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CORRELATION BETWEEN LEVEL OF KNOWLEDGE AND ANTIBIOTIC USE BEHAVIOUR

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ABSTRACT
Background: Antibiotics are one of the great discoveries in the world of health that have saved many lives since their invention by Sir Alexander Fleming in 1928. Not long after its discovery, antibiotic usage faced a new issue, which is antibiotic resistance, that caused antibiotic effectiveness to decrease and caused millions of deaths ever since. Until now, antibiotics have become a global threat that has to be addressed. This research aims to determine the community's knowledge level about antibiotics, whether their use of antibiotics is rational, and whether knowledge about antibiotics in the community will affect their usage of antibiotics. **Method:** A cross-sectional strategy is used in this descriptive-analytical study. The population and sample of this study were the community of Kelurahan Sei Putih Timur 2 Medan that met the criteria of respondents of 120 people. **Results:** The results obtained were 38 respondents (31.7%) has insufficient level of knowledge about antibiotics, 56 respondents (46.7%) had sufficient knowledge, and 26 respondents (21.7%) had good knowledge about antibiotics. The number of respondent who has rational usage of antibiotics was 69 (57.5%), and the other 51 respondents (42.5%) have irrational usage of antibiotics. From the analysis, 63 respondent, has sufficient to good knowledge about antibiotics and their rational usage.
Conclusion: Most of the antibiotic use behaviour of the East Sei Putih 2 Community is classified as rational, and has sufficient knowledge about antibiotics.

Keyword: *Antibiotics, Knowledge, Society*

ABSTRAK
Latar Belakang: *Antibiotik adalah salah satu penemuan besar di dunia kesehatan yang telah menyelamatkan banyak nyawa sejak penemuannya oleh Sir Alexander Fleming pada tahun 1928. Tidak lama setelah penemuannya, penggunaan antibiotik menghadapi masalah baru, yaitu resistensi antibiotik, yang menyebabkan efektivitas antibiotik menurun dan menyebabkan jutaan kematian sejak saat itu. Hingga saat ini, antibiotik telah menjadi ancaman global yang harus ditangani. Penelitian ini bertujuan untuk mengetahui tingkat pengetahuan masyarakat tentang antibiotik, apakah penggunaan antibiotik mereka rasional, dan apakah pengetahuan tentang antibiotik di masyarakat akan mempengaruhi penggunaan antibiotik mereka.*
Metode: *Strategi cross-sectional digunakan dalam studi deskriptif-analitis ini. Populasi dan sampel penelitian ini adalah masyarakat Kelurahan Sei Putih Timur 2 Medan yang memenuhi kriteria responden sebanyak 120 orang.*
Hasil: *Diperoleh 38 responden (31,7%) memiliki tingkat pengetahuan tentang antibiotik yang tidak mencukupi, 56 responden (46,7%) memiliki pengetahuan yang memadai, dan 26 responden (21,7%) memiliki pengetahuan yang baik*

tentang antibiotik. Jumlah responden yang memiliki penggunaan antibiotik secara rasional adalah 69 (57,5%), dan 51 responden lainnya (42,5%) memiliki penggunaan antibiotik yang tidak rasional. Dari analisis, 63 responden, memiliki pengetahuan yang cukup baik tentang antibiotik dan penggunaannya yang rasional.

Kesimpulan: *Sebagian besar perilaku penggunaan antibiotik Komunitas Sei Putih Timur 2 diklasifikasikan sebagai rasional, dan memiliki pengetahuan yang cukup tentang antibiotik.*

Kata kunci: *Antibiotik, Pengetahuan, Masyarakat*

1. Introduction

Antibiotics are one of the great discoveries in healthcare that have saved many lives. Antibiotics are medications specifically designed to target bacteria, making them essential for treating and preventing bacterial infections effectively [1]. Since the first antibiotic, penicillin, was discovered in 1928 by Sir Alexander Fleming, penicillin has been very effective and has been used in cases of severe infections. But not long after, the problem of penicillin resistance emerged, which caused the effectiveness of penicillin to decrease. Since then, until now, antibiotic resistance has been a global problem that has claimed many lives. In 2019, antibiotic resistance alone caused 1.3 million deaths globally and could rise to 10 million by 2050 if the problem remains neglected [2].

