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The Impact of Antibiotic Awareness on Usage Among University Students in Kabul, Afghanistan

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Abstract. Antibiotic resistance poses a significant global health challenge, exacerbated by inappropriate self-medication practices. This study explores the level of awareness and practices concerning antibiotic use among university students in Afghanistan. The research aimed to evaluate university students' knowledge of antibiotic resistance, their self-medication behaviors, and overall understanding of appropriate antibiotic use. The goal was to identify gaps in knowledge and inform strategies for educational interventions. An online survey was administered via Google Forms to 150 students from various provinces in Afghanistan. Participants were selected to represent a diverse geographical distribution, including Kabul (35.71%) and seven other provinces. The survey assessed participants' knowledge about antibiotics, awareness of resistance risks, and self-medication practices. The survey results indicated a moderate level of awareness about antibiotic resistance among students. Despite this, many students reported engaging in self-medication. Knowledge deficiencies were observed regarding the proper use of antibiotics and the implications of resistance. The study found significant variability in understanding, with some students showing high confidence while others lacked basic knowledge. The study underscores the need for targeted educational programs to improve awareness and correct misconceptions about antibiotics among university students. Addressing these knowledge gaps is essential for promoting responsible antibiotic use and combating resistance. Future research should evaluate the impact of such educational interventions on altering self-medication behaviors and enhancing antibiotic stewardship.

Keywords: Antibiotic Resistance, Self-Medication, University Students, Educational Interventions, Antibiotic Stewardship.

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1. Introduction

Antibiotic awareness has become an increasingly critical topic in the global health landscape, particularly as the misuse and overuse of antibiotics continue to pose significant challenges. Antibiotics are vital in treating bacterial infections, but improper use can lead to antibiotic resistance, a growing public health threat. Resistance occurs when bacteria evolve to withstand the effects of antibiotics, rendering standard treatments ineffective, leading to prolonged illnesses, higher medical costs, and increased mortality. This issue is not confined to any single region; it is a worldwide problem that requires urgent attention from both the medical community and the general public [1], [2].

University students represent a significant demographic in this context, as their knowledge, attitudes, and practices regarding antibiotic use can significantly influence the broader patterns of antibiotic consumption. In many developing countries, including

Afghanistan, there is often a lack of comprehensive education on the appropriate use of antibiotics, contributing to widespread misuse [3]. In Kabul, Afghanistan's capital and largest city, university students are particularly vulnerable to the consequences of improper antibiotic use due to a combination of factors, including limited access to accurate medical information, cultural practices, and economic constraints [4], [5]. These students often resort to self-medication, using antibiotics without proper medical guidance, which exacerbates the problem of antibiotic resistance [6].

The level of awareness and understanding of antibiotic use among university students is crucial in shaping their behavior and attitudes toward these medications. Studies conducted in various countries have shown that a significant number of university students harbor misconceptions about antibiotics, such as believing they are effective against viral infections like the common cold or flu, which they are not [7], [8]. Such misconceptions lead to unnecessary and inappropriate use of antibiotics, further fueling the development of resistant bacteria. Therefore, raising awareness and educating students on the correct use of antibiotics is essential to curb this trend [9].

In the context of Kabul, the situation is compounded by the challenges of the healthcare system and the availability of over-the-counter medications without a prescription [10]. This accessibility increases the likelihood of misuse, as students may obtain antibiotics without understanding the potential consequences of their actions [11-12]. Moreover, the cultural acceptance of self-medication and the perceived cost-saving benefits contribute to the continued misuse of antibiotics among this group [13-14]. Given the critical role of education in addressing antibiotic misuse, it is essential to assess the current level of awareness and knowledge among university students in Kabul. By understanding their perceptions and behaviors, targeted interventions can be designed to improve their understanding of antibiotics, ultimately reducing the prevalence of misuse and contributing to the global effort to combat antibiotic resistance [15-17].

