EVALUATION OF THE USE OF FLUOROQUINOLONE ANTIBIOTICS IN PATIENTS WITH SPECIFIC DIARRHEA IN THE INPATIENT INSTALLATION OF A PRIVATE HOSPITAL IN THE WEST BEKASI REGION FOR THE 2020 PERIOD

Herlin Widiyananda Lestari[1*], Nofria Rizki Amalia Harahap[1], Melania Perwitasari[1], Numlil Khaira Rusdi[2]

1. Bachelor of Pharmacy Study Program, Sekolah Tinggi Ilmu Kesehatan Mitra Keluarga, Bekasi,Indonesia
2. Bachelor of Pharmacy Study Program, University of Muhammadiyah Prof. DR. HAMKA, Jakarta,Indonesia

*Correspondence : Herlin Widiyananda Lestari | STIKes Mitra Keluarga | email: herlinwidiyanandal@gmail.com

Abstract

Introduction: The rational use of antibiotics is the selection of antibiotics that are selective against infecting microorganisms and effectively destroy infecting microorganisms. The consequences ofgiving antibiotics that are not appropriate can lead to several negative impacts, one of which is bacterial resistance to antibiotics. Specific diarrhea with certain infectious causes is included in the top 10 diseases of patients undergoing hospitalization. Diarrhea is very common in developingcountries, one of which is Indonesia. This study was conducted with the aim of evaluating the rationale of the use of fluoroquinolone antibiotics in inpatients at a private hospital in the West Bekasi region in the period 2020.

Methods: The design of this study was a retrospective non-experimental study using patient medical records. Evaluation of antibiotics carried out is the accuracy of prescribingfluoroquinolone antibiotics. The sample of this study was 83 diarrhea patients who were treated inan inpatient installation of a private hospital in the West Bekasi area for the period 2020.

Results: Evaluation of the use of antibiotics in this study included the right indication, the right patient, the right dose, the right drug, and the right duration of drug administration. The results showed that the right indication was 100%, the patient was 100% right, the dose was 100% right,the drug was 87.9%, and the duration of the drug was 81.93%.

Conclusion: It can be concluded that based on the results of this study, it was found that the use of antibiotics in patients with specific diarrheal diseases affected the rationality of antibiotics, namely the right indication, the right patient, the right dose, the right drug, and the right time of administration.

Keywords: Specific Diarrhea, Antibiotics, Fluoroquinolones, Retrospective

INTRODUCTION

Diarrhea is a disease condition with symptoms of bowel movements that have a liquid or soft consistency, and occur with a frequency of 3 or more times a day. The causes of diarrhea are divided into 6 groups, namely bacterial infections, viral infections, malabsorption, poisoning, allergies, immune disorders and other causes of disease. Diarrhea has become a health problem with very high morbidity and mortality in several developing countries such as Indonesia (Firmansyah, 2020). Diarrhea is a very endemic disease in West Java Province. According to the 2015 Diarrhea Rapid Survey data, cases of diarrhea of all ages nationally were 270 cases/1,000 population. The target that is the reach of services for diarrhea sufferers of all ages at health facilities is 10% of the number of diarrhea sufferers of all ages. The results of the presentation of service coverage for diarrhea sufferers in 2019 in districts/cities of West Java Province were 75.8% (Jabar Health Office, 2019).

The management of specific diarrhea is the administration of antibiotic therapy. Antibiotic therapy is used to provide therapy for diarrhea that occurs due to bacterial infection or bloody diarrhea and there are symptoms of systemic infection experienced by the patient (Dewi, 2016). The administration of antibiotic therapy is very dangerous if it is not consumed according to the dose because it will cause bacterial resistance to these antibiotics. Thus, antibiotic management requires attention to achieve rational administration. In the administration of antibiotics that are not appropriate will cause the risk of resistance. Several types of antibiotics in Indonesia are resistant to several bacteria that cause diarrhea, resulting in a decrease in the ability of antibiotic therapy when treating infections experienced by humans which will make treatment much more difficult (Frida, 2018).

