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The Relationship between Knowledge and Attitudes and the Rationality of Antibiotic Use Behavior in Pharmacy Students

Devi Ristian Octavia*, Primanitha Ria Utami
Universitas Muhammadiyah Lamongan, Indonesia
** Correspondent Author: devioctavia1987@gmail.com*

ABSTRACT
Antibiotics are the most commonly prescribed, sold, and used drugs worldwide. In some developing countries, many antibiotics can be obtained without a prescription and cause a person to take antibiotics irrationally. Pharmacists are the main source of information on the rational use of antibiotics. Therefore, it is important to know the knowledge and rationality behavior of antibiotic use among pharmacy students because they are potential sources of drug information in the future. This study used an observational analytic method with a cross-sectional study design approach. Sampling was done by means of total sampling involving 147 respondents. Data analysis was performed using the chi-square test. The results showed that pharmacy students have good knowledge of 84.4%, positive attitude 88.4%, and rational behavior 90.5%. The results of the chi-square test obtained p values of 0.003 and 0.001. There is a relationship between knowledge and attitudes towards the rationality of behavior using antibiotics.

Keywords: Antibiotic, Attitude, Knowledge, Resistant

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BACKGROUND

Self-medication among adolescents has become a serious global problem and plays an important role in the irrational use of medication and tends to increase with increasing age (Deo et al., 2018). Self-medication with antibiotics can lead to antibiotic resistance among college students (Rathish et al., 2017). Inappropriate use of antibiotics causes antibiotic resistance. This has become a serious global crisis, with more infections that are resistant to multiple drugs and fewer effective antibiotics available (Hu et al., 2018).

Antimicrobial resistance is an urgent and serious global health problem, demanding great attention from health care professionals around the world. The inevitable consequence of the widespread use of these agents has been the reason for the emergence of antibiotic-resistant pathogens, leading to an increased need for new drugs (Shrestha, 2019).

Research in Nepal revealed that almost all participating students lacked sufficient knowledge of antibiotics. Therefore, it is imperative to create school-based and community-based awareness programs by policymakers for adolescents to increase their knowledge about the safe use of antibiotics as well as to prevent the consequences of antibiotic resistance during their adulthood (Deo et al., 2018). Another study in China involving 11,192 medical students reported that 27% of students treated self-limiting disease using antibiotics and 64% kept antibiotics as private stock, where 57% of them bought at pharmacies without using a doctor's prescription (Hu et al., 2018). Massive abuse of antibiotics for self-limiting illnesses by young educated adults is a serious problem. A national campaign is urgently needed to address the rational prescription of antibiotics by physicians, enforce existing restrictions on the sale of over-the-counter antibiotics, and educate the general public about antibiotics and management of self-limiting diseases (Wang et al., 2017). Another Arabic study conducted by Alghadeer et al., (2018) revealed that 34% of respondents studied used antibiotics without a prescription even though they knew that it was harmful to health. The reason they use antibiotics without a prescription is a history of previous treatment and tracing the antibiotics prescribed by a previous doctor.

The problem of using antibiotics in Indonesia is very complicated, because the sale of antibiotics is carried out freely in pharmacies or drugstores. In addition, most people keep antibiotic reserves at home or force doctors to write an antibiotic prescription. The issue of antibiotics is a problem that does not only occur in Indonesia, but is a global problem that is quite complex and must be resolved together. The irrational use of antibiotics in animals and humans results in a significant increase in antibiotic resistance. The impact of antibiotic resistance has decreased the potency of these antibiotics in overcoming infections and diseases in humans, animals or plants (Anna & Fernandez, 2013).

The problem of irrational use of antibiotics cannot be separated from the role of health workers, especially pharmacists who should understand more about rational use of antibiotics. Widayati et al., (2012) stated that information about antibiotics and their use, including suggestions for taking antibiotics without a prescription as an independent treatment, were obtained mainly from health workers and people with a background in health education. This of course needs attention, especially in designing programs to minimize the irrational use of antibiotics in the community or community.

Research in Lampung (Arilinia, 2018) reveals that of the 120 respondents, 65% have a good level of knowledge, 60% positive attitude and 54.2% rational behavior. In this study, it was also stated that there was a relationship between knowledge and attitudes towards the rationality of antibiotic use behavior in the community. Based on the initial survey conducted on 40 students, it was found that 10 students (25%) still lacked knowledge of the

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rational use of antibiotics, namely inaccurate use and lack of understanding of the side effects of antibiotics.