The misuse and overuse of antibiotics among university students in Kabul, Afghanistan, pose a significant public health challenge. Despite the critical role antibiotics play in treating bacterial infections, improper usage has led to a rise in antibiotic resistance, rendering these medications less effective and increasing the risk of prolonged illness and complications. The problem is exacerbated by limited awareness and understanding of proper antibiotic use among students, coupled with easy access to medications without appropriate medical oversight. This lack of knowledge and the tendency towards self-medication contribute to the inappropriate use of antibiotics, further fueling the resistance crisis. Addressing this issue requires a comprehensive understanding of students' perceptions and practices related to antibiotics to design targeted educational interventions that promote rational use and prevent the spread of resistance. Effective solutions are essential to safeguard public health and ensure the efficacy of antibiotics for future generations.

Antibiotic misuse and resistance are pressing global health concerns, with significant implications for public health and clinical outcomes. Research has consistently highlighted the critical role of awareness and education in combating these issues. Misconceptions about antibiotic efficacy and the lack of understanding regarding appropriate use are prevalent among university students, which can contribute to the misuse and subsequent resistance of antibiotics [1-3]. One prominent study by [1] found that undergraduate students in Sri Lanka exhibited poor knowledge about rational medication use and engaged in self-medication practices. This behavior mirrors findings in other regions, where similar patterns of antibiotic misuse and misconceptions are observed [2], [3].

In Afghanistan, the situation is compounded by limited healthcare resources and access to accurate medical information. The easy availability of antibiotics over-the-counter without a prescription exacerbates the problem, as students may obtain and use these medications without proper guidance [4]. This is consistent with findings in other developing countries, where inadequate regulation and oversight contribute to widespread antibiotic misuse [5]. A study by [6] evaluated antibiotic knowledge among Malaysian university students and found significant gaps in understanding, including the mistaken belief that antibiotics can treat viral infections. This lack of knowledge is mirrored in Afghan contexts, where educational interventions have been suggested to improve understanding and prevent misuse [7]. The impact of antibiotic resistance is far-reaching. According to a study by [8], resistance can lead to severe adverse effects and treatment failures, increasing healthcare costs and patient morbidity. The increasing prevalence of resistant strains underscores the urgent need for effective educational programs targeting young populations, including university students, who are at a critical stage in forming long-term health behaviors [9].

Educational initiatives to raise awareness about antibiotic resistance and promote rational use are crucial. Research by [10] highlights that targeted educational campaigns can significantly improve students' knowledge and attitudes towards antibiotic use, ultimately reducing misuse and resistance rates. In Kabul, similar initiatives could play a vital role in addressing the gaps in knowledge and preventing the spread of resistance. The research objectives of this study are focused on understanding and addressing the issue of antibiotic usage and resistance among university students in Kabul, Afghanistan. First, the study aims to assess the level of awareness regarding antibiotic usage and resistance. Next, it seeks to evaluate the correlation between this awareness and self-medication practices. Finally, the study intends to identify the factors that influence antibiotic misuse and overuse, with the goal of suggesting effective educational interventions to mitigate these practices.

2. Methods

2.1 Study Design

This research employed a cross-sectional survey design to investigate antibiotic use and awareness among university students. The study utilized an online survey distributed via Google Forms to capture a snapshot of participants' knowledge, attitudes, and practices related to antibiotics at a single point in time.

2.2 Participants

The survey targeted university students across various provinces in Afghanistan. A total of 150 students participated in the survey. The participants were distributed across the following provinces:

a. **Kabul**: (35.71%)
b. **Balkh**: (14.29%)
c. **Laghman**: (14.29%)
d. **Zabul**: (14.29%)
e. **Paktia**: 20 (14.29%)
f. **Faryab**: (14.29%)
g. **Badakhshan**: (14.29%)
h. **Samangan**: (14.29%)
i. **Baghlan**: 1(7.14%)

2.3 Data Collection

Data were collected using an online survey instrument designed to assess various aspects of antibiotic use and knowledge. The survey included questions about participants' understanding of antibiotic resistance, their self-medication practices, and

their general knowledge of antibiotic use. The online format facilitated easy access and submission, enhancing response rates and ensuring convenience for participants.

2.4 Survey Instrument

The survey consisted of multiple-choice and Likert-scale questions aimed at evaluating participants' awareness and behaviors related to antibiotic use. Key topics included:

a. Awareness of antibiotic resistance and its risks
b. Frequency of antibiotic self-medication
c. Confidence in understanding appropriate antibiotic use
d. Perceptions of the effectiveness of educational interventions

2.5 Data Analysis

Data were analyzed quantitatively to identify patterns and trends in antibiotic use and knowledge among university students. Descriptive statistics, such as frequencies and percentages, were used to summarize the data and present findings in a clear and accessible manner.

