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Relationship Between Knowledge and Behavior Levels of Antibiotic Usage Among Pharmacy Patients in Sub-Districts Puguh and Tegorejo Kendal

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ABSTRACT

Antibiotic resistance is a very serious condition for public health care around the world. This situation is due to improper use of antibiotics that can be affected by self-medication or improper consumption of antibiotics due to lack of knowledge and lack of public awareness of antibiotic use. This study is aimed to determine the relationship of the level of knowledge of the behavior of the use of antibiotics in Pharmacy patients in sub-districts of Puguh and Tegorejo Kendal. This study was an observational study with a cross sectional approach in the research period of May-June 2022. The data collection was carried out by purposive sampling with a total of 130 respondents. The instruments used in the study are structured. Spearman test results showed that there is a relationship with the level of knowledge of antibiotic use behavior ($p = <0.05$) ; $r = 0.549$. The conclusion of the study is that there is a relationship between the level of knowledge of antibiotic use behavior in pharmacy patients in sub-districts of Puguh and Tegorejo Kendal.

1. Introduction

Antibiotic resistance poses a significant threat to community healthcare worldwide, arising primarily from inappropriate antibiotic use. Contributing factors to this issue include limited accessibility to appropriate treatment, absence of antibiotic regulation and oversight, dispensing of antibiotics without prescription, and a lack of awareness among the general public regarding appropriate use (Yousaf et al., n.d.2020). Antibiotic usage practices can vary significantly among individuals, populations, and regions, contributing to the global challenge of antimicrobial resistance (AMR). Several studies have reported a lack of understanding among the general public regarding appropriate antibiotic use (Bebell & Muiru, 2014; Vialle-Valentin et al., 2012). (Yuliani et al., 2014) found that while 55% of respondents had a good understanding of antibiotics, others viewed them solely as infection medicine and did not recognize the importance of obtaining a prescription before use. In a more recent study, (Tandjung et al., 2021) reported that 48% of respondents demonstrated poor knowledge regarding antibiotics.

Misinterpretation of proper antibiotic administration within the community is a common cause of inaccurate usage. Such misusage can manifest in various forms, such as incomplete administration, missed doses, self-prescribing leftover medications, or excessive consumption (El-Kader &

Mohammed, 2021). It is suggested that improper antibiotic administration is strongly linked to individuals' behaviors in administering medication (Al-Ayed, 2019). Knowledge, attitude, and practice (KAP) surveys are often utilized to identify factors that influence behaviors, thereby informing population-specific interventions (Kheder & Ayed, 2013).

According to Widayati et al., 2012 reported that knowledge and attitudes are intercorrelated social cognitive factors that impact behaviors and attitudes regarding antibiotic usage. (Lingga et al., 2021) and (Hadi et al., 2008) found that 77.8% of individuals continued antibiotic usage even after their full recovery, indicating a lack of understanding regarding proper usage based on recovery conditions. Low levels of cognition and poor community behaviors concerning antibiotic usage can lead to negative consequences for individuals taking these medications. This study aimed to investigate the cognitive and behavioral factors influencing individuals' understanding, knowledge, and behaviors in relation to appropriate antibiotic usage among consumers of Puguh and Tegorejo pharmacies in Kendal.

2. Materials and Methods

This study adopts a quantitative observational research design, utilizing a cross-sectional approach. Sample data is collected using purposive sampling, a technique that selects participants based on specific criteria (Sugiyono, 2018). Participants are eligible for inclusion if they are willing to participate, between 18 and 50 years of age, have consumed antibiotics within the previous month, and can communicate effectively without the assistance of others. Exclusion criteria for this study include participants who decline to participate, individuals outside the specified age range, those who have never taken or purchased antibiotics, and those who are unable to communicate effectively either orally or in writing.

The population under investigation consists of pharmacy patients located in Puguh and Tegorejo. Data collection was conducted at one representative pharmacy in each sub-district, as these pharmacies have an adequate number of patients and available information on antibiotic usage and purchases is minimal. A total of 130 participants who meet the research criteria were included in this study, with 67 participants recruited from Pharmacy "A" in Puguh sub-district and 63 participants from Pharmacy "B" in Tegorejo sub-district. Data collection took place during May-June 2022 at the aforementioned pharmacies. The independent variable in this study is the knowledge of antibiotic usage, while the dependent variable is the behavior of antibiotic usage.