Based on this, considering the high incidence of diarrhea and the high use of fluoroquinolone antibiotics. In addition, the occurrence of irrationality in the use of antibiotics, it is necessary to conduct research on the rationale of using fluoroquinolone antibiotic therapy as the first line in diarrhea patients. This study was conducted to evaluate the right indication, the right patient, the right dose, the right drug, and the right time of administration for the use of fluoroquinolone antibiotics.

METHOD

This study uses a non-experimental descriptive observational method. The study was conducted through retrospective medical record data from diarrhea patients who received antibiotics at the inpatient installation of the West Bekasi Region Private Hospital for the period 2020. The observational study design was where the researcher did not treat the variables and only observed the situation that had occurred. The study was conducted at a private hospital in West Bekasi from February to March 2022. The study population was all patients with a diagnosis of diarrhea at an inpatient installation at a private hospital in the West Bekasi region for the period 2020. The number of samples in this study were 83 patients. is the population that has met the inclusion criteria and exclusion criteria.

Slovin's formula:

$$n = \frac{N}{1 + N\,(e)^2}$$

Information:

n = Sample Unit (Number of Respondents Required)

N = Population (sum of population size of specific diarrheal patients in one of the West Bekasi Private Hospitals in 2020)
e = Error Value Used

The researcher uses an error value of 5%, the number of samples used is based on the formula, namely:

$$n = \frac{92}{1 + (92\ (0{,}5^2))}$$

$$= \frac{92}{3{,}5}$$

$$= 74{,}5 \sim 75$$

With the addition of a drop out of 10%, the sample size of this study was 83 patients.

RESULTS

A. Characteristic Data

Patient data if it has been obtained then grouped by gender and age to determine the distribution of specific diarrhea patients who are hospitalized in a private hospital in the West Bekasi area.

1. By Gender

In table 1, it can be seen that patients with a diagnosis of specific diarrhea are mostly male with the amount of data obtained is 45 with a percentage of 54.2%, while for female sex the data obtained is 38, the percentage is 45.8%. The results showed that the percentage of patients with specific diarrhea by gender who underwent hospitalization was higher than that of women.

Table 1. Characteristics by Gender

Gender	Medical Record	Percentage
Laki-laki	45	54,2%
Perempuan	38	45,8%
Total	**83**	**100%**

2. By Age

The age data in this study was used to determine the number of patients with specific diarrhea suffered by adolescents, adults to geriatrics. The results obtained in adolescent to geriatric patients suffered the most in the age range of 20-44 years, namely 47 patients (56.6%), and the 45-54 year age group as many as 21 patients (25.3%). Then the lowest age range is the age group 60-69 (2.4%).

Table 2. Characteristics by Age

Age group	Medical Record	Percentage
10-14 year	-	-
15-19 year	4	4,8%
20-44 year	47	56,6%
45-54 year	21	25,3%
55-59 year	6	7,2%
60-69 year	2	2,4%
>70 year	3	3,6%

Total	**83**	**100%**

3. Route of Antibiotic Administration

On the route of giving antibiotics to specific diarrheal patients inpatients at private hospitals in the West Bekasi area for the 2020 period, the most were orally with a large percentage of 96.4%, intravenously 1.2% and drip 2.4%.

Table 3. Distribution of Patients by Route of Antibiotics

Drug Route	Medical Record	Percentage
Oral	80	96,4%
Intravena	1	1,2%
Drip	2	2,4%
Total	**83**	**100%**

4. Duration of Antibiotics

There is a long period of giving antibiotics to inpatient diarrhea patients at a private hospital in the West Bekasi area for the 2020 period, which can be seen from 1-7 days as many as 82 patients (98.8%) and 8-14 days as many as 1 patient (1.2%).