Most of the diseases suffered by people in Indonesia come from microorganisms, such as bacteria, viruses, fungi, and parasites. It is known that antibiotics have different working mechanisms, so they are classified into several categories, such as beta-lactams, cephalosporins, aminoglycosides, and others [3,4]. Although antibiotics themselves are very well known among the public, public knowledge of the use, side effects, and problems of antibiotic resistance is very inadequate. According to the research carried out by Fitriah, most of the population has inadequate knowledge about the use of antibiotics. The research found that most of the respondents are still using antibiotics over the counter without a prescription [5].

Incorrect usage of antibiotics can raise many problems, such as unwanted side effects. Antibiotics like rifampicin, cotrimoxazole, and isoniazid are hepatotoxic and hematotoxic. Chloramphenicol can cause anaemia and neutropenia that can be fatal if used without a prescription [6]. Allergies are also commonly found in antibiotic use. Patients experiencing acute allergic reactions may present with symptoms such as urticaria, angioedema, and anaphylaxis. Those with sub-acute allergic reactions may exhibit symptoms like contact dermatitis or maculopapular rashes, exanthema bulosa, Stevens-Johnson necrolysis epidermal toxic syndrome (SJS-TEN).

The majority of antibiotic allergies are caused by the beta-lactam class, with 15% of patients showing hypersensitivity to beta-lactams [7,8]. Allergies can occur to all types of natural and semisynthetic penicillins, but allergies occur more frequently when given parenterally than orally [9]. In contrast to beta-lactams, hypersensitivity reactions are quite rare when using macrolide antibiotics [10]. For the aminoglycoside group, the most common allergic reactions are primarily to gentamicin, tobramycin, and amikacin. For gentamicin, there have been reports of allergic dermatitis, contact sensitivity, ulcerative dermatitis, urticaria, rash, and exfoliative erythroderma [11]. In a study in Baltimore, the prevalence of antibiotic sensitivity was 9.89%, where the top antibiotics reported were penicillin (42%), sulfonamides (25%), furoquinolones (4.3%), tetracyclines (4.2%), and macrolides (3.5%) [12].

The biggest problem with the improper use of antibiotics can lead to antibiotic resistance. Antibiotic resistance is an event where bacteria have adapted so that the level of effectiveness of the antibiotic can be reduced [13]. Resistance occurs due to several mechanisms, including intrinsic resistance, acquired resistance, genetic mutations, and DNA transfer. These mechanisms may enable some bacteria to survive the use of certain antibiotics and develop resistance that can be transmitted to other bacteria as they multiply [14]. This can develop several problems, such as longer therapy, the use of second or third-line treatment, which can have a greater risk of side effects for patients, greater treatment costs, and other problems.

Antibiotic resistance is strongly influenced by the level of public understanding and the ease of obtaining antibiotics. The use of antibiotics without a prescription can be done by obtaining information from the internet, or by the closest person to imitate the treatment given by the previous doctor. In St. No. 419 of December 22, 1949, which includes antibiotics as hard drugs (list G), self-medication is regulated by the government as part of the community's efforts to treat themselves. This law regulates the distribution of drugs included in List G, and Article 3, paragraph 1 regulates that drugs included in List G are not allowed to be used

for personal purposes. As such, their use violates the law. However, these drugs, especially antibiotics, can still be easily obtained from pharmacies throughout Indonesia. The purpose of this study was to identify the level of community knowledge about antibiotics and the behaviour of using antibiotics in the community, and whether there is a relationship between the level of community knowledge and the behaviour of using antibiotics in Kelurahan Sei Putih Timur 2.

