Determining the Prevalence of Self-Medication with Antibiotics in General Populations: A Cross-Sectional Study

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Abstract: Background: Antibiotic resistance is a burgeoning global threat exacerbated by the widespread practice of self-medication with antibiotics. This study explores the prevalence and determinants of such self-medication among the general population.

Methods: A quantitative, cross-sectional analysis was conducted involving participants selected through stratified random sampling to represent a range of demographic and socio-economic backgrounds. Data was collected using a comprehensive questionnaire designed to gauge demographics, self-medication behaviors, sources of antibiotics, and awareness of antibiotic use and resistance.

Results: The study found that 44.4% of respondents have engaged in self-medication with antibiotics. A significant trend towards self-medication was noted among younger, highly educated individuals, with minor ailments and accessibility to leftover medications being the most cited reasons for self-medication. Knowledge and awareness of antibiotic use were found to be inversely proportional to the prevalence of self-medication.

Conclusion: The practice of self-medicating with antibiotics is alarmingly common and is influenced by demographic factors, with young, educated individuals at the forefront of this behavior. There exists a disparity between self-perceived knowledge about antibiotics and actual medication practices. Comprehensive public health strategies are needed to educate the public on the proper use of antibiotics and to regulate their availability, aiming to curb the development of antibiotic resistance.

Keywords: Antibiotic resistance, Self-medication, Public health, Antibiotic awareness, Cross-sectional study.

1. Introduction

The misuse of antibiotics through self-medication is a global health concern that contributes to the development of antibiotic resistance, a significant threat to public health. Antibiotic resistance poses a significant challenge, exacerbated by the improper use of antibiotics, such as self-medication. This practice often leads to the misuse of antibiotics through incorrect dosing, unsuitable treatment durations, and the application of antibiotics for nonbacterial infections, contributing to the emergence of resistant bacterial strains. A comprehensive understanding of this behavior and the factors influencing it is critical to developing effective interventions to reduce antibiotic misuse.

Extensive research has assessed the prevalence of self-medication with antibiotics across diverse populations [1], [2], identifying various motivations and patterns. An investigation conducted in Asmara, Eritrea, revealed that common reasons for self-medication include previous successful experiences, minor ailments perceived as not

requiring professional consultation, and the desire for immediate relief. Amoxicillin emerged as the most frequently self-administered antibiotic, primarily obtained from pharmacies and leftover prescriptions. It was noted that a considerable number of individuals estimated dosages independently, and many did not complete their treatment courses as prescribed [3].

In contrast, a study of residents in China demonstrated a lower incidence of self-medication, which may be attributed to socio-economic factors and specific demographic characteristics. This research highlighted the prevalent storage of antibiotics at home, serving as a primary source for self-medication. Despite the lower prevalence, widespread misconceptions about the effectiveness of antibiotics against viral infections persist. The study concluded that merely enhancing antibiotic knowledge might not suffice to promote rational use, highlighting the importance of addressing broader health beliefs and perceptions [4].

These findings emphasize the complexity of self-medication with antibiotics, highlighting the necessity for multifaceted interventions that consider socio-demographic characteristics, knowledge levels, attitudes, and health beliefs. Strategies to curb self-medication with antibiotics should extend beyond simple information dissemination, aiming to modify perceptions and improve access to healthcare services. The primary goal of this research is to explore the prevalence of self-medication with antibiotics and to understand the myriad factors that influence this practice, as well as the public's awareness and attitudes towards antibiotic use and resistance.

2. Methodology:

Research Design

The study was conducted in a cross-sectional approach aimed at examining the extent and factors associated with self-medication with antibiotics within the general population.

Sampling Technique

Participants were chosen through stratified random sampling to ensure that the sample was representative of varied demographic and socio-economic sectors within the general population. This selection method was pivotal for achieving a broad and inclusive participant base, thereby enhancing the generalizability of the research findings.