The community believes in people around them who have a background in health education, including students in the health science group who are currently studying, or those who work in pharmacies, drug stores or other health facilities as a source of information about drugs including antibiotics (Pratiwi et al., 2013). Nautika L et al., (2017) stated that students majoring in Pharmacy need to increase their understanding of the use of antibiotics, because after completing their studies they will go to the community to provide pharmaceutical services, so that people can use antibiotics rationally.

METHODS

The research method applied by the researcher was observational analytic. This observational research was conducted with the aim of knowing the relationship between knowledge and attitudes with the rationality of antibiotic use behavior among pharmacy students at Universitas Muhammadiyah Lamongan. The research design used a cross-sectional study approach, namely data collection was carried out only once with a questionnaire as a research instrument. The population in this study were all students majoring in Pharmacy in semesters 2 and 4. While the sampling technique was carried out by the total sampling method, namely 147 students. Data collection was carried out using a questionnaire. The questions in the questionnaire form include aspects of the characteristics of the respondent, knowledge of antibiotics, the respondent's attitude towards antibiotics and the behavior of using antibiotics rationally or irrationally. Each question has a "yes" and "no" answer, for questions that are correctly answered, point 1 and one point 0. The data obtained are processed and analyzed by univariant SPSS for the level of knowledge about antibiotics (meaning; use; indication; dose; rules of use; and side effects), attitudes regarding the use of antibiotics appropriately, and rational or irrational behavior of students in using antibiotics, then two-variable (bivarian) analysis which aims to determine the relationship between independent and dependent variables by applying a 95% confidence level and the level of significance (α) = 0.05.

RESULTS

Table 1. Characteristics of Respondents

Parameter	Category	Total	Persentase (%)
Gender	Women	133	90,5
	Man	12	8,2
Age	17	2	1,4
	18	32	21,8
	19	68	46,3
	20	33	22,5
	21	8	5,4
	23	2	1,4
Domicile Status	Kos	39	26,5
	With Parent	107	72,8

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Table 2. The results of measuring student attitudes towards the use of antibiotics

No	Statement	Percentage of correct answers
1	Every time I get sick, I choose not to consult a doctor first if I want to use antibiotics	90,2
2	I thought I could give the antibiotics I was using to a family member who was sick	97,6
3	I like to keep antibiotics in the medicine box for preparation	76,5
4	I prefer to take antibiotics when I cough than other medicines	98,2
5	I prefer to use the antibiotics the doctor prescribes rather than use the rest of the family's antibiotics	95,6
6	I would rather get information about antibiotics from a doctor than a midwife or nurse	90,1
7	I prefer to use trusted internet media as a source of information on antibiotics rather than brochures / leaflets	69,6
8	I prefer to finish the antibiotics used to avoid resistance	95,3
9	I prefer to buy antibiotics at the pharmacy even if it's expensive	93,1
10	I prefer to buy antibiotics at drugstores // drugstores because they are cheaper	78,2

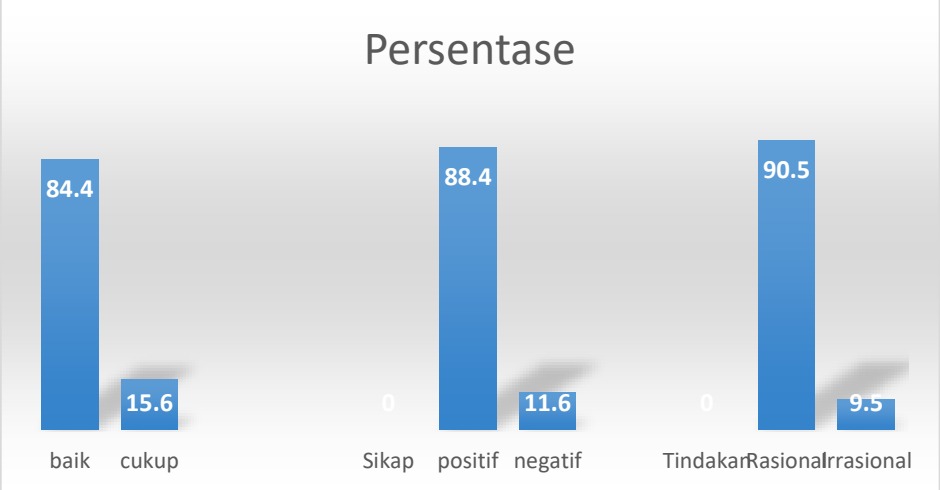

Figure 1. Level of Knowledge, Attitudes and Rationality of Use of Antibiotics

DISCUSSION

This study aims to evaluate the knowledge of D3 Pharmacy students at Universitas Muhammadiyah Lamongan about rational use of antibiotics. It is important for pharmacy study program students to really understand the knowledge about the rational use of antibiotics. This is in accordance with their competence in the future as Associate Pharmacy experts, namely being able to convey information regarding pharmaceutical services through effective communication, both interpersonal and professional, to patients; peer; pharmacist; other health workers and the community in accordance with the authority and ethics that are their responsibility. The same thing was also stated by Nautika L et al., (2017) Pharmacy students should understand antibiotics and their use, because after completing their