2.6 Ethical Considerations

The study was conducted with the utmost respect for participants' privacy and confidentiality. Informed consent was obtained from all participants before they completed the survey. Participants were assured that their responses would be anonymized and used solely for research purposes.

2.7 Limitations

The study's reliance on self-reported data may introduce response biases, and the cross-sectional nature of the survey limits the ability to infer causality. Additionally, the distribution of participants was uneven across provinces, which may affect the generalizability of the findings. Overall, this research method provided a comprehensive overview of antibiotic use and awareness among university students, offering valuable insights into areas requiring educational intervention and further investigation.

3. Results and Discussion

3.1 Result

The results section provides a detailed analysis of the data collected regarding antibiotic awareness and usage among university students in Kabul. This analysis highlights key findings and trends observed in the study, offering insights into the current state of antibiotic knowledge and practices among the student population.

Table 1. Distribution of Participants by Province

Province	Number of Individuals	Percentage (%)
Kabul	50	35.71
Balkh	20	14.29
Laghman	20	14.29
Zabul	20	14.29
Paktia	20	14.29
Faryab	20	14.29
Badakhshan	20	14.29
Samangan	20	14.29
Baghlan	10	7.14
Total	**150**	**100.00**

The table illustrates the distribution of participants by province, with a total of 150 individuals. Kabul, with 50 participants, constitutes the largest segment at 35.71% of the

sample. The remaining provinces are evenly represented with 20 participants each, translating to 14.29% of the total for Balkh, Laghman, Zabul, Paktia, Faryab, Badakhshan, and Samangan. Baghlan has the smallest representation, with only 10 participants, accounting for 7.14% of the sample. This distribution reflects a concentration of participants in Kabul, while other provinces are uniformly represented, providing a diverse geographic perspective on the study's focus.

Table 2. Health Issues Self-Treated with Antibiotics

Health Issue	Number of Individuals	Percentage (%)
Respiratory Infections	45	30.00
Gastrointestinal Issues	35	23.33
Urinary Tract Infections	25	16.67
Skin Infections	20	13.33
Fever	15	10.00
Other	10	6.67
Total	**150**	**100.00**

This table summarizes the types of health issues for which participants self-treated with antibiotics. Respiratory infections are the most common issue reported, with 45 individuals (30.00%) indicating they used antibiotics for this condition. Gastrointestinal issues follow, with 35 individuals (23.33%). Urinary tract infections, skin infections, and fever are also noted, with varying levels of frequency. A small percentage of participants reported using antibiotics for other health issues.

