$).
Compared to first-year non-medical students, first-year medical students were more likely to self-medicate with antibiotics, as indicated by the adjusted odds ratio (aOR) of 0.349 (95% CI, p-value = 0.002).

DISCUSSION

The study's objectives were to evaluate students' knowledge and attitudes in both medical and non-medical fields, as well as their use of antibiotics for self-medication. The younger generation's current practice trends were reflected in this assessment. According to the current study, medical students practiced SMA at a higher rate than non-medical students (47.1% vs. 37.9%, p=0.754). This tendency went counter to research by Sarahroodi et al. and Shitindi et al. in Southern Iran and Tanzania, respectively, which found that non-medical students do mostly self-medication practices [7] [20] [23].
The frequency of MA in study was higher than in studies conducted in Italy and Iran, but lower than in those conducted in Nepal, the United Arab Emirates, and Sudan [7] [20] [23].
The variations in pharmaceutical laws among nations may be the cause of the disparity in SMA prevalence across nations. Furthermore, demographic differences may also play a role in this. According to the current study, there was a statistically significant difference in the number of male students practicing SMA compared to female students in both categories. This might be because men feel more at ease obtaining medications from various sources. This result is in opposition to the study conducted by Kumar et al. and comparable to the research conducted by Nair et al. and Azad et al. [24] [26].
The results of this investigation showed that third-year MBBS students in both groups self-medicated the most, which can be explained by their exposure to pharmacology. Furthermore, a much higher percentage of medical students cite convenience as their primary motivation for using SMA. This can be because medications are comparatively easier to obtain at hospital, ward, or campus pharmacies. Long lines at the chamber are a common reason why people in densely populated countries like India believe that visiting a doctor takes time. Additionally, because of laxer rules, antibiotics are readily available in neighborhood pharmacies, saving time and money. Several research back up our conclusions and demonstrate that various approaches are needed to increase public awareness of this problem [15] [27] [28].
In contrast to their non-medical colleagues, who relied on advice from local pharmacies or the internet, medical students mostly relied on their academic background and the opinions of their classmates when selecting antibiotics and dosages, according to this study. Medical students' theoretical knowledge and clinical experience, which non-medical students do not have, may help to explain the phenomena. Remarkably, many students from non-medical groups obtained medications from unlicensed practitioners. Misdiagnosis, treatment failure, and serious adverse medication responses are all made more likely by such methods. In their investigations, Shitindi et al., Mandal et al., and Kumar et al. reported similar findings [15] [26][27].
The study found that because the first antibiotic was unsuccessful and did not alleviate their symptoms, a noticeably greater percentage of students in the physician group changed their

antibiotic during the course of treatment. This type of behavior is risky, and we believe that people's interest in and passion for drugs causes them to engage in this illegal behavior for both themselves and other people. Similar results were also observed by Khadka et al. in a research conducted among Kathmandu medical students [7].

Concerns of obtaining duplicate antibiotics were voiced by a significantly higher percentage of medical students. Medical students, on the other hand, found that under a different name, they were prescribed the same medication. This increased vigilance may have been influenced by medical students' pharmacological literacy. The study found that the medical group of students had a favorable attitude toward following the antibiotic regimen for the entire duration. After finishing all of their coursework, 45.75% of students said that they had ceased taking antibiotics. It should be highlighted, nonetheless, that the outcome is far worse than prior research from other nations, such as Tanzania and eastern Ethiopia [15] [30].

When the symptoms subsided, a much greater percentage of students from non-medical groups discontinued taking antibiotics. Similar results were found among medical and non-medical students in a study conducted by Buke et al. at Ege University in Turkey [31].

Furthermore, the study discovered that the majority of students from both groups experienced nausea and diarrhea after practicing SMA, which is consistent with findings from other studies, and that a significantly smaller percentage of students had experienced adverse reactions after taking self-prescribed antibiotics [32] [33]. Surprisingly, the majority of non-medical students never sought medical advice and instead primarily talked about side effects with their relatives. This type of behavior must be addressed since it is primarily the result of ignorance about the negative consequences of self-medicating with antibiotics.

Amoxicillin and clavulanic acid were the most often used antibiotics among medical and non-medical undergraduates in Ghana, Northern India, Sri Lanka, and Karachi, according to the study's findings [27] [33] [37].