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education, they will serve the community, especially in pharmaceutical practice. The competence of pharmacists, especially in educating patients in conveying information about antibiotics and how to use it rationally. Antibiotic resistance has become a marker of irrational and excessive use of these drugs in many countries (Jairoun et al., 2019). Students can play an important role in reducing inappropriate antibiotic use; In this context, a growing number of research reports are focusing their attention on the relationship between medical and non-medical students' knowledge and attitudes towards antibiotic use (Jairoun et al., 2019). Respondent characteristics (Table 1) were dominated by women (90.5%), 19 years old (46.3%) and domicile status with parents (72.8%).

Measurement of knowledge; Attitudes and behavioral rationality of using antibiotics in this study using a questionnaire. The questionnaire contains statements of knowledge about antibiotics (20 questions), attitudes towards antibiotics (10 statements) and the rationality of antibiotic use behavior (10 statements). Each statement contains a yes and no answer. The results of the evaluation of students 'knowledge about antibiotics showed that the students' knowledge was good about antibiotics. In the knowledge questionnaire questions about the indications for the use of antibiotics, namely "Antibiotics can be used to treat all types of diseases" as many as 98.7% of students answered correctly. Antibiotics are drugs used to treat infections caused by bacteria. The use of antibiotics is said to be rational if they are used to treat bacterial infections. Infection due to viruses and fungi does not need antibiotics. D3 Pharmacy students have studied the indications for the use of antibiotics so that almost all of them already know the indications for the use of antibiotics. The use of antibiotics provides an option to kill the infecting microorganism, with minimal side effects on the host cell. All antibiotic therapy is based on an individual patient evaluation (Moser et al., 2019). Apart from not being able to be used for infections that occur due to fungi or viruses, antibiotics also do not need to be given for diseases that are self-limiting disease or minor illnesses that can heal on their own, such as flu, cough or fever. According to the Kementrian Kesehatan RI, (2008), a strict indication of antibiotic therapy begins with establishing a diagnosis of infection due to certain bacteria, collecting and examining clinical information as well as the results of supporting laboratory examinations, for example microbiology, serology, or other support. Optimal antibiotic use depends on the identification of primary and secondary foci, and knowledge of which pathogens to expect in a particular infectious syndrome and information on general patterns of regional antibiotic resistance (Moser et al., 2019). An important goal of antibiotic therapy is the successful treatment of individual patients with bacterial infections. Optimal clinical treatment results can only be achieved if toxicity, pathogen selection, and development of resistance are minimized (Walger, 2016).

The statements in points 2, 3, 6, 7 and 9 are about the interval and how to use antibiotics. Most of the students were able to answer correctly on the question points. Duration, therapy guidelines and range of days of antibiotic therapy. The duration chosen by doctors in the treatment of bacterial infections tends to choose a longer period of time than a shorter one, so that the benefits of therapy are maximized (Aurnhammer et al., 2018). Hoover, (2017) states that the average duration of inpatient antibiotics is three days, outpatient antibiotics is seven days, and the total duration is 10 days. In the Mentari (2019) it was explained that based on the pharmacokinetic properties of antibiotics in the body it is divided into 2, among others: Time dependent killing, which is the length of time that antibiotics are in the blood at a level above the Minimal Inhibitory Level (MIC) is very important in order to estimate the benefits of the clinic and concentration dependent where the higher the level of antibiotics in the blood beyond the MIC, the higher the inhibitory