Instrumentation and Data Collection

A comprehensive questionnaire was meticulously crafted with the collaboration of a team of experts in public health, pharmacology, and behavioural sciences. This tool was designed to capture a wide range of data, including detailed demographic profiles, histories of antibiotic self-medication, motivations behind such practices, sources from which antibiotics were obtained, and participants' awareness and attitudes regarding antibiotic use and resistance.

The questionnaire's validity and reliability were rigorously tested through a pilot study before it was finalized, ensuring that the questions were culturally appropriate and understandable for participants whose first language was not English.

Data Collection Period

Data collection was conducted from February 4, 2024, to April 20, 2024. This schedule was carefully planned to allow enough time for thorough data gathering and accommodate participants' availability across different regions.

Ethical Considerations

The study adhered strictly to ethical guidelines prescribed by the institutional review committee at the Univerity of Hail, from which approval was obtained before the commencement of the research. Informed consent was a prerequisite for all participants, who were assured anonymity and confidentiality. This ethical rigour was maintained throughout the study to protect the rights and well-being of all participants, allowing them the freedom to withdraw from the study at any point without any consequences.

3. Result

The demographic analysis of the participants revealed a predominantly young and highly educated cohort with significant gender disparities. The majority of respondents fall within the 18-24 age range, constituting 55.7% of

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the total, primarily reflecting a university student demographic. The subsequent age groups, 25-34 years and 35-44 years, represent 16.2% and 11.3% of the sample, respectively, indicating a lesser but notable representation of early to mid-career adults. Those aged 45-54 years comprised 10.5% of the participants, while the older age groups, 55-64 years and 65 years and older, were the least represented, making up 4.9% and 1.4%, respectively.

In terms of gender distribution, females significantly outnumbered males, accounting for 79.5% of the sample compared to 20.4% for males. This disparity suggests potential variations in the willingness to participate or in the recruitment methods that might have favoured female participants.

The data indicate a high level of educational attainment among the participants, with 78.2% holding at least a college or university degree. Those with only a high school education formed 13.8% of the sample, while postgraduate degree holders and those with less than a high school education were relatively minor groups, representing 4.1% and 3.8% of the participants, respectively as seen in (Table 1).

Demographic Factor	Category	Count	Percentage
Age Group	18-24 years	993	55.70%
	25-34 years	289	16.20%
	35-44 years	202	11.30%
	45-54 years	187	10.50%
	55-64 years	87	4.90%
	65 and more	25	1.40%
Gender	Female	1,418	79.50%
	Male	364	20.40%
Education Level	College/University	1,395	78.20%
	High School Graduate	246	13.80%
	Postgraduate Degree	74	4.10%
	Less Than High School Graduate	68	3.80%

Table 1: Demographic Profile of Study Participants

In the investigation of self-medication trends, the inquiry revealed distinct patterns among the respondents. When queried about the history of antibiotic use without a prescription, a slight majority reported they had not engaged in such behavior, with 863 individuals (48.4%) negating the practice. In contrast, a considerable proportion, 792 participants (44.4%), affirmed they had indeed self-medicated, highlighting a prevalent behavior that bypasses professional medical advice. A smaller segment, comprising 128 of the respondents (7.2%), remained uncertain about their past actions regarding this practice.

Further analysis of the frequency with which these self-medicating events occurred within the previous year unveiled that more than half of the respondents, 947 individuals (53.1%), had refrained from self-medicating. However, a significant portion, 341 participants (19.1%), reported self-medicating 2-3 times, and another 266 (14.9%) did so once, reflecting occasional reliance on antibiotics without prescriptions. Notably, 157 respondents (8.8%) indicated more habitual use, self-medicating more than five times within the year, while 72 individuals (4%) did so 4-5 times, raising concerns about the regularity of this practice.

The exploration into the motivations behind self-medication without prescriptions revealed that 773 participants (43.3%) did not specify their reasons, perhaps indicating a casual approach to antibiotic use. Nevertheless, a substantial number, 372 respondents (20.9%), attributed their self-medication to minor infections such as sore throats or colds, and 106 (5.9%) to dental issues. A smaller group, 92 individuals (5.2%), cited a combination of minor infections and dental issues as their rationale, suggesting self-diagnosis and treatment for what they perceived as minor ailments.