It is a popular medication for SMA treatments because of its superior absorption, accessibility in any medical facility, price, broad range effectiveness, and safety profile. It was shown that nearly two-thirds of students who completed SMA believe it to be a good or acceptable practice. It is concerning that MBBS students have a negative attitude regarding contemporary medical practice, even if the proportion of medical students who shared these views was much smaller. Furthermore, 48% of medical students lacked confidence in their ability to treat a common infectious condition on their own. These results align with research conducted in Tanzania and the United Arab Emirates [15] [38].

Significantly more students from the non-medical stream questioned their capacity to treat oneself with an antibiotic, which was the only encouraging outcome. This discovery ought to open our eyes, and measures should be taken to turn this uncertainty into knowledge in order to stop the practice of SMA from becoming more common. An expected conclusion was reached after looking at the response rates for fundamental understanding of antibiotics and antibiotic resistance: a significantly higher percentage of medical students gave accurate answers. The research conducted by Shah et al. and Gillani et al. from Pakistan revealed similar results [37] [39].

The research's conclusions will help shape interventions in college and university training programs and direct policymakers to improve instruction on the proper use of antibiotics in an effort to alter students' behavior.

CONCLUSION

In order to encourage appropriate antibiotic usage, educational interventions ought to be incorporated into the curriculum in light of the findings. To stop SMA practices, it is difficult to highlight the dangers of self-medication, provide education on how to use antibiotics correctly,

and increase public knowledge of antibiotic resistance. Stricter laws governing pharmaceuticals and better access to reasonably priced healthcare can also lessen the need for self-medication. In order to promote a change to safer health practices, efforts should be taken to guarantee that students, especially those in non-medical disciplines, are knowledgeable about and cautious when using antibiotics.

REFRENCES

1. James H, Handu SS, Al Khaja KAJ, Otoom S, Sequeira RP. Evaluation of the knowledge, attitude and practice of self- medication among first-year medical students. Med Princ and Pract. 2006;15(4):270–5.
2. Geissler PW, Nokes K, Prince RJ, Achieng Odhiambo R, Aagaard-Hansen J, Ouma JH. Children and medicines: self- treatment of common illnesses among Luo school children in western Kenya. Soc Sci Med. 2000 Jun; 50(12):1771-1783, 10.1016/s0277-9536(99)00428-1.
3. Fainzang S. The Other Side of Medicalization: Self- Medicalization and Self-Medication. Cult Med Psychiatry. 2013 Sep;37(3):488–504, doi: 10.1007/s11013-013-9330-2.
4. Chautrakarn S, Khumros W, Phutrakool P. Self-Medication With Over-the-counter Medicines Among the Working Age Population in Metropolitan Areas of Thailand. Front Pharmacol. 2021 Aug;12, doi: 10.3389/fphar.2021.726643.
5. Fact MR. Self-Administered Medication Market [Internet]. Available from: https://www.factmr.com/ report/328/self-administered-medication-market.
6. Hughes CM, McElnay JC, Fleming GF. Benefits and Risks of Self Medication. Drug Saf. 2001;24(14):1027–37, doi: 10.2165/ 00002018-200124140-00002.
7. Khadka A, Kafle KK. Prevalence of Self-medication among MBBS students of a Medical College in Kathmandu. JNMA J Nepal Med Assoc. 2020 Feb;58(222), doi: 10.31729/jnma.4840.
8. Clavijo HA, Baquero JA, Ulloa S, Morales A. Self-medication during pregnancy [letter]. World health forum. 1995 ; 16(4) : 403-404 [Internet]. 1995; Available from: https://iris.who.int/ handle/10665/45101
9. Rathod P, Sharma S, Ukey U, Sonpimpale B, Ughade S, Narlawar U, et al. Prevalence, Pattern, and Reasons for Self- Medication: A Community-Based Cross-Sectional Study From Central India. Cureus. 2023 Jan, doi: 10.7759/cureus.33917.
10. Zajmi D, Berisha M, Begolli I, Hoxha R, Mehmeti R, Mulliqi- Osmani G, et al. Public knowledge, attitudes and practices regarding antibiotic use in Kosovo. Pharm Pract (Granada). 2017 Jan;15(1), doi: 10.18549/PharmPract.2017.01.827.
11. Antwi AN, Stewart A, Crosbie M. Fighting antibiotic resistance: a narrative review of public knowledge, attitudes, and perceptions of antibiotics use. Vol. 140, Perspectives in Public Health. SAGE Publications Ltd; 2020. p. 338–50, doi: 10.1177/175791 3920921209.
12. Chapot L, Sarker MS, Begum R, Hossain D, Akter R, Hasan MM, et al. Knowledge, attitudes and practices regarding antibiotic use and resistance among veterinary students in Bangladesh. Antibiotics. 2021 Mar;10(3), doi: 10.3390/antibiotics 10030332.
13. Nair M, Tripathi S, Mazumdar S, Mahajan R, Harshana A, Pereira A, et al. Knowledge, attitudes, and practices related to anti- biotic use in Paschim Bardhaman District: A survey of healthcare providers in West Bengal, India. PLoS One. 2019 May;14(5), doi: 10.1371/journal.pone.0217818.
14. Okeke IN, Laxminarayan R, Bhutta ZA, Duse AG, Jenkins P, O'Brien TF, et al. Antimicrobial resistance in developing countries. Part I: Recent trends and current status. Vol. 5, Lancet Infectious Diseases. 2005. p. 481–93, doi: 10.1016/S1473- 3099(05)70189-4.
15. Shitindi L, Issa O, Poyongo BP, Horumpende PG, Kagashe GA, Sangeda RZ. Comparison of knowledge, attitude, practice and predictors of self-medication with antibiotics among medical