Table 4. Distribution of Patients with Duration of Antibiotics

Giving Time	Medical Record	Percentage
1-7 day	82	98,8%
8-14 day	1	1,2%
Total	**83**	**100%**

A. Pattern of Antibiotic Use

The pattern of single use of antibiotics can be shown in table 5.

Table 5. Patterns of Antibiotic Use of Diarrhea Patients in Private Hospitals in the West Bekasi Region for the 2020 Period

Pattern of Drug	Nama Obat	Medical Record	Percentage
Single	Ciprofloxacin oral	76 Oral	91,6%
Single	Ciprofloxacin Drip	1 Drip	1,2%
Single	Levofloxacin Oral	4 Oral	4,8%
Single	Levofloxacin IV	1 IV	1,2%
Single	Levofloxacin Drip	1 Drip	1,2%
Total		**83**	**100%**

The results of the evaluation of the accuracy of the administration of fluroquinolone antibiotic therapy in this study were based on the guidelines of the Minister of Health in 2011 and according to the NEJM (The New England Journal of Medicine) Acute Infectious Diarrhea. This evaluation includes several forms of criteria including the right patient, the right indication, the right dose, the right drug, and the right time of administration.

B. Evaluation of Antibiotic Use

The results of the evaluation of the accuracy of the administration of fluroquinolone antibiotic therapy in this study were based on the guidelines of the Minister of Health in 2011 and according to the NEJM (The New England Journal of Medicine) Acute Infectious Diarrhea. This evaluation includes several forms of criteria including the right patient, the right indication, the right dose, the right drug, and the right time of administration.

Table 6. Evaluation of Antibiotic Use in Patients with Specific Diarrhea in Private Hospitals in the West Bekasi Region for the 2020 Period

Parameter	(%) Accuracy	(%) Inaccuracy
Right Patient	100%	-
Right Indication	100%	-
Right Dose	100%	-
Right Drug	87,95%	12,05%
Right Time	81,93%	-
(Not right / Too Long)	-	6,02%
(Not right / Too Short)	-	12,05%

DISCUSSION

Characteristic Data

Based on the results of the study in table 1. regarding the distribution of patients according to gender characteristics above, it can be seen that patients with a diagnosis of diarrhea suffered mostly by men with the amount of data obtained by 45 patients with a large percentage of 54.2%, while for the female gender the data obtained as much as 38 percentages of 45.8%. The form of lifestyle, level of sanitation, and physical activity are factors that influence the occurrence of diarrhea. Male patients are very susceptible to diarrhea due to their lifestyle and poor sanitation levels compared to women (Riskesdas, 2013).

Based on table 2. the age data of the patients in this study, patients with specific diarrhea patients included adolescents, adults to geriatrics. The number of patients aged 20-44 years were 47 patients (56.6%), and the group aged 45-54 years were 21 patients (25.3%). This result cannot be said to be in accordance with the results of previous studies regarding the prevalence of diarrhea, stating that diarrhea is very common in children. Diarrhea that occurs in children is defined as the second leading cause of death in the world after pneumonia. The results of this study can be used as a basis, because adults are also more susceptible to diarrhea. The results of this study are in line with research conducted by Dewi (2016) which showed that there were more diarrhea patients in the adult age group (59%) compared to children.

Based on the results of a study regarding the route of antibiotic administration in hospitalized specific diarrheal patients at a private hospital in the West Bekasi area for the 2020 period the most orally with a total of 80 patients (96.4%), intravenously as many as 1 patient (1.2%) and drip in 2 patients (2.4%). Basically the route of administration of oral antibiotics shouldbe the main choice for infection therapy, but if the patient's infection is severe, then parenteral antibiotics can be reconsidered (Kemenkes RI, 2011a). Administration of routes such as intravenous and drip are usually given for cases of patients who are weak, have nausea, severe vomiting, or are unconscious when they come to the hospital to get a quick drug effect, but if the

patient's condition is outside of these conditions, parenteral antibiotics should be replaced immediately. with oral antibiotics (Kemenkes RI, 2011a).