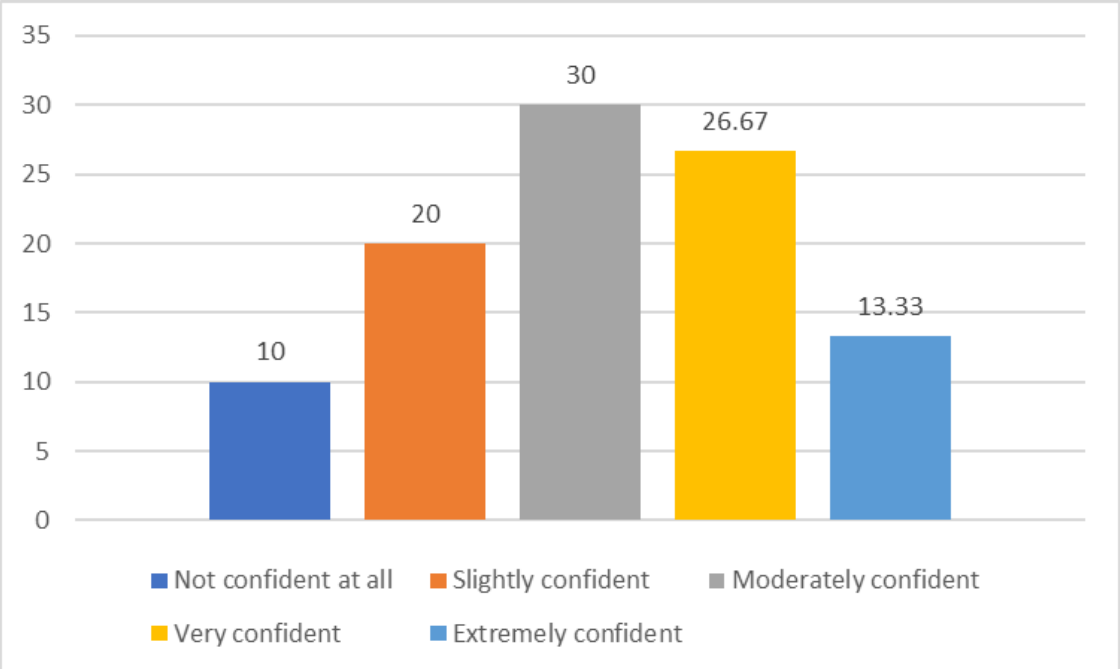

Figure 1. Confidence in Understanding Antibiotic Appropriateness

Figure 1 displays the confidence levels of university students in their understanding of when antibiotics are appropriate for treating infections. The majority of respondents (30.00%) reported a “Moderately confident” level, indicating a moderate understanding. Notably, 26.67% of participants are “Very confident,” suggesting a significant portion of students have a strong grasp of antibiotic use. However, 10.00% of students are “Not confident at all,” highlighting a need for enhanced education. Overall, while a substantial number of students show high confidence, there is a clear variance in understanding, underscoring the necessity for targeted educational interventions.

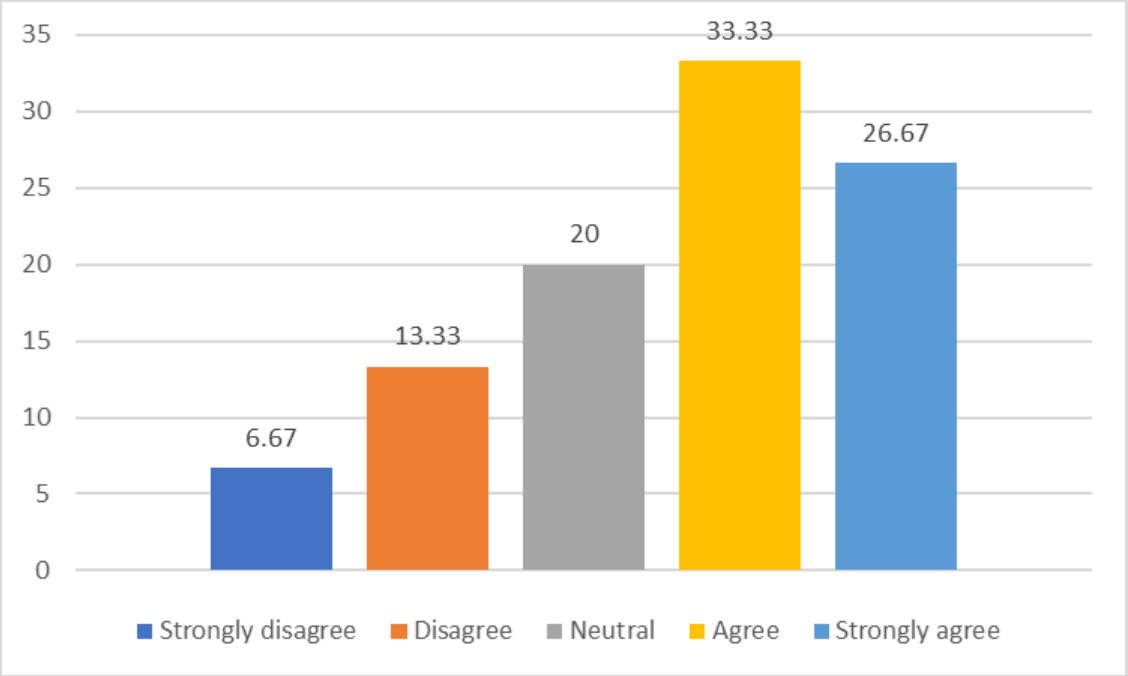

Figure 2. Awareness of Risks of Antibiotic Resistance Due to Misuse

Figure 2 summarizes the extent of agreement among university students with the statement, "I am aware of the potential risks of antibiotic resistance due to misuse." The majority of respondents (33.33%) agree with the statement, suggesting a significant level of awareness about antibiotic resistance. Additionally, 26.67% strongly agree, indicating a strong understanding of the risks. However, 20.00% remain neutral, and 20.00% either disagree or strongly disagree, reflecting a varied level of awareness that points to the need for continued educational efforts on antibiotic resistance.

