

Prevalence of Self-Medication and Associated Factors among Healthcare Students during the COVID-19 Pandemic: A Cross-Sectional Study at the University of Zambia

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Abstract

Background: The global effects of COVID-19 on individuals worsened the problem of self-medication (SM), a driver of antimicrobial resistance (AMR). In Zambia, there is little information documented on the prevalence of SM among students during the COVID-19 pandemic. **Aim:** This study assessed the prevalence of SM and associated factors among healthcare students at the University of Zambia. **Materials and Methods:** This descriptive cross-sectional study was conducted among 323 healthcare students using a structured questionnaire. Data analysis was done using SPSS version 23.0. Statistical significance was conducted at a 95% confidence level. Binary logistic regression was used to determine the factors that were associated with self-medication. **Results:** Of the 323 participants, 51.4% were female and 67.8% were from the program of pharmacy. The prevalence of SM was 95% with paracetamol (36.5%), azithromycin (19.3%), and chlorpheniramine (13.6%) being the most used medicines. The most common conditions that students experienced included headaches (22.6%), sneezing (13.6%), fever (8.7%), and coughing/sneezing



(5.6%). SM practices were due to fear of contracting COVID-19 from health-care facilities (21.4%), time-consuming at healthcare facilities (19.2%), and knowledge of medicines acquired in school (18.9%). Older students, aged between 34 and 50 years were less likely to practice SM compared to those who were younger (OR = 0.068, 95% CI: 0.015 - 0.304). Furthermore, students who were aware of SM were more likely to practice SM than those who were not aware (OR = 32.866, 95% CI: 7.751 - 139.525). **Conclusion:** This study found high awareness and prevalence of SM among healthcare students with painkillers, antibiotics, and anti-allergies overused to treat symptoms. The overuse and misuse of antibiotics may lead to antimicrobial resistance, thus the need to promote antimicrobial stewardship even in universities. There is a need to promote the rational use of medicines during COVID-19 and other future public health emergencies.

Keywords

Antibiotics, Antimicrobial Resistance, Painkillers, Self-Medication, COVID-19, Healthcare Students

1. Introduction

The emergence of COVID-19 can be traced back to December 2019, when it was first reported in Wuhan City, located in Hubei Province in Central China (Lu et al., 2020; Zhu et al., 2020). The virus quickly spread globally, resulting in a surge in both morbidity and mortality rates (Abayomi et al., 2021; Atkins et al., 2020; Bilinski et al., 2023; Borchering, 2021; Chileshe et al., 2020; Erdem & Lucey, 2021; Helle et al., 2021; Roy & Ghosh, 2020). By March 2020, the World Health Organization (WHO) had declared the outbreak a global pandemic (Cucinotta & Vanelli, 2020; Sohrabi et al., 2020). As a result, governments worldwide implemented measures such as lockdowns and social distancing to combat the pandemic (Farooq et al., 2020; Haider et al., 2020; Huang et al., 2021; Mudenda et al., 2022a; Mudenda et al., 2022b; Riddle et al., 2020). However, these measures and other factors made it challenging for individuals to access healthcare services, leading many to turn to self-medication (SM) as a solution (Abdelwahed et al., 2023; Arias et al., 2022; Makowska et al., 2020; Mudenda et al., 2020).

Self-medication (SM) is the use of medicines not prescribed by prescribers and without the guidance of authorised healthcare professionals (Abdelwahed et al., 2022; Baracaldo-Santamaría et al., 2022; Kassie et al., 2018). SM has the potential to cause adverse drug reactions, treatment failure, drug-to-drug interactions, the development of antimicrobial resistance (AMR), and increased morbidity and mortality (Baracaldo-Santamaría et al., 2022; Bennadi, 2014; Khatony et al., 2020; Saha et al., 2022; Sono et al., 2023; Sunny et al., 2019). The risks of AMR development are high for individuals that practice SM using antimicro-