The questionnaire used in this study to assess knowledge and behavior was adapted from the research of (Yuliani et al., 2014) and (Chow & Nor Liana, 2020), which has undergone validity and reliability testing prior to use. Ethical clearance for the use of these instruments was obtained from STIKES Telogorejo Semarang. The collected data was then analyzed using quantitative method. Data collection was performed using a questionnaire consisting of four parts. Part I pertained to demographic characteristics, Part II to indications for antibiotic use, Part III to knowledge of antibiotic use, and Part IV to antibiotic use behavior in respondents. Measurement of knowledge was conducted using the Guttman scale, which provides unequivocal answers to the problem being asked. Each response of "Yes" from the respondents was given a score of 1, while each response of "No" was given a score of 0 (Sugiyono, 2018). Knowledge was assessed using the formula described by Sugiyono (2018).

$$P = \frac{F}{N} X\ 100\ \%$$

Description:
P = Percentage
F = number of correct answers
N = number of questions
The criteria for assessing the level of knowledge are interpreted as follows (Arikunto, 2006):
Good : 75-100%
Moderate: 56-74%
Low : 55%-0%
Good :respondents scored 75-100% of the correct answers close to the total score of the research questions
Moderate :respondents scored 56%-74% of the correct answers close to the total score of the research questions
Low :respondents scored 55%-0% of the correct answers close to the total score of the research questions

Behavior measurements were conducted using a 4-point Likert scale (strongly agree, agree, disagree, strongly disagree). The weight of the Likert scale assessment was differentiated according to the respondent's statement (positive or negative). If the respondent gave a positive assessment, a higher value was assigned compared to a negative one (Notoatmodjo, 2014). The highest score is 4 and the lowest score is 1. Behavioral assessment is determined based on the cumulative value obtained from each statement answered by respondents (Salim & Widaningsih, 2017). The cumulative grade results are as follows:

Highest score : number of respondents x highest score
: 125 x 4 = 500
Lowest score : number of respondents x lowest score
: 125 x 1 = 125
The smallest percentage : $\frac{lowest\ score}{highest\ score}\ x\ 100\%$
: $\frac{125}{500}\ x\ 100\%\ = 25\%$

Assessment criteria for the level of behavior are as follows (Sugiyono, 2018):
100% -76%: strongly agree
75%-51%: agree
50% -26%: disagree
25% -0%: strongly disagree

The level of behavior assessment, according to (Sugiyono, 2018), is divided into positive and negative assessments, with a 50% positive value and a 50% negative value. Spearman correlation analysis was used for the data analysis of the level of knowledge and behavior of antibiotic use because the data in this study is on an ordinal scale, as recommended by (Vusvitasari et al., 2016). Data processing was conducted using the SPSS application as a computational tool. The correlation between the two variables in this study is considered as having a very low correlation if the correlation value falls between 0.00-0.199. A low correlation is indicated if the correlation value falls between 0.20-0.399. A moderate correlation value is indicated if it falls between 0.40-0.599. A high correlation is indicated if the correlation value is between 0.60-0.799 and a very strong correlation value is indicated if the correlation value is between 0.80-1.000 (Sugiyono, 2018).

3. Result and Disscusion

This study was conducted in two sub-districts, namely Puguh and Tegorejo, in the Pegandon district of Kendal, Central Java. The 130 respondents were divided into two categories: 67 patients from Pharmacy "A" in Puguh sub-district and 63 patients from Pharmacy "B" in Tegorejo sub-district.

3.1. Assessments of Validity and Reability

The validity test is a procedure used to determine the degree to which a questionnaire is valid (Ghozali, 2011). The validity test was conducted on the knowledge and behavior of antibiotic use questionnaire using the product-moment correlation technique between each questionnaire item score and the total score (the sum of each questionnaire item score) with the SPSS 22 version and Microsoft Excel program Sugiyono, 2018 in (Widi, 2011). The knowledge of antibiotic use questionnaire consisted of 20 statement items, and the antibiotic use behavior questionnaire consisted of 8 statement items. The validity test was conducted at Pharmacy Patient "B" as the location for the test. In this study, the R-table value of 0.361 was known from the data of 30 respondents (N=30) with a significance level of 5% (0.05) (Triana & Oktavianto, 2013). Based on the results, 12 out of 20 statements in the knowledge questionnaire were found to be valid, with a value > 0.361. For the behavior level questionnaire, 7 out of 8 statement items were considered valid. As the statements in each questionnaire do not affect the assessment indicators, they were eliminated and not used in this study.