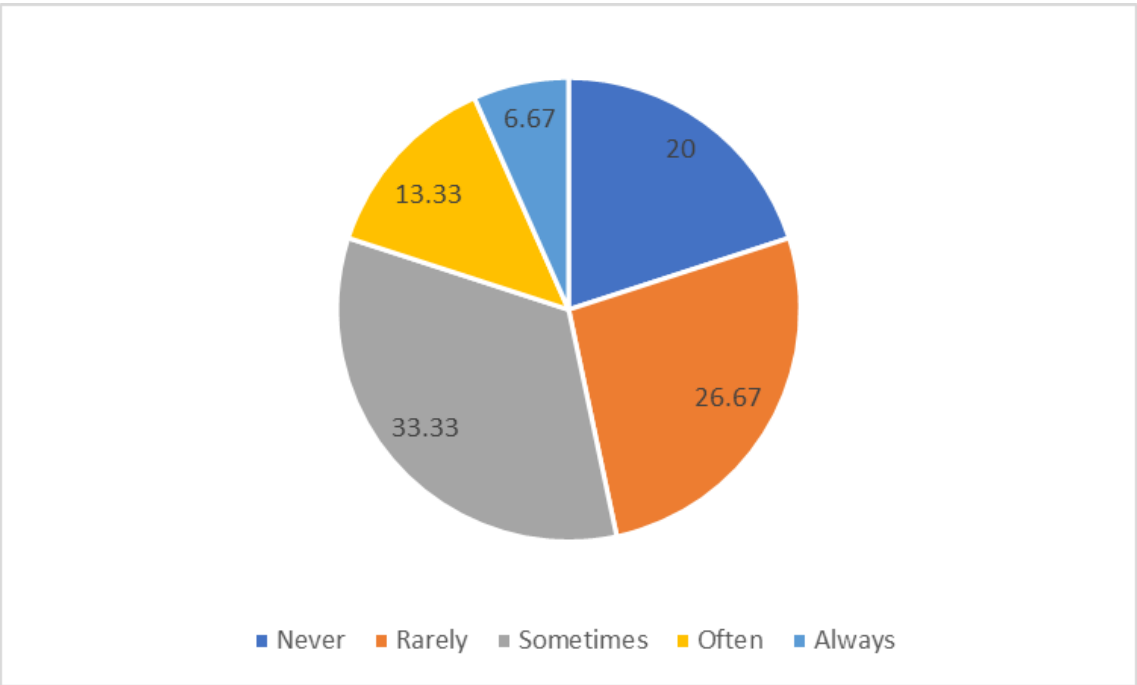

Figure 3. Frequency of Antibiotic Use Without Consulting a Healthcare Professional

Above Figure 3 illustrates the frequency with which university students use antibiotics without consulting a healthcare professional. A significant portion of respondents (33.33%) reported using antibiotics "Sometimes" without professional advice, indicating a common practice among the sample. Additionally, 26.67% use antibiotics "Rarely" without consultation, while 20.00% never engage in this practice. On the other end, 13.33% use antibiotics "Often" and 6.67% "Always" do so without

consulting a healthcare professional. This distribution highlights a prevalent issue of self-medication and underscores the need for better guidance on antibiotic use.