bials because they tend to take lower or higher doses, shorter or longer treatment durations, skip doses, consume left over and expired antibiotics and usually for unknown conditions (Rather et al., 2017; Sachdev et al., 2022; Sono et al., 2023; Sunny et al., 2019; Zeb et al., 2022). High prevalence rates of SM have been reported across populations during the COVID-19 pandemic (Aslam et al., 2021, 2022; Malik et al., 2021; Mustafa et al., 2023; Nasir et al., 2020a; Nasir et al., 2020b; Rafiq et al., 2022). For university students, the pandemic affected the education system and led to the closure of schools leading to mental health problems including stress, anxiety, and depression among university and college students (Dhar et al., 2020; Elmer et al., 2020; Fruehwirth et al., 2021; Irfan et al., 2021; Lopes & Nihei, 2021; Mudenda et al., 2022d; Mudenda et al., 2021b; Radwan et al., 2020). Alongside this, the fear, stress, and anxiety generated by the spread of COVID-19 caused students to develop poor healthcare-seeking behaviour and therefore resort to SM practices (Aucejo et al., 2020; Choudhary et al., 2021). Additionally, SM was highly prevalent, especially among students who were feeling unwell as they could not visit the hospital but resorted to practising SM (Yasmin et al., 2022).

Evidence has shown that most individuals rely on various substances as preventive remedies against COVID-19, including natural products, vitamin C supplements, antivirals, anti-helminthic (ivermectin), anti-inflammatory drugs, and antibiotics such as azithromycin (Barati et al., 2020; Hikaambo et al., 2021; Mudenda et al., 2020; Panahi et al., 2023; Quincho-Lopez et al., 2021; Remuzzi et al., 2022; Singla et al., 2021). Furthermore, due to fears of contracting COVID-19, many people shunned visiting health facilities altogether, which drove individuals to self-medicate (Almaqawi et al., 2023; Chileshe et al., 2020; Czeisler et al., 2020; Mudenda et al., 2020; Smolić et al., 2023). Furthermore, since the clinical presentation of COVID-19 includes dry cough, headaches, fever, sore throat, flu, colds, malaise, breathlessness, body aches, vomiting, and abdominal disturbances (He et al., 2020; Parasher, 2021; Siordia, 2020; Vetter et al., 2020), individuals practised SM either due to the suspicion of being infected with COVID-19 or to prevent contracting it, or beliefs that they had a minor ailment that could be managed using over-the-counter medicines (Zhong et al., 2020).

The growing levels of stigmatisation of individuals who were perceived as a potential source of COVID-19 contributed to the SM problem (Bhanot et al., 2021; Wegbom et al., 2021). Due to the fear of being stigmatised, some people practised SM for ailments and infectious diseases such as malaria, flu, diarrhoea, etc. more convenient even though these may not be related to COVID-19 itself (Bhanot et al., 2021; Mudenda et al., 2020; Wegbom et al., 2021). The short-term beneficial effects of SM include reducing healthcare costs and saving time, according to those who practised it (Onchonga et al., 2020). However, SM may contribute to the development of AMR, adverse drug reactions, and organ damage (Tuyishimire et al., 2019). AMR may cause a variety of consequences including increased healthcare expenses, morbidity and mortality (Cosgrove & Carme-

li, 2003; Dadgostar, 2019; Ikuta et al., 2022; Jonas et al., 2017; Michael et al., 2014; Prestinaci et al., 2015).

Studies have shown that SM is a common practice among university and college students (Alzoubi et al., 2023; Delam et al., 2020; Mannasaheb et al., 2021). However, these studies looked at the variations in the prevalence of SM among students before the COVID-19 pandemic (Behzadifar et al., 2020; Mudenda et al., 2022e; Zulu et al., 2020). This high practice of SM among some students can be attributed to long queues at health facilities and lack of time to visit the hospital due to their busy lecture schedules (Al-Qahtani et al., 2022; Zheng et al., 2023; Helal & Abou-ElWafa, 2017; Khatony et al., 2020). Evidence has shown that antibiotics were among the medicines that were overused and misused due to SM among students to treat colds, flu, and fever, increasing the risk of AMR development (Banda et al., 2020; Jirjees et al., 2022; Kimathi et al., 2022; Wegbom et al., 2021; Zheng et al., 2023).