Regarding the sources of antibiotics used for self-medication, the absence of a specific source was reported by 773 participants (43.3%), possibly pointing to varied and ad hoc acquisition methods. A significant number of

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individuals, 372 (20.9%), obtained antibiotics without a prescription from pharmacies, a practice that implies easy access to antibiotics and potential regulatory oversights. Online purchases were made by 106 respondents (5.9%), indicating the role of digital platforms in facilitating self-medication. Antibiotics were also sourced from friends or family by 92 participants (5.2%), and leftover prescriptions were used by 53 individuals (3%), revealing the informal networks that contribute to self-medication behaviours. For more information, see (Table 2).

Description	Response	Cou	Percent
Have You Ever Taken Antibiotics Without a Prescription?	No	863	48.40%
	Yes	792	44.40%
	Not Sure	128	7.20%
Frequency of Self-Medication in the Past Year	No (did not self-medicate)	947	53.10%
	2-3 times	341	19.10%
	Once	266	14.90%
	More than 5 times	157	8.80%
	4-5 times	72	4.00%
Reasons for Taking Antibiotics Without a Prescription	No specific reason	773	43.30%
	Minor infections (e.g., sore throat, cold)	372	20.90%
	Dental issues	106	5.90%
	Combined reasons (Minor infections and dental issues)	92	5.20%
Sources of Antibiotics for Self-Medication	No specific source provided	773	43.30%
	Pharmacy without prescription	372	20.90%
	Online purchase	106	5.90%
	Obtained from friends or family	92	5.20%
	Leftover from previous prescriptions	53	3.00%

Table 2: Self-Medication Practices

An assessment of knowledge and attitudes towards antibiotic use disclosed that nearly half of the participants (48.4%, n=863) have never taken antibiotics without a prescription, which indicates a compliance with medical guidance. Conversely, 44.4% (n=792) admitted to self-medicating, reflecting a significant portion of the sample engaging in this potentially risky behavior. A smaller contingent, 7.2% (n=128), could not confidently assert their stance on the matter, pointing to possible uncertainty or lack of awareness regarding their medication habits.

Delving into the frequency of self-medication within the last year, over half of the respondents (53.1%, n=947) stated they had not self-medicated, suggesting a majority adherence to prescribed antibiotic use. Nonetheless, self-medication 2-3 times was reported by 19.1% (n=341) of the sample, and a single instance was noted by 14.9% (n=266), indicating occasional lapses in following professional medical advice. More concerning, 8.8% (n=157) disclosed self-medicating more than five times, and 4% (n=72) did so 4-5 times in the past year, raising questions about the frequency and reasons behind these practices.

When examining the reasons for self-medication without a prescription, 43.3% (n=773) did not specify their motives, potentially indicating a gap in awareness about the importance of prescription adherence. Self-treatment for minor infections, such as sore throats and colds, was cited by 20.9% (n=372), while dental issues accounted for 5.9% (n=106). Additionally, 5.2% (n=92) indicated both minor infections and dental issues as justifications for self-medication.

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In terms of sourcing antibiotics for self-medication, a sizable number of participants (43.3%, n=773) did not disclose their sources. This lack of transparency could be indicative of various unregulated avenues. Notably, 20.9% (n=372) acquired antibiotics from pharmacies without prescriptions, revealing potential regulatory gaps. Online purchases were made by 5.9% (n=106), demonstrating the internet's role in self-medication practices. Friends or family supplied antibiotics to 5.2% (n=92), and 3% (n=53) resorted to leftover prescriptions, highlighting informal methods of obtaining these medications as illustrated in (Table 3).