Based on the results of the study regarding the duration of administration in table 4 antibiotics in specific diarrhea patients hospitalized in a private hospital in the West Bekasi area for the 2020 period 1-7 days as many as 82 patients (98.8%) and 8-14 days as many as 1 patient (1.2%). It can be seen that the duration of drug administration until the patient is declared allowed to go home from the hospital is about 5-7 days for the category of diseases caused by infection (Kemenkes, 2011).

Antibiotic Usage Profile

One of the pharmacological therapies for patients with diarrhea is antibiotics. Based on table 5.4, the profile of the use of antibiotics in the research sample is ciprofloxacin and levofloxacin. This antibiotic is a fluoroquinolone class of antibiotics with a broad antibacterial spectrum. The mechanism of this antibiotic is to play a role in inhibiting DNA replication so that it has bactericidal properties. Fluoroquinolone class of antibiotics has excellent activity against gram-negative and gram-positive bacteria. In the results of table 5.4, it can be seen that the most widely used fluoroquinolone class of antibiotics is ciprofloxacin. Ciprofloxacin is a fluoroquinolone antibiotic that is used as first-line treatment for patients with infections due to invasive bacterial pathogens or in empiric treatment. Empirical treatment is therapy that uses antibiotics before the type of bacteria that infects the patient is known. Antibiotics that have a broad spectrum are very effective as empirical therapy and therefore provide optimal outcomes. The fluoroquinolone group is a class of antibiotics that according to previous researchers was considered the first choice therapy for diarrhea patients, especially in Traveler's dhiarrhoe.

Evaluation of Antibiotic Use

The evaluation carried out in this study was based on data on the use of specific diarrheal patients using guidelines, such as the Regulation of the Minister of Health of the Republic of Indonesia No. 2406 of 2011, Dipiro 2008 : Pharmacotherapy: A Pathophysiologic Approach. Sevebth and NEJM (The New England Journal of Medicine) Acute Infectious Diarrhea. Evaluations carried out on the use of antibiotics include the right patient, the right indication, the right dose, the right drug, and the right time of administration. Patients can be said to be rational when using drugs if they receive therapy according to clinical needs including a dose, timeliness and affordable price. The use of appropriate drugs is recommended in improving the quality of health and patient therapy (Eldesi, 2015).

Right Patient

Evaluation of the accuracy of patients in the study sample is shown in table 5.6. Right patient is a form of therapy that is used by considering the patient's condition first which is generally included in the medical record that there is a patient history such as a hypersensitivity reaction (allergy). Antibiotic monotherapy given to patients in this study was ciprofloxacin in 77 cases (92.8%) while 4 cases (7.2%) were given levofloxacin. In this study, there were no patients who experienced hypersensitivity (allergy) to the fluoroquinolone antibiotics given such as ciprofloxacin and levofloxacin. Based on medical record data, the patient's exact criteria have met the criteria of 100%.

Research conducted by Winarti (2021) stated that all patients did not have complaints of hypersensitivity (allergic) reactions to the antibiotics given, so that the use of antibiotics in patients in this study could be said to be 100% correct. However, if the patient is allergic to certain

antibiotics but the antibiotics are still prescribed, then the antibiotic is declared inappropriate for the patient.

Precise Indication

Evaluation of the accuracy of the indications in the study sample is shown in table 5.6. Precise indication is the accuracy of drug administration given to patients diagnosed with diarrhea by doctors who have a specific therapeutic spectrum so that the administration is adjusted to the patient's diagnosis. Diarrhea diagnosis is determined by the doctor based on the symptoms and the results of the patient's stool test. Based on the exact criteria, the indications can be stated to have met the criteria of 100% because the administration of antibiotics is in accordance with the diagnosis determined by the doctor, namely Specific Diarrhea.

Research conducted by Okpri (2020), based on the accuracy of the indications for the use of antibiotics for diarrhea patients at the Friendship Hospital based on the Friendship Hospital Guidelines with 90 samples, said to be 100% accurate. Indications by providing therapy to patients based on physical examination, laboratory results and by only listening to the complaints experienced by patients to provide the best therapeutic action (Okpri, 2020).