In Zambia, SM is a common practice that has been reported in some studies (Kalungia et al., 2016; Mudenda et al., 2021a; Mudenda et al., 2022e; Zulu et al., 2020). A study by Banda and others reported a 61.1% prevalence of SM among medical students at the Copperbelt University (Banda et al., 2021). However, this cited study was done before the COVID-19 pandemic and only focused on medical students. Therefore, our study aimed to fill this knowledge gap by assessing the prevalence of SM, the most common self-prescribed medicines, and associated factors during the COVID-19 pandemic among healthcare students at the University of Zambia.

2. Materials and Methods

2.1. Study Design, Site and Population

This cross-sectional study was conducted among healthcare students studying at the University of Zambia from August to October 2021. Healthcare students including those in Biomedical Sciences, Pharmacy, Physiotherapy, and Radiography are based at the School of Health Sciences at the Ridgeway Campus. Therefore, to be eligible, a participant had to be registered with the School of Health Sciences and provided informed and written consent.

2.2. Sample Size Estimation and Sampling Criteria

The sample size was estimated using Yamane's formula (Joskow & Yamane, 1965), using a margin of error of 5% and a finite population of 727 undergraduate healthcare students (Biomedical Sciences = 203, Pharmacy = 424, Physiotherapy = 83, and Radiography = 17). A 10% non-response was taken into consideration. The estimated sample size was 258 healthcare students. All participants were selected using the stratified random sampling method.

2.3. Data Collection

Data collection was done using a pre-validated questionnaire from a similar

study that was done among medical students (Zardosht et al., 2016). The questionnaire was validated by conducting a pilot study among 20 pharmacy students who were excluded from the main study. The questionnaire had two sections, including Section A which had questions on the socio-demographic characteristics of participants and Section B, which had questions on awareness and practice of SM, the names and classes of medicines that were used for SM, conditions experienced, and reasons for practising SM. Data were collected by two data collectors and responding to a questionnaire took approximately 15 to 20 minutes per participant. A total of 400 questionnaires were distributed.

2.4. Data Analysis

The data collected were entered into Microsoft Excel 2016 spreadsheet (Microsoft, Redmond, WA, USA) and further exported to IBM Statistical Package for Social Science (SPSS) version 23.0 (IBM Corporation, Armonk, New York, USA) for analysis. Statistical significance was set at a 95% confidence level and $p < 0.05$. Univariate analysis was conducted to determine the relationship between socio-demographic factors and SM using the Chi-square test or where necessary, Fisher's exact test. All variables that had $p < 0.20$ were further analysed using binary logistic regression to determine the factors that influenced SM among healthcare students.

2.5. Ethical Approval

This study was conducted after ethical approval was obtained from the University of Zambia Health Sciences Research Committee (UNZAHSREC), with an approval number of 202112030051. Additionally, permission to carry out this study was also obtained from the management at the University of Zambia. Our study was non-invasive and provided no perceived risk to participants. All study information was restricted to the investigators. The participants provided informed and written consent after being asked to participate in the study.

3. Results

Socio-Demographic Characteristics of Participants

Overall, the study enrolled 323 participants giving a response rate of 81%, in which the majority, 51.4% ($n = 166$), were female, 67.2% ($n = 217$) were aged between 18 and 25 years with a mean age of 25.3 years (Table 1).

The majority (82%) of healthcare students were aware of SM. Conversely, the prevalence of SM among healthcare students was 95% (Table 2).

The commonly self-prescribed medicines were paracetamol (36.5%), azithromycin (19.5%), chlorpheniramine (13.6%), and amoxicillin (10.2%) (Table 3).

The most conditions that healthcare students experienced during the COVID-19 pandemic included headaches (22.6%), sneezing (13.6%), fever (5.9%), and cough/sneezing (5.6%) (Table 4).

Most (21.4%) healthcare students practised SM due to fear of contracting COVID-19. Furthermore, most (19.2%) felt that it was better to self-medicate

Table 1. Socio-demographic characteristics of participants.