2. Method

The design of this research is a descriptive, analytical study with a cross-sectional approach. This study was conducted over 5 months, from June to November 2024, starting with obtaining ethical clearance from the USU Health Research Ethics Commission with number 1098/KEPK/USU/2024, conducting the research, and completing the final report. Data processing was also carried out during this timeframe. The research will take place in the area of Kelurahan Sei Putih Timur 2, Medan, North Sumatra. The study population sample consists of all residents aged 17 to 65 years who reside in Kelurahan Sei Putih Timur 2 and meet the inclusion criteria. The sample size of this study is 120, which is calculated using Slovin's formula. Samples were taken using a probability sampling technique with simple random sampling. This method is used because of the characteristics of the population of this research location, which is homogeneous.

The inclusion criteria of this research are individuals who are aged between 17 and 65 years old, who are permanent residents of Kelurahan Sei Putih Timur 2, can read and write, have used antibiotics in the past 3 months, signed a letter of consent, and were willing to fill in the questionnaire given. The exclusion criteria in this research are individuals who are below the age of 17 and above the age of 65.

Data was collected by using questionnaires that had been tested for validity and reliability. The questionnaire has two parts: one to measure participants' knowledge about antibiotics, which has 15 general questions about antibiotics. The other part of the questionnaire is used to measure participants' behaviour regarding the use of antibiotics. The results were then calculated using Likert's scale. A score of ≥ 35 indicates good knowledge about antibiotics, and a score of ≥19 shows rational behaviour in using antibiotics.

3. Result

The following table will be attached to present the distribution data on the level of public knowledge about antibiotics among residents.

Table 1 shows that 46.7% of the level of knowledge about antibiotics among the residents of Sei Putih Timur 2 falls into the "adequate" category, followed by the "low" category at 31.7%, and 21.7% of the residents have good knowledge about antibiotics.

Table 1. Level of Knowledge About Antibiotics

Level of Knowledge	Frequency	Percentage (%)
Low	38	31.7
Adequate	56	46.7
Good	26	21.7
Total	120	100.0

Table 2 shows that the majority of antibiotic usage behaviour among the residents of Sei Putih Timur 2 falls into the rational category. This is evidenced by 57.5% of the residents exhibiting rational behaviour in antibiotic usage, while only 42.5% of the residents exhibit irrational antibiotic usage behaviour. A bivariate analysis was used to determine the relationship between the level of knowledge about antibiotics and antibiotic usage behaviour. This analysis used the chi-square test.

Table 2. Antibiotic usage behaviour among the residents

Antibiotic usage behaviour	Frequency	Percentage (%)
Irrational	51	42.5
Rational	69	57.5
Total	120	100.0

Based on Table 3 above, only 6 individuals demonstrated rational behaviour when using antibiotics, while 32 individuals with low knowledge levels exhibited irrational behaviour. Respondents with an adequate level of knowledge mostly showed rational behaviour in using antibiotics, with approximately 44 out of the total respondents falling into this category, and only 12 respondents displaying irrational behaviour. Respondents categorized as having good knowledge about antibiotics predominantly exhibited rational behaviour, with 19 respondents showing rational behaviour and only 7 exhibiting irrational behaviour.

Table 3. Results of the Bivariate Analysis

		Antibiotic usage behaviour			*p-value*
		Irrational	Rational	Total	
Level of Knowledge	Less	32	6	38	0.001
	Adequate	12	44	56	
	Good	7	19	26	
Total		51	69	120	

4. Discussion

The rise in antibiotic resistance or antimicrobial resistance (AMR) is one of the biggest health threats worldwide, with a greater impact on low- and middle-income countries (LMICs). Globally, recent research estimates AMR was the direct cause of 1.27 million deaths and was responsible for 4.95 million deaths in 2019 [15]. Therefore, it is important for everyone who uses antibiotics to know the correct use of antibiotics to prevent resistance and avoid unwanted effects due to antibiotic use.

The results of the chi-square test analysis on the relationship between the level of knowledge about antibiotics and antibiotic usage behaviour indicate a *p-value* of <0.001, which is <0.005. This signifies a significant relationship between the level of knowledge about antibiotics and antibiotic usage behaviour among the residents of Kelurahan Sei Putih Timur 2.