Right Dosage

Evaluation of dose accuracy in the study sample is shown in table 5.6. Appropriate dosing is a drug use that must be adjusted to the therapeutic range of the drug. Based on table 5.4, it can be stated that all patients with specific diarrhea in this study sample had received antibiotics (ciprofloxacin and levofloxacin) which met the dose accuracy of 100%. Evaluation of dose accuracy was carried out based on the NEJM (The New England Journal of Medicine) Acute Infectious Diarrhea Guidelines for empirical and definitive antibiotic therapy in diarrhea patients. The recommended dose of ciprofloxacin is 500 mg orally twice daily and levofloxacin 500 mg orally once daily.

The accuracy of the dose is very necessary in the success of therapy (Baxter, K., 2008). If the use of antibiotics is given at a dose that exceeds the normal dose it can cause resistance, while the use of antibiotics with a lower dose can result in the expected therapeutic effect not being achieved because the antibiotic does not reach the MIC (Athifah, 2019). The use of appropriate antibiotics depends on the value of clinical parameters and the type of infecting bacteria as well as selecting by optimizing the pharmacodynamic dose of antibiotic use (Athifah, 2019). Monitoring of antibiotics needs to be done to see if the antibiotics given have reached therapeutic levels during treatment (Athifah, 2019).

Research conducted by Vidya (2017) showed that there were 10 cases of inappropriate antibiotic doses given to patients with diarrhea under five. Dosage inaccuracy is divided into two categories, namely underdose in 7 cases (13.46%) and overdose category in 3 cases (7.69%). Overdose is the dose or frequency given that exceeds the standard dose according to the Pediatric Dosage Handbook guidelines, while underdose is the dose or frequency given less than the standard dose according to the Pediatric Dosage Handbook guidelines. According to the analysis of the study, 41 cases (78.85%) of antibiotic doses were correct (Vidya, 2017). Dosage inaccuracy is divided into two categories, namely underdose in 7 cases (13.46%) and overdose category in 3 cases (7.69%). Overdose is the dose or frequency given that exceeds the standard dose according to the Pediatric Dosage Handbook guidelines, while underdose is the dose or frequency given less than the standard dose according to the Pediatric Dosage Handbook guidelines. According to the

analysis of the study, the correct dose of antibiotics was obtained in 41 cases (78.85%) at the right dose (Vidya, 2017).

Right Medicine

Evaluation of drug accuracy in the study sample is shown in table 5.6. The right drug is a form ofconformity in the selection of antibiotics by taking into account the effectiveness of the antibiotictherapy. The choice of antibiotics used in this study both empirically and definitively was in accordance with the NEJM (The New England Journal of Medicine) Acute Infectious Diarrhea Guidelines on the use of fluoroquinolone antibiotics such as ciprofloxacin and levofloxacin for patients with specific diarrhea. Based on the criteria for the right drug, it can be stated that all patients in this study had met the criteria for the right drug by 73 patients (87.95%) and 10 patients(12.05%). The accuracy of fluoroquinolone antibiotics in this study is based on the fact that fluoroquinolones are the first of choice for the treatment of specific diarrhea (Guerrant, 2004). Theinaccuracy of antibiotics is due to the use of fluoroquinolone antibiotics in patients whose stool test results show fungal infection. Fluoroquinolone antibiotics are broad-spectrum antibiotics thatcan inhibit or kill bacteria from both gram-positive and gram-negative groups. The mechanism ofaction of the fluoroquinolone class of antibiotics is to inhibit nucleic acid synthesis, by inhibitingthe action of DNA gyrase (topoisomerase II) and topoisomerase IV. The half-life of ciprofloxacinis 3-5 hours and the half-life of levofloxacin is 5-7 hours (Katzung, 2018).