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power against bacteria. In taking antibiotics, you should drink it using a glass of water. Certain antibiotics will experience drug interactions when taken with tea, coffee or milk. For example, tetracycline antibiotics will experience interactions in the form of decreasing the effects of tetracyclines in the body when taken with coffee, milk or tea. The cephalosporin class of drugs will experience a decrease in the amount of drug absorbed in the body due to the presence of casein and calcium in milk. The next statement is about where and how to buy safe antibiotics (Statements 5 and 8). In the statement, most of the students were able to answer the statement correctly, namely in obtaining medicine, the public should buy it at the nearest pharmacy. The pharmacy fulfills all the procedures and requirements set, so that it can be said that the quality of the drugs stored in the pharmacy is maintained (Purwidyaningrum et al., n.d.). While the last statement is about antibiotic resistance. In the statement, only 64.6% of students answered correctly. The use of conventional antibiotics for the treatment of bacterial infections is becoming increasingly tense due to an increase in the occurrence of resistance and a decrease in the development rate of new antibiotic agents (Hauser et al., 2016). According to Ivoryanto et al., (2017) The high irrational use of antibiotics in society results in microbial resistance. Increasing knowledge extensively during education on campus can instill moral responsibility for rational use of antibiotics, so as to eradicate antibiotic resistance (Jamshed et al., 2014).

From a total of 147 respondents, 124 students (84.4%) had good knowledge about antibiotics. This is in line with the opinion of Inácio et al., (2017) that pharmacy students have good knowledge about antibiotics and infection control. In the study, it was explained that 90% of respondents stated that antibiotic resistance would become a major clinical problem in the future if people used antibiotics irrational. Fejza et al., (2016) state that modules and special training on the use of antibiotics that have been studied in college must be carried out in pharmaceutical services in the community.

D3 Pharmacy students at Muhammadiyah University in Lamongan are more careful in using antibiotics. They choose to consult a doctor first before using antibiotics. The lowest possible score is on the statement point 6, which is about "I prefer to use trusted internet media as a source of information about antibiotics rather than brochures / leaflets". Based on the results of direct observations of students, they stated that sometimes they find it difficult to distinguish whether the information contained on the internet is really valid or false.

The results of the measurement of the rationality for the use of antibiotics in the Universitas Muhammadiyah Lamongan pharmacy students showed that 90.5% (133) students behaved rationally towards the use of antibiotics. The rationale for the use of antibiotics is based on the exact aspects of the indication; right patient; proper method and duration of use; the right dosage; be well informed and alert to drug side effects. The use of drugs is classified as rational according to WHO if the patient gets the correct drug for clinical therapy needs, with a dose that meets therapeutic needs for an appropriate period of time, and at a relatively affordable cost for both individuals and communities (Octavia et al., 2019). The results of this study are in line with those stated by Huang et al., (2013) that the curriculum in Health sciences significantly increases students' knowledge of antibiotics and increases their attention to antibiotic resistance that may arise from indiscriminate use of antibiotics. Other studies have also revealed that rational antibiotic prescription has become a priority in undergraduate medical and advanced professional education to ensure a quality management system. Program optimization has been carried out, especially, in critically determining therapeutic indications, in increasing targeted therapy, shortening treatment duration, and influencing outpatient and inpatient settings (Kern, 2018). Although the level

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of knowledge is in the good category regarding the use and resistance of antibiotics, however, the level of practice in the field is still poor. So it is necessary to deepen the curriculum on the prevention of antibiotic resistance in medical students (Okedo-Alex et al., 2019).

The results of the Univariate analysis on the measurement of knowledge of attitudes and the rationality of using antibiotics for D3 Pharmacy students at Universitas Muhammadiyah Lamongan can be seen in Figure 1.

The results of the Bivariant analysis of knowledge and attitudes, as well as knowledge of actions with a confidence level used was 95% and a significance level of 0.05, using a Chi-square with an alternative Fisher Exact obtained p value: 0.003 from the results of the relationship between knowledge and rationality of antibiotic use behavior, which means that there are There is a significant relationship between the level of knowledge and the rationality of using antibiotics. Analysis of the attitude and rationality of use behavior obtained p value: 0.001, which means that there is a significant relationship between attitudes and rationality of the use of antibiotics. Respondents with higher education level characteristics tend to have better knowledge, more appropriate attitudes and better practices about antibiotic use (Nepal et al., 2019). The same thing was also expressed by Angelina & Tjandra, (2019) who revealed that there was a relationship between knowledge and respondents on the behavior of using antibiotics. Other studies have also revealed that there is a significant relationship between work and sex and the use of antibiotics (Nurmala & Gunawan, 2020). Providing information from doctors and pharmacists regarding the use of antibiotics can increase the rationality of using antibiotics in society (Erdsiek et al., 2020).

CONCLUSION

The results of the measurement of the level of knowledge showed that 84.4% (124) students had good knowledge, 88.4% (130) students had a positive attitude towards antibiotics and 90.5% (133) students had rational behavior in using antibiotics. There is a relationship between knowledge and the rationality of using antibiotics with a p value: 0.003. There is a relationship between attitude and rationality of antibiotic use with p value: 0.001

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