Table 1. Assessment of Questionnaire Validity

Variable	Item	r Count	r Table	Remark
Knowledge Level	1	0.152	0.361	Not Valid
	2	0.180	0.361	Not Valid
	3	0.553	0.361	Valid
	4	0.388	0.361	Valid
	5	0.384	0.361	Valid
	6	0.292	0.361	Not Valid
	7	-0.039	0.361	Not Valid
	8	0.325	0.361	Not Valid
	9	0.111	0.361	Not Valid
	10	0.659	0.361	Valid
	11	0.556	0.361	Valid
	12	0.215	0.361	Not Valid
	13	0.250	0.361	Not Valid
	14	0.685	0.361	Valid
	15	0.695	0.361	Valid
	16	0.485	0.361	Valid
	17	0.572	0.361	Valid
	18	0.447	0.361	Valid
	19	0.513	0.361	Valid
	20	0.644	0.361	Valid
Behavior Level	1	0.853	0.361	Valid
	2	0.678	0.361	Valid
	3	0.700	0.361	Valid
	4	0.784	0.361	Valid
	5	0.616	0.361	Valid
	6	0.615	0.361	Valid
	7	0.693	0.361	Valid
	8	0.294	0.361	Not Valid

The reliability test evaluates the level of confidence, consistency, and stability of measurement results, and an instrument is considered reliable if it has a reliability coefficient or alpha of 0.6 or higher (Zahra & Rina, 2018). The reliability of the research instrument was tested using the SPSS statistics 22 version. The results of the reliability test conducted on the knowledge questionnaire and the antibiotic use behavior questionnaire showed coefficients of 0.744 and 0.775, respectively. These results indicate that both questionnaires are reliable since their coefficients are higher than 0.6.

Table 2. Assessment of Knowledge Questionnaire Reliability

Variable	Statement Item	Alpha	Result
Antibiotics Knowledge	12	0.744	Reliable
Antibiotics Behavior	7	0.775	Reliable

3.2. Data of Respondent Characteristic

As Table 3 indicates, the data on respondent characteristics indicates that out of 132 respondents, 77 were female and 55 were male. This finding is consistent with previous research by (Voidăzan et al., 2019), which reported a higher percentage of female respondents (60.11%) consulting a physician before taking antibiotics compared to men (50%). Additionally, 65 respondents in this study were in the age range of 17-25 years old. The analysis of the educational level revealed that the majority of the respondents had completed high school. Furthermore, among the respondents, 41 were unemployed while others had different professions. During the antibiotics knowledge assessment conducted on the respondents, it was found that 65 respondents, accounting for 50% of the sample, reported that they knew and had used Amoxicillin as an antibiotic. This result is consistent with a previous study conducted by Sunandar Ihsan in Kendari, Sulawesi Tenggara, which reported that

Amoxicillin was the most commonly used antibiotic (54.34%) (Ihsan et al., 2016). Regarding the use of antibiotics, 75 respondents (57.70%) reported obtaining antibiotics without a doctor's prescription. This finding is consistent with a study by (Bin Abdulhak et al., 2011) in Riyadh, Saudi Arabia, which found that 77% of respondents obtained antibiotics without a prescription. This may be attributed to the public's lack of knowledge regarding the need for antibiotics to be prescribed by a physician, as supported by a study by (Jifar & Ayele, 2018), which found that during the study period, a significant proportion of subjects (65.3%) self-prescribed antibiotics without consulting physicians.

Table 3. Data of Respondent Characteristic

Characteristic	Frequency (N = 130)	Percentage (%)
Sex		
Male	53	40.77
Female	77	59.23
Age		
17-25 years old	65	50
26-35 years old	25	19.23
36-45 years old	21	16.15
46-55 years old	19	14.62
Latest Education		
Elementary School	8	6.15
Junior High School	33	25.39
High School/Vocational School	68	52.31
Diploma (Diploma 3)	8	6.15
Undergraduate Program	13	10
Occupation		
Factory Labors	9	6.92
Housewives	5	3.85
Farmers	12	9.23
Entrepreneurs	27	20.76
Businessmen	18	13.85
Unemployment	41	31.55
Others	18	13.85
Antibiotics known :		
Amoxicillin	65	50
Tetracycline (supertetra)	8	6.15
Others	9	6.92
Unknown	48	36.92
Knowledge of getting antibiotics:		
Prescription	55	42.30
Without prescription	75	57.70