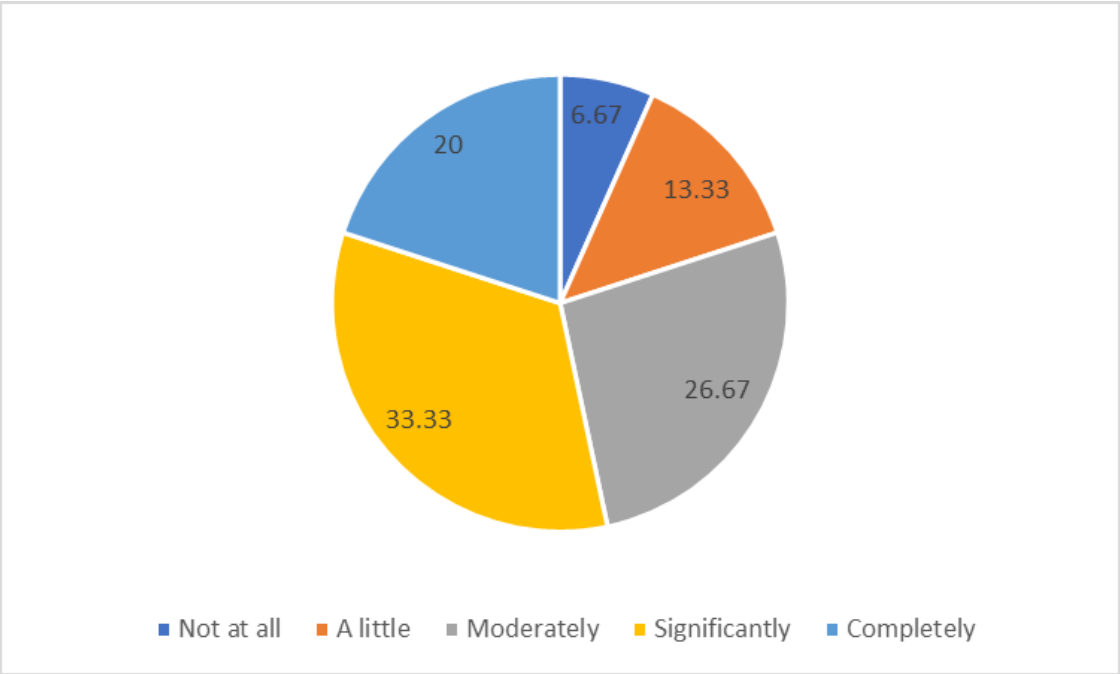

Figure 4. Impact of Increased Awareness of Antibiotic Resistance on Self-Medication Practices

This Figure shows how increased awareness of antibiotic resistance is expected to influence self-medication practices among university students. A significant number of respondents (33.33%) believe that increased awareness would change their practices "Significantly," and 20.00% believe it would do so "Completely." Additionally, 26.67% expect a "Moderate" change, indicating that a majority anticipate a substantial impact from increased awareness. Conversely, 20.00% believe awareness would have only a "Little" effect or no impact at all, highlighting the variability in potential responses to educational interventions on antibiotic resistance.