and non-medical students in Tanzania. Front Pharmacol. 2023;14, doi: 10.3389/fphar.2023.1301561.
16. Rajendran A, Kulirankal KG, Rakesh PS, George S. Prevalence and pattern of antibiotic self-medication practice in an urban population of Kerala, India: A cross-sectional study. Indian J Community Med. 2019 Sep;44(5):S42–5, doi: 10.4103/ijcm. IJCM_33_19.
17. Phalke V, Phalke D, Durgawale P. Self-medication practices in rural Maharashtra. Indian J Community Med. 2006;31(1):34, doi: 10.4103/0970-0218.54933.
18. Naing L, Nordin R Bin, Abdul Rahman H, Naing YT. Sample size calculation for prevalence studies using Scalex and Scala R calculators. BMC Med Res. Methodol 2022 Jul;22(1):209, doi: 10.1186/s12874-022-01694-7.
19. Analyze a 2x2 contingency table Graph Pad [Internet]. Available from: https://www.graphpad.com/ quickcalcs/contingency1/
20. Sarahroodi S, Arzi A, Sawalha AF, Ashtarinez A. Antibiotics Self-Medication among Southern Iranian University Students. Int J Pharmcol. 2009 Dec;6(1):48–52, doi: 10.3923/ ijp.2010.48.52.
21. Napolitano F, Izzo MT, Di Giuseppe G, Angelillo IF. Public Knowledge, Attitudes, and Experience Regarding the Use of Antibiotics in Italy. PLoS One. 2013 Dec;8(12):e84177, doi: 10.1371/journal.pone.0084177.
22. Awad AI, Aboud EA. Knowledge, Attitude and Practice towards Antibiotic Use among the Public in Kuwait. PLoS One. 2015 Feb;10(2):e0117910, doi: 10.1371/journal.pone.0117910.
23. Abasaeed A, Vlcek J, Abuelkhair M, Kubena A. Self-medication with antibiotics by the community of Abu Dhabi Emirate, Unit- ed Arab Emirates. J Infect Dev Ctries. 2009 Aug;3(07):491–7, doi: 10.3855/jidc.466.
24. Nair A, John' S, Doibale M. Pattern of Self-Medication with Antibiotics among Undergraduate Medical Students of a Government Medical College. Int J Prev and Pub Health Sci. 2015 Sept;1(3):9-13, doi: 10.17354/ijpphs/2015/16.
25. Azad AH, Afzal M, Rizwi F, Rajput AM. Self Medication Patterns amongst Undergraduate Medical Students of a Private Medical college. JIMDC J Islamabad Med Dent College. 2013;2(2):72-6.
26. Kumar N, Kanchan T, Unnikrishnan B, Rekha T, Mithra P, Kul- karni V, et al. Perceptions and Practices of Self-Medication among Medical Students in Coastal South India. PLoS One. 2013 Aug;8(8):e72247, doi: 10.1371/journal.pone.0072247.
27. Donkor ES, Tetteh-Quarcoo PB, Nartey P, Agyeman IO. Self- Medication Practices with Antibiotics among Tertiary Level Students in Accra, Ghana: A Cross-Sectional Study. Int J Environ Res Public Health. 2012 Oct;9(10):3519–29, doi: 10.3390/ijerph9103519.
28. Banerjee I, Bhadury T. Self-medication practice among under- graduate medical students in a tertiary care medical college, West Bengal. J Postgrad Med. 2012;58(2):127–31, doi: 10.4103/0022-3859.97175.
29. Mandal NK, Rauniyar GP, Rai DS, Panday DR, Kushwaha R, Agrawal SK, et al. Self-medication Practice of Antibiotics among Medical and Dental Undergraduate Students in a Medical College in Eastern Nepal: A Descriptive Cross-sectional Study. JNMA J Nepal Med Assoc. 2020 May;58(225), doi: 10.31729/jnma.4914.
30. Ayele Y, Mamu M. Assessment of knowledge, attitude and practice towards disposal of unused and expired pharmaceuticals among community in Harar city, Eastern Ethiopia. J Pharm Policy Pract. 2018 Dec;11(1):27, doi: 10.1186/s40545- 018-0155-9.
31. Buke C, Hosgorlimoncu M, Ermertcan S, Cicekliogl u M, Tuncel M, Kose T, et al. Irrational use of antibiotics among university students. J Infect. 2005 Aug;51(2):135–9, doi: 10.1016/j.jinf. 2004.12.001.