Research conducted by Andriani et al., (2016) obtained the results of 38 patients who received therapy according to the 2005 WHO standards, which were 100% right indication, 76.31% right drug, 76.31% right patient and 71.05% right dose (Andriani et al., 2016). If based on research conducted by Subur et al., (2020) the evaluation of drug use on the right indication, right patient and right dose indicators has reached 100%, but on the right drug indicator it is 37% and the wrong drug is 63%, the drug inaccuracy occurs in This study was due to the use of antibiotics without laboratory results showing acute diarrhea due to infection (Subur et al., 2020).

Right Time of Giving

Evaluation of drug accuracy in the study sample is shown in table 5.6. The duration of administration of antibiotic therapy depends on the severity and type of infecting bacteria. The inaccuracy of the duration of administration is if the duration of administration of the prescribed antibiotic is less than that specified by the NEJM (The New England Journal of Medicine) Acute Infectious Diarrhea Guidelines regarding the use of fluoroquinolone antibiotics. Short duration of antibiotic administration resulted in the expected clinical outcome could not be achieved, whereas if the administration of antibiotics was too long it could increase the risk of resistance, which would slow down healing. Stopping the use of antibiotics can also lead to resistance. Resistance is the resistance of microbes to certain antimicrobial substances. Resistance can occur through several mechanisms, namely, microorganisms produce enzymes that damage the active substance, microorganisms change membrane permeability to drugs, changes in the target structure of drugs, changes in metabolic pathways, and microorganisms change enzymes that function for their metabolism to become less active against drugs (Burke.A. Chunhe, 2015). Based on the proper evaluation of the duration of administration to specific diarrhea patients in the inpatient installation of a private hospital in the West Bekasi area, there is an inaccuracy in the length of administration, namely too short and too long. The accuracy of antibiotics used by specific diarrhea patients was 68 patients (81.92%) while the inaccuracy of antibiotics occurred in 15 patients, namely 5 patients

(6.02%) incorrectly with too long duration and 10 patients (12.05%) incorrectly with duration is too short. Assessment of the suitability of the duration of antibiotic administration in patients with specific diarrhea based on the suitability of the duration of antibiotic administration with the NEJM (The New England Journal of Medicine) Acute Infectious DiarrheaI guidelines. Based on the results of the study there were 10 patients (12.05%) with definitive therapy and 73 patients (87.95%) with empiric therapy. Empirical treatment is the most widely used treatment with antibiotics given before the results of the culture test or the type of bacteria that infect the patient are known, therapy can be seen from the patient's specific symptoms by first-line administration of the patient according to the guidelines. Antibiotics that have a broad spectrum are very effective as empirical therapy and therefore provide optimal outcomes. Definitive treatment is a form of therapy given, when the patient has been tested for faecal culture and the type of infected bacteria is known. According to the NEJM (The New England Journal of Medicine) Acute Infectious Diarrhea guidelines, the duration of empiric antibiotic administration in diarrheal patients is at least 3 days, while definitive therapy is at least 5 days (Guerrant, 2004).

Research conducted by Okpri (2020) related to the evaluation of the accuracy of the duration of antibiotic administration in inpatient diarrhea patients at the Friendship Hospital, it was still found that antibiotics were given with the wrong duration of administration with a duration of administration that was too short or too long. The accuracy of giving antibiotics in this study was 49 patients (46.2%), and the inappropriateness of giving antibiotics with too long a duration was 27.3%, and the administration was too short and too short was 26.40% (Okpri, 2020).

CONCLUSION

Based on the results of this study which was carried out at a private hospital in the West Bekasi area for the 2020 period, it can be concluded that based on the characteristics, the gender of the patient that dominates is male 54.2% compared to female 45.8% and based on the age of the patient with specific diarrhea. includes adolescents, adults and geriatrics. The number of patients aged 20-44 years were 47 patients (56.6%), and 45-54 years were 21 patients (25.3%).

The profile of the use of antibiotics in the study sample was treatment that used antibiotics alone, namely