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•	•	nt	age
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	Yes	792	44.40%
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	Obtained from friends or family	92	5.20%
	Leftover from previous prescriptions	53	3.00%

Table 3: Knowledge and Attitudes Towards Antibiotic Use

This bar graph depicts (Figure 1) the distribution of sources from which participants reportedly acquire information regarding the use of antibiotics. It clearly illustrates the predominance of healthcare professionals as the primary source of legitimate information, with 62.35% of participants turning to them. The internet emerges as the second most relied-upon medium, accounting for 23.47% of responses, indicating its significant role as a digital source. Meanwhile, friends and family constitute 16.76%, highlighting their influence as a notable informal source of advice on antibiotic usage.



Figure 1: Sources of Information

In the domain of factor analysis pertaining to self-medication behavior, the Principal Component Analysis (PCA) unearthed two principal components of note. Component 1, which accounts for 45.14% of the variance, is substantially driven by participants' self-assessed knowledge and their awareness of antibiotic resistance. This element serves as a delineator, differentiating individuals who are both informed and cognizant of the ramifications of antibiotic resistance from their less informed counterparts.

Component 2, explaining 33.42% of the variance, encapsulates the variances inherent in self-medication behaviors. This suggests a spectrum of behaviors among participants, ranging from non-use to a frequent tendency to use antibiotics without a prescription. The identification of this component is indicative of the diversity in self-medication practices and could have implications for targeted educational campaigns and policy-making aimed at curbing self-medication and its associated risks, as indicated in (Table 4).

Factor	Со	Varian	Insights
Description	mpo	ce	
	nent	Explai	
		ned	
Principal Comp	onent A	Analysis	
Component 1:	1st	45.14%	Component 1 is heavily influenced by self-rated knowledge and
Knowledge-			awareness of antibiotic resistance, distinguishing individuals who are both
Awareness			knowledgeable and aware from those who are not.
Component 2:	2nd	33.42%	Component 2 captures variations related to actual self-medication
Self-			behaviors, indicating a gradient from non-use to frequent use of antibiotics
Medication			without prescription.
Behavior			

Table 4: Factor Analysis of Self-Medication Behavior

The correlation analysis conducted presented significant associations between the participants' self-rated knowledge, their awareness of antibiotic resistance, and self-medication practices.

A moderate positive correlation (r = 0.25, p < 0.01) was identified between participants' self-assessed knowledge and their tendency to self-medicate. This relationship indicates that individuals who perceive themselves as more knowledgeable about antibiotics are also more inclined to engage in self-medication, a link that could reflect an overestimation of their understanding or a belief in their capability to manage their own treatment safely. An inverse association (r = -0.20, p < 0.05) emerged, demonstrating that increased awareness of antibiotic resistance correlates with a decrease in the practice of self-medication. This finding highlights the importance of awareness and education in potentially curbing the inappropriate use of antibiotics.

A strong positive correlation (r = 0.40, p < 0.001) was observed here, suggesting that individuals who rate their knowledge highly also exhibit greater awareness of antibiotic resistance. This connection may indicate that educational strategies are effectively enhancing both knowledge and awareness concurrently.

The data revealed a substantial positive correlation (r = 0.35, p < 0.001) between the frequency of self-medicating behaviors and the incidence of using antibiotics without a prescription. This pattern highlights the habitual nature of self-medication in certain population segments, meriting targeted public health interventions. For more information see (Table 5).

Variables Compared	Correlation	P-	Interpretation
	Coefficient (r)	valu	
		e	
Self-Rated Knowledge & Self-Medication	0.25	< 0.0	Moderate positive correlation,
Practices		1	statistically significant
Awareness of Antibiotic Resistance & Self-	-0.2	< 0.0	Moderate negative correlation,
Medication Practices		5	statistically significant
Self-Rated Knowledge & Awareness of	0.4	< 0.0	Strong positive correlation,
Antibiotic Resistance		01	statistically significant
Self-Medication Practices & Frequency of	0.35	< 0.0	Strong positive correlation,
Antibiotic Use Without Prescription		01	statistically significant

Table 5: Correlation Analysis of Self-Medication Behaviors and Attitudes

4. Discussion

Our assessment identified a significant prevalence of self-medication with antibiotics, with 44.4% of respondents admitting to this practice [5]. This prevalence is consistent with prior data, revealing that the primary motivations for self-medication are minor infections and the availability of leftover medications [4], [6], [7], [8], [9]. These motivations reflect a common pattern of self-treatment for perceived minor ailments [10], [11].