Variable	Characteristic	Frequency (n = 323)	Percentage (%)	<i>p-value</i>
Sex	Female	166	51.4	0.656
	Male	157	48.6	
Age (years)	18 - 25	217	67.2	0.001
	26 - 33	81	25.1	
	34 - 41	20	6.2	
	42 - 50	5	1.5	
Marital Status	Unmarried	259	80.2	0.001
	Married	64	19.8	
Program of study	Pharmacy	219	67.8	0.001
	Biomedical Sciences	73	22.6	
	Physiotherapy	19	5.9	
	Radiography	12	3.7	
Year of Study	Second	64	19.8	0.014
	Third	70	21.7	
	Fourth	101	31.3	
	Fifth	88	27.2	

Table 2. Awareness and prevalence of self-medication among healthcare students.

Variable	Response	Frequency n, (%)	<i>p-value</i>
Awareness of self-medication	Yes	265 (82)	0.001
	No	58 (18)	
Prevalence of self-medication	Yes	307 (95)	0.001
	No	16 (5)	

Table 3. Commonly self-prescribed medicines by healthcare students during the COVID-19 pandemic.

Variable	Characteristic	Frequency n, (%)	<i>p-value</i>
Name of medicines	Amoxicillin	33 (10.2)	0.001
	Azithromycin	63 (19.5)	
	Paracetamol	118 (36.5)	
	Chlorpheniramine	44 (13.6)	
	Vitamin C	4 (1.2)	
	Others	45(14.6)	
Class of medicines	Antiacids	7 (2.2)	0.001
	Antiallergies	46 (14.2)	

Continued

Class of medicines	Antibiotics	110 (34.1)	0.001
	Painkillers	123 (38.1)	
	Vitamins	4 (1.2)	
	Others	17 (5.5)	

Table 4. Common conditions experienced by the students during the COVID-19 pandemic.

Condition	Frequency	Percent
Headache	73	22.6
Sneezing	44	13.6
Fever	28	8.7
Cough/sneezing	19	5.9
Coughing	18	5.6
Coughing/headache/sneezing	18	5.6
Gastritis	5	1.5
General malaise	5	1.5
Others	113	35

than go to the hospital as it was time-consuming. Furthermore, students practised SM (18.9%) due to the knowledge they acquired during school training concerning medicine (**Table 5**).

The factors influencing SM among healthcare students are shown in **Table 6**. Older healthcare students, aged between 34 and 50 years were less likely to self-medicate compared to those who were younger (OR = 0.068; 95% CI: 0.05 - 0.304). Furthermore, healthcare students who were aware of SM were more likely to self-medicate compared to those who were not aware (OR = 32.886, 95% CI: 7.751 - 139.525).

4. Discussion

To our knowledge, this is the first study to assess the prevalence of SM and associated factors among healthcare students during the COVID-19 pandemic in Zambia. Our study found that 82% of the students were aware of SM. Despite the high level of awareness, 95% of them had practised SM during the pandemic with paracetamol, azithromycin, and amoxicillin being the most self-prescribed medicines. Most students practised SM to treat symptoms such as headaches, sneezing, fever, and cough, and due to fear of contracting COVID-19 if they visited healthcare facilities, beliefs that going to seek medical care was time-consuming, and knowledge about medicines acquired at school during training. Factors associated with SM included being aged between 34 to 50 years and being aware of SM.

Table 5. Reasons for self-medication among healthcare students.

Reason	Frequency (n)	Percentage (%)	<i>p-value</i>
Due to my knowledge of medicines acquired during training	61	18.9	
Due to fear of contracting COVID-19 in healthcare facilities	69	21.4	
Medicines were recommended by healthcare workers	59	18.3	0.001
Medicines were recommended by friends/relatives	54	16.7	
It is time-consuming to go to the hospital	62	19.2	

Table 6. Factors influencing self-medication among healthcare students during the COVID-19 pandemic.