The research conducted in the Sei Putih Timur 2 Village community showed that most respondents had a moderate level of knowledge and exhibited rational behaviour in using antibiotics, with 44% of the total respondents falling into this category. Only 16% of the respondents demonstrated good knowledge about antibiotics and rational behaviour in their use. This data indicates that only a small portion, or 16%, of the Sei Putih Timur 2 community has a good understanding of antibiotics and uses them appropriately and rationally. The *p-value* = <0.001, which is less than 0.005, indicates a significant relationship between the level of knowledge about antibiotics and the behaviour of antibiotic use among respondents. This aligns with the theory proposed by Notoatmodjo, which states that education influences learning, and thus, knowledge is better acquired by individuals with higher education levels. People with higher education tend to obtain more information from others and through media sources [16]. According to Notoatmodjo, the cognitive knowledge domain plays a pivotal role in shaping individual behaviour. However, as individual appreciation and activities are influenced by both internal and external factors, knowledge possesses the transformative power to alter behaviour. Innate factors such as intelligence level, emotional state, gender, and others significantly impact behaviour. Furthermore, an individual's conduct can be shaped by elements within their environment, including physical, social, cultural, economic, political, and other dimensions [5].

Meinitasari et al (2021) conducted a study that identified a significant relationship between knowledge and antibiotic use behaviour in the Borobudur community, yielding a *p-value* of 0.001. This result underscores a significant correlation between antibiotic knowledge and its usage behaviour [17,18]. In alignment with these findings, Meinitasari reported a positive correlation coefficient of 0.528, which is consistent with the bivariate correlation in this study (0.464), indicating a proportional relationship between antibiotic knowledge and usage behaviour [17]. Furthermore, a study by Sugihantoro, examining the relationship between knowledge and antibiotic use behaviour in pharmacies within the Glagah District of Lamongan Regency, revealed a correlation coefficient of 0.431. This value suggests a moderate yet significant relationship between knowledge and the rational application of antibiotics. [18]

A study in Thailand on nursing students found that more than half of the respondents had used antibiotics, mistakenly believing that antibiotics can treat colds and influenza (70.3%), malaria (66.8%), measles (63.6%), and sore throats (60.9%). About 71.5% were aware of the impact of antibiotic resistance on themselves and their families, but 93.1% mistakenly believed that antibiotic resistance means the body is resisting antibiotics. Despite high eHealth literacy, nursing students have misconceptions about conditions that can be treated with antibiotics and inadequate knowledge about antibiotic resistance [19,20].

Based on the data obtained from the study, most respondents still have misconceptions about antibiotics. This is evident from the large number of respondents who incorrectly answered questions regarding the use of antibiotics for fever. Most respondents believe that antibiotics are medications for treating fever. As for respondents' behaviour in using antibiotics, most of them still share antibiotics prescribed by doctors with other individuals, which is an inappropriate practice. Therefore, when deciding to use antibiotics to treat infections, it is crucial to follow several fundamental principles. These involve ensuring an accurate diagnosis, identifying the appropriate patient, selecting the correct antibiotic, administering the proper dosage, and being mindful of potential side effects and drug interactions, which can only be performed by qualified medical professionals.

The limitation of this study is that the results of the questionnaire filled out by the respondents may still be very subjective based on the knowledge of each respondent. The strength of this study is that it is the first study about antibiotic knowledge in Sei Putih Timur and can be a reference for implementing health programs related to antibiotic use education in the community.

5. Conclusion

Based on the research, the majority of the community possesses a moderate level of knowledge about antibiotics (46.7%), followed by those with low knowledge (31.7%) and good knowledge (21.7%). The study found that most of the community still exhibits rational behaviour in using antibiotics, with a percentage of 64%. Data analysis from the research indicates a significant relationship between the level of knowledge about antibiotics and the behaviour of antibiotic use in the Sei Putih Timur 2 community.

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Conflict interest

The authors declare that there is no conflict of interest in this research.

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