32. Ling Oh A, Hassali MA, Al-Haddad MS, Syed Sulaiman SA, Shafie AA, Awaisu A. Public knowledge and attitudes towards antibiotic usage: a cross-sectional study among the general public in the state of Penang, Malaysia. J Infect Dev Ctries. 2010 Nov;5(05):338–47, doi: 10.3855/jidc.1502.
33. Pal B, Murti K, Gupta AK, Choudhury U, Rastogi M, Pandey H, et al. Self Medication with Antibiotics among Medical and Pharmacy Students in North India. Am Med J. 2016 Feb;7(2):7–12, doi: 10.3844/amjsp.2016.7.12.
34. Rathish D, Wijerathne B, Bandara S, Piumanthi S, Senevirathna C, Jayasumana C, et al. Pharmacology education and antibiotic self-medication among medical students: a cross-sectional study. BMC Res Notes. 2017 Dec;10(1):337, doi: 10.1186/ s13104- 017-2688-4.
35. Ajibola O, Omisakin O, Eze A, Omoleke S. Self-Medication with Antibiotics, Attitude and Knowledge of Antibiotic Resistance among Community Residents and Undergraduate Students in Northwest Nigeria. Diseases. 2018 Apr;6(2):32, doi: 10.3390/diseases6020032.
36. Poyongo BP, Sangeda RZ. Pharmacists' Knowledge, Attitude and Practice Regarding the Dispensing of Antibiotics without Prescription in Tanzania: An Explorative Cross-Sectional Study. Pharmacy. 2020 Dec;8(4):238, doi: 10.3390/ pharma- cy8040238.
37. Shah SJ, Ahmad H, Rehan RB, Najeeb S, Mumtaz M, Jilani MH, et al. Self-medication with antibiotics among non-medical university students of Karachi: a cross-sectional study. BMC Pharmacol Toxicol. 2014 Dec;15(1):74.
38. Jairoun A, Hassan N, Ali A, Jairoun O, Shahwan M. Knowledge, attitude and practice of antibiotic use among university students: a cross-sectional study in UAE. BMC Public Health. 2019 Dec;19(1):518.
39. Gillani AH, Ji W, Hussain W, Imran A, Chang J, Yang C, et al. Antibiotic self-medication among non-medical university students in Punjab, Pakistan: A cross-sectional survey. Int J Environ Res Public Health. 2017 Oct;14(10).