The results reveal that demographic variables, notably younger age and lower educational attainment, correlate significantly with higher incidences of self-medication [12]. These findings extend the discussion by linking self-medication to socio-economic status, suggesting that lower socio-economic groups might experience restricted access to healthcare, which influences their self-medication behaviors [1], [13].

There is a moderate correlation between self-rated knowledge and actual self-medication behavior, suggesting an overestimation of personal understanding of antibiotics [14], [15]. This discrepancy indicates a cognitive dissonance where individuals believe they are making informed health decisions despite engaging in risky health behaviors. Additionally, a higher awareness of antibiotic resistance correlates with reduced self-medication, underscoring the importance of educational campaigns in mitigating antibiotic misuse [16].

Given the strong correlation between educational interventions and improved antibiotic use, the study advocates for targeted educational programs tailored to demographics most likely to engage in self-medication [17]. These programs should emphasize the risks of antibiotic resistance and promote accurate health information, reflecting successful strategies observed in broader health campaigns [18].

Limitations of the Study

While the study utilized stratified random sampling to ensure diverse representation, the results predominantly reflect the views and behaviors of a younger, highly educated demographic. This overrepresentation might limit the generalizability of the findings to the broader population, particularly to older and less educated groups who may have different patterns of antibiotic use. Moreover, the higher proportion of female participants could skew the understanding of gender-specific self-medication practices.

The reliance on self-reported data is another limitation, as it may introduce response biases. Participants might have underreported their use of antibiotics without a prescription due to social desirability or memory recall issues. Such biases could affect the accuracy of the reported prevalence of self-medication and the motivations behind it.

Additionally, the cross-sectional design of the study provides a snapshot in time and cannot establish causality between observed factors and self-medication behaviors. Longitudinal studies would be required to assess changes over time and to identify causal relationships more definitively.

Recommendations for Future Research and Policy

To address the limitations identified in this study and to further the research on antibiotic self-medication, future studies should aim to include a broader range of demographic groups, particularly targeting older and less educated populations to enhance the generalizability of the findings. Mixed-methods approaches, incorporating both quantitative and qualitative data, could provide deeper insights into the motivations and contexts of self-medication practices.

Policymakers and healthcare providers should consider the development and implementation of targeted educational programs that focus on the risks of antibiotic resistance and the importance of adhering to prescribed treatments. These programs should be culturally tailored and accessible to people of all educational backgrounds to maximize their impact.

Furthermore, regulatory measures should be strengthened to control the sale of antibiotics without prescriptions, including stricter enforcement at pharmacies and monitoring of online sales. Public health campaigns could also benefit from leveraging digital media to disseminate information effectively, especially among younger demographics who frequently use these platforms. while the study provides valuable insights into the prevalence and factors associated with antibiotic self-medication, ongoing research and proactive policy interventions are essential to mitigate the risks associated with this practice and to combat the growing challenge of antibiotic resistance.

5. Conclusion

This study brings to the forefront the pressing concern of antibiotic self-medication, indicating that a significant portion of individuals engage in this practice. Driven by factors such as medication availability and the perception of trivial health issues, this behavior is notably common among the younger and less educated, who may have limited healthcare access. This research also emphasizes the critical influence of knowledge and awareness on antibiotic consumption. A notable gap between self-perceived knowledge and actual behavior suggests an overconfidence in personal understanding of antibiotic use.

A comprehensive strategy is needed to tackle this issue. Strengthening education about the dangers of improper antibiotic use and the significance of maintaining their effectiveness is crucial. Targeted initiatives, aimed particularly at those prone to self-medication, are essential to promoting informed health choices.

In addition, rigorous regulation is necessary to oversee antibiotic distribution, ensuring their use is judicious and medically supervised. Such measures and ongoing research and policy development are vital to address antibiotic resistance and protect community health.

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