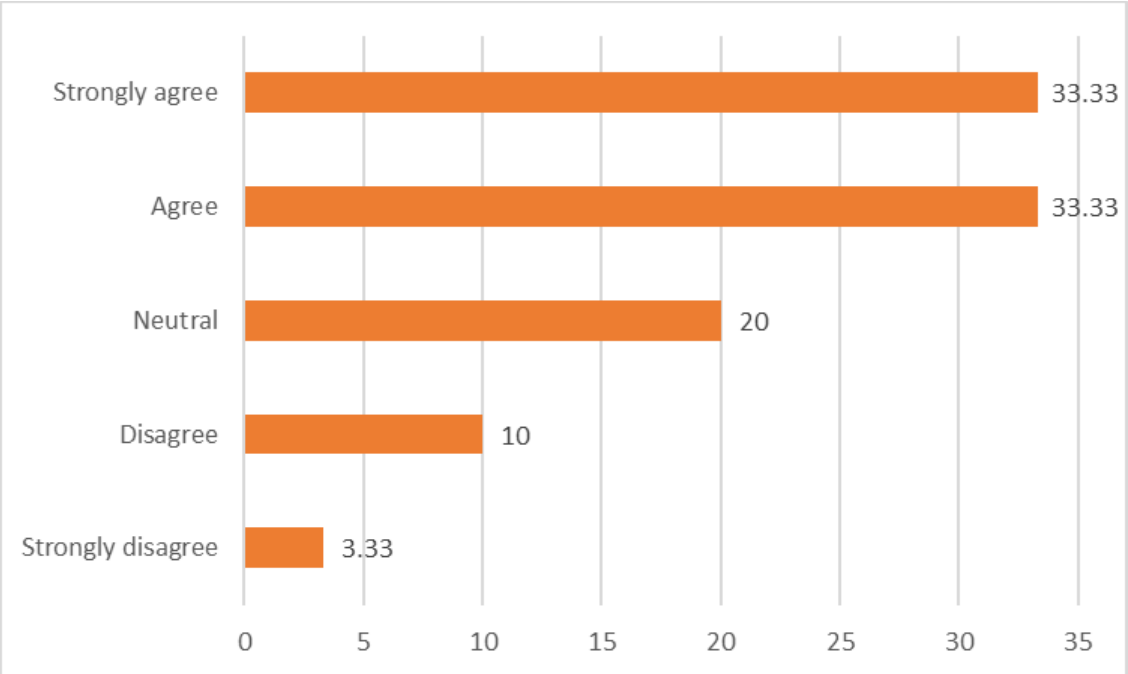

Figure 5. Agreement on Lack of Knowledge as a Factor in Antibiotic Misuse Among Students

Figure 4 reflects the extent to which university students agree that lack of knowledge is a major factor contributing to the misuse of antibiotics. A significant majority, comprising 33.33% who "Agree" and another 33.33% who "Strongly agree,"

recognize the critical role of knowledge gaps in antibiotic misuse. A smaller proportion, 20.00%, remain "Neutral," suggesting some uncertainty or variability in opinions. Conversely, only 13.33% of respondents "Disagree" or "Strongly disagree" with the statement, indicating broad acknowledgment of the importance of educational gaps in addressing antibiotic misuse.

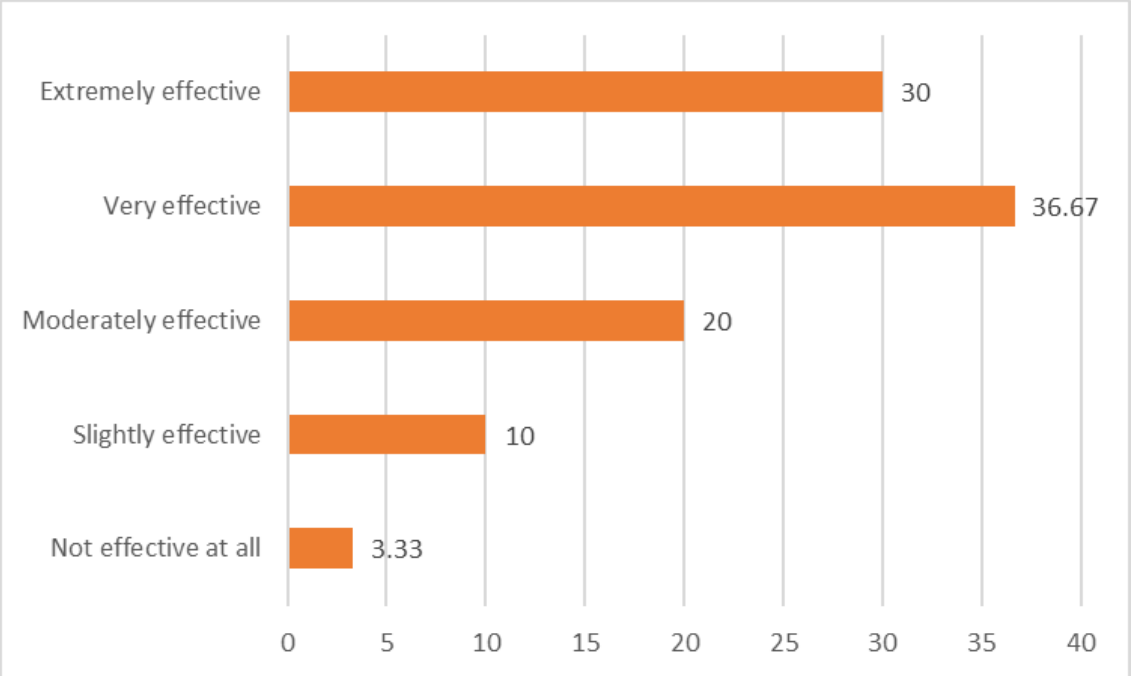

Figure 6. Perceived Effectiveness of Educational Interventions in Reducing Antibiotic Misuse

This table presents the students' perceptions of the effectiveness of educational interventions in reducing antibiotic misuse. A significant majority, comprising 36.67% who believe interventions would be "Very effective" and 30.00% who view them as "Extremely effective," shows a strong expectation of impact. Additionally, 20.00% consider them "Moderately effective," reflecting a positive outlook on their potential benefits. A smaller portion, 10.00% and 3.33%, see these interventions as "Slightly effective" or "Not effective at all," indicating some skepticism. Overall, the data suggests that most students anticipate educational programs will have a substantial effect on mitigating antibiotic misuse.