Variable	<i>p-value</i>	Characteristics	OR: 95% CI	<i>p-value</i>
Gender	0.355	Male	Ref	0.633
		Female	-	
Age (years)	0.001	18 - 33	Ref	0.001
		34 - 50	0.068: 0.015 - 0.304	
Marital status	0.073	Unmarried	Ref	0.577
		Married	-	
Programme of study	0.285	Pharmacy	Ref	0.703
		Non-pharmacy	-	
Year of Study	0.801	Clinical	Ref	0.650
		Non-clinical	-	
Awareness of self-medication	0.001	No	Ref	0.001
		Yes	32.886: 7.751 - 139.525	

Our study revealed that most healthcare students were aware of SM. This is in line with another study that was conducted in Nigeria in which 97.8% of students were aware of SM (Asekun-Olarinmoye et al., 2019). This high awareness of SM demonstrated that students have heard or learnt about SM medication during their university training.

Our study found high awareness and prevalence of SM among healthcare students. The prevalence of SM found in our study is higher than the 61.1% that was reported in an earlier study among medical students at the Copperbelt University in Zambia (Banda et al., 2021), 76.8% in Nigeria (Asekun-Olarinmoye et al., 2019), 78% in Sri Lanka (Subashini & Udayanga, 2020), 71.7% in India (Ka-

sulkar & Gupta, 2015), 64.98% in Ethiopia (Zewdie et al., 2020), 62.5% among University students in Iran (Delam et al., 2020), 54.3% in Portugal (Alves et al., 2021), 41% among pharmacy students in Zambia (Mudenda et al., 2022e), and 14.5% in Peru (Rojas-Miliano et al., 2022). Our current findings indicate an increase in SM among university students during the COVID-19 pandemic compared to two earlier studies before that pandemic that reported a prevalence of 61.1% and 41% respectively (Banda et al., 2021; Mudenda et al., 2022e). Other studies also found a high prevalence of SM among university students, including 98.2% in Saudi Arabia (Alshammari et al., 2021), 95.4% in Nepal (Shah et al., 2021), and 83% in Pakistan (Yasmin et al., 2022). This was partially attributed to the ease of access to antibiotics from the community pharmacies and the use of previous prescriptions. Additionally, university students practised SM due to fear of contracting COVID-19 and the various symptoms that they experienced during the pandemic.

The current study found that most of the students practised SM using painkillers and antibiotics, with paracetamol, azithromycin, and amoxicillin being the high self-prescribed medicines for conditions including headaches, sneezing, fever, and coughing. This is similar to reports from a study conducted in Ethiopia (Zewdie et al., 2020), Iran (Delam et al., 2020), Saudi Arabia (Loni et al., 2023), and Nepal (Shah et al., 2021), in which students practised SM usually using painkillers and antibiotics. The high use of painkillers can be attributed to headaches that students frequently experienced during the pandemic (Delam et al., 2020). Similarly, studies have revealed that students practised SM using painkillers to manage pain due to headaches and stomachaches in Nepal (Shah et al., 2021), Peru (Rojas-Miliano et al., 2022), and Pakistan (Yasmin et al., 2022). However, a study in Iran reported that the most used medicines for SM among university students were antibiotics (Hashemzaei et al., 2021). The overuse of antibiotics such as azithromycin during the COVID-19 pandemic has been reported in other studies (Adebisi et al., 2021; Borba et al., 2020; Butler et al., 2021; Horumpende et al., 2018; Lucien et al., 2021; Mudenda et al., 2022c; Mudenda et al., 2023c; Oldenburg et al., 2021; Popp et al., 2021; Wang et al., 2020; Wu et al., 2020). Despite the recommended use of azithromycin to treat bacterial infections associated with COVID-19, its inappropriate use may promote the development of AMR (Bogdanić et al., 2022; Butler et al., 2021). The overuse of antibiotics in our study and similar studies is a public health concern, especially with the growing rates of antimicrobial-resistant pathogens (Daria & Islam, 2022; Mudenda et al., 2022c; Murillo-Zamora et al., 2022; Murray et al., 2022; Schnall et al., 2019). These findings indicate the need to develop and implement antimicrobial stewardship (AMS) programmes in universities to promote the rational use of antibiotics (Kusuma et al., 2022; Liew et al., 2020; Majumder et al., 2020; Ogunnigbo et al., 2022).