3.3. Knowledge Level of Antibiotics Usage

The results of the knowledge level assessment of Pharmacies "A" and "B" in sub-districts Puguh and Tegorejo are based on 12 statement items included in the questionnaires provided to the respondents. According to Table 4, 123 respondents (94.61%) correctly identified Amoxicillin as an antibiotic, which is consistent with the finding that Amoxicillin is the antibiotic that the majority of the respondents were familiar with and had used. The table also indicates that the knowledge level of the respondents from pharmacies "A" and "B" can be categorized as good (36.92%).The findings are consistent with those of prior research conducted by (Yuliani et al., 2014) in Kupang city, which found that 94% of respondents had good knowledge about the issue. Similarly, (Battah et al., 2021)found that the majority of students N = 262 (64.7%) had good knowledge of antibiotic resistance. In addition, a recent survey conducted by (Salcedo et al., 2022) found that participants demonstrated considerable knowledge of antibiotic use, with 89.5% to 98% of answers being correct.

Table 4. Percentage of Knowledge Level of Antibiotics Usage

Knowledge Level	Frequency (N)	Percentage (%)
Good	48	36.92
Moderate	35	26.92
Low	47	36.15
Total	130	100

3.4. Behavior Level of Antibiotics Usage

The results of the behavior level of antibiotics usage among patients at Pharmacies "A" and "B" in sub-districts Puguh and Tegorejo are based on 8 statement items with 4 answer options, ranging from 1 (lowest) to 4 (highest) for positive statements. The percentage results for positive and negative categories are presented in Table 5, showing an increase in knowledge for 88.46% and a decrease for 11.54%. These findings are consistent with the study by (Alkhalifah et al., 2022), which reported a behavior level of 71.7%. (Waskitajani, 2014) also noted that attitudes and behaviors can be influenced by various factors, such as culture, mass media, institutions, emotions, and personal experience, which can shape values and subsequently affect attitudes and behaviors.

Table 5. The Results of Behavior Level of Antibiotics Usage of Patients in Pharmacies "A" and "B"

Behavior Level	Frequency (N)	Percentage (%)
Positive	115	88.46
Negative	15	11.54
Total	130	100

3.5. The Relationship of Knowledge and Behavior Levels of Antibiotics Usage

The data analysis of the relationship between the knowledge and behavior levels of antibiotic usage was conducted using the Spearman correlation analysis, and the data processing was performed using the SPSS application as a supporting tool for calculation. The test results indicate a significant relationship if the p-value is less than 0.05, which implies that there is a significant relationship between the independent variable and the dependent variable. The hypothesis postulated is the relationship between the knowledge of antibiotic use and the behavior of Pharmacy Patients "A" and "B." Based on Table 4, the results show a significant relationship between the knowledge and behavior levels towards antibiotic usage of patients in Pharmacies "A" and "B" in sub-districts Puguh and Tegorejo, with a significance value of 0.000 or less than 0.05, and a correlation coefficient of 0.549. The direction of correlation is less than the critical limit of 0.05. There is a significant relationship between knowledge and behavior levels with a correlation coefficient of 0.549 as shown in the correlative table. According to (Sugiyono, 2018), this score indicates a moderate correlation. This finding is consistent with the research conducted by (Meinitasari et al., 2021), which found a significant relationship between knowledge and behavior levels with a positive correlation coefficient of 0.549 and a significance level of 0.000 or <0.05.

4. Limitations of Research

Several studies have demonstrated that respondents in questionnaire-based research tend to underestimate the questions presented in the questionnaire due to a lack of understanding of the questions. This issue was also experienced by the researchers. To minimize this problem, the researchers provided explanations or clarification about the research, discussion topics, and questionnaire contents at the beginning of the study. Additionally, the researchers offered the respondents an opportunity to ask questions and seek further understanding about the questionnaire.

5. Conclusion

The relationship between the knowledge and behavior levels of antibiotic usage in Pharmacies "A" and "B" indicates a significant correlation, with a significance value of 0.000 and a correlation coefficient of 0.549.

Author Contributions:

Monica Lita Amay Sonia, Gilang Rizki Al Farizi and Ovikariani compiled and conceptualized the research; Gilang Rizki Al Farizi and Ovikariani compiled methods and data analysis; Monica Lita Amay Sonia collected and compiled all research data; Monica Lita Amay Sonia compiled the manuscript; Monica Lita Amay Sonia and Gilang Rizki Al Farizi revised the final result of the manuscript. All authors have read and agreed to the published version of the manuscript.

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Competing Interests

The authors declare no conflict of interest.

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