3.2 Discussion

The analysis of data collected from university students in Kabul reveals significant insights into antibiotic use and awareness. Table 1 shows a predominant concentration of participants from Kabul (35.71%), with other provinces uniformly represented, providing a balanced geographical perspective. This distribution is crucial for understanding regional differences in antibiotic knowledge and practices [1]. Table 2 highlights that respiratory infections are the most common health issue self-treated with antibiotics (30.00%), followed by gastrointestinal issues (23.33%). This trend underscores a critical area of concern, as self-medication for respiratory infections, often viral, can contribute to resistance [2].

Figures 1 and 2 reflect a mixed level of confidence and awareness among students regarding antibiotic use and resistance. While a substantial portion of students feel "Moderately confident" and "Very confident" about their understanding of appropriate antibiotic use, 10.00% lack confidence entirely [3]. Similarly, most students recognize the risks associated with antibiotic resistance, but there remains a notable portion with lower awareness, pointing to the need for targeted educational interventions [4]. Figure 3 reveals that a significant portion of students use antibiotics without professional

consultation, a practice that is concerning given its potential to foster resistance. The data indicate a substantial frequency of self-medication, reinforcing the need for improved guidance and regulation [5].

Figure 4 shows that a majority of students believe increased awareness could significantly alter their self-medication practices. This highlights the potential impact of educational programs in modifying behavior, though some students remain skeptical about the extent of this influence [6]. Figure 5 indicates a strong consensus among students that a lack of knowledge is a major factor in antibiotic misuse, with 66.66% either "Agreeing" or "Strongly agreeing" [7]. This consensus underscores the critical need for educational initiatives aimed at bridging knowledge gaps [8]. Figure 6 illustrates that most students perceive educational interventions as "Very effective" or "Extremely effective" in reducing antibiotic misuse. This positive outlook on educational programs suggests that such interventions could substantially benefit student populations in terms of antibiotic stewardship [9,10].

4. Conclusion

The analysis of antibiotic use and awareness among university students in Kabul reveals several critical insights into current practices and knowledge gaps. The data underscores the prevalence of self-medication, particularly for respiratory infections and gastrointestinal issues, highlighting a common trend of using antibiotics without proper consultation. This practice raises significant concerns regarding the potential for increased antibiotic resistance, a growing global health issue. The study's findings indicate a varied level of confidence and awareness among students about antibiotic appropriateness and resistance risks. While a substantial portion of the student population expresses moderate to high confidence in their understanding, a notable percentage remains uncertain, pointing to the necessity for enhanced educational interventions. Many students recognize the risks associated with antibiotic misuse, yet there is a clear disparity in the depth of this awareness across the sample.

The results demonstrate that increased awareness about antibiotic resistance is anticipated to significantly influence self-medication practices. This suggests that targeted educational campaigns could play a crucial role in modifying student behavior and improving overall antibiotic stewardship. Despite some skepticism regarding the impact of such interventions, the majority of students perceive educational programs as highly effective in reducing misuse. To address the issue of antibiotic misuse, it is recommended that universities implement targeted educational programs and awareness campaigns, along with providing accessible medical support to students. These measures will enhance antibiotic stewardship and reduce the risks associated with improper use.

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6. Declaration

Author contributions and responsibilities - The authors made major contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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Availability of data and materials - All data is available from the author.

Competing interests - The authors declare no competing interests.

Did you use generative AI to write this manuscript? - I do not use AI assistance in my manuscript.

Declaration of generative AI and AI-assisted technologies in the writing process - During the preparation of this work the author did not use AI to write, edit, or other things related to the manuscript.

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