Our study found that most healthcare students practised SM due to fear of contracting COVID-19 if they visited healthcare facilities, similar to what has

been reported in other studies (Dare et al., 2022; Wegbom et al., 2021). Our study also revealed that most students practised SM because of concerns about spending a lot of time at healthcare facilities. These findings corroborate with reports from other studies in which a time-saving option was the reason for practising SM among students than going to delay at hospitals (Alshammari et al., 2021; Loni et al., 2023; Shah et al., 2021). Furthermore, most students practised SM due to the knowledge acquired during their medical training about medicine use. This was similar to the findings reported in Iran where students had more information about medicines and thus practised SM (Hashemzaei et al., 2021). Additionally, the “stay-home” strategy also impedes visiting health facilities for medical care (Rafiq et al., 2022; Tekeba et al., 2021). In Ethiopia, students practised SM because they had mild diseases and were dissatisfied with the healthcare services in hospitals (Zewdie et al., 2020).

The present study found that practising SM was associated with being a younger student, i.e., being aged between 18 and 34 years. This is in line with another study which reported that participants who were aged 35 years and above were less likely to practice SM compared to those who were younger (Tekeba et al., 2021). Similarly, a study in Sri Lanka found that younger students were more likely to self-medicate compared to older students (Subashini & Udayanga, 2020). Our study also found that students who were aware of SM were more likely to practice SM than those who were not aware. In Saudi Arabia, SM among students was associated with gender where females were more likely to self-medicate than males (Alshammari et al., 2021). Female students and those with negative attitudes towards SM were likely to self-medicate in Portugal (Alves et al., 2021). Our findings and those from other studies demonstrate that SM is influenced by various factors that need to be identified if this practice is to be addressed.

The findings of this study demonstrate the need to develop and implement strategies to promote the rational use of medicines (Kar et al., 2010; Mudenda et al., 2023a; Patrício et al., 2012; SIAPS, 2015; Sartelli et al., 2023). Additionally, it is critical to use antimicrobials rationally to prevent the occurrence of AMR (Mudenda et al., 2023a; Walsh, 2014). Some important considerations include the development and implementation of antimicrobial stewardship (AMS) programs in universities (Espinosa-Gongora et al., 2021; Godman et al., 2021; Khan et al., 2021; Mudenda et al., 2023a; Ogunnigbo et al., 2022; Saleem et al., 2022; Siachalinga et al., 2022) and effective infection prevention and control (IPC) measures (Ahmed et al., 2020; Das et al., 2022; Deryabina et al., 2021; Mudenda et al., 2023b; Musoke et al., 2020; Zingg et al., 2015; Sartelli et al., 2023). This would increase awareness and knowledge of the dangers of SM and encourage students to seek medical help rather than treating themselves. The strategy of raising student’s awareness and knowledge of SM has been reported to be effective in eliminating SM practices (Rahimisadeh et al., 2022). Subsequently, university curricula should be strengthened in areas of AMS and rational use of me-

dicines (Patrício et al., 2012; SIAPS, 2015). Finally, restricting access to antimicrobials without prescriptions have led to reduced dispensing of antibiotics without a prescription (Kopsidas et al., 2023).

This study was conducted among healthcare students from one learning institution in Zambia which may affect the generalization of the findings. However, the findings of this study highlight the need for education interventions to address the problem of self-medication.

Implications for Practice and Future Research

This study found a high prevalence of self-medication among healthcare students who usually happen to know the consequences of this practice. To mitigate this practice, there is a need to develop educational campaigns and awareness programmes on the consequences of self-medication. Furthermore, it would be important to conduct further research using focused group discussions with the students to understand their preference to self-medicate when they can easily access healthcare services in hospitals.

5. Conclusion

This study found a high prevalence of SM among healthcare students, especially among older students who were not aware of SM. There is a need to promote the rational use of medicine and awareness campaigns among university students. These findings may inform healthcare policymakers about the potential measures to develop and implement in combating SM practices in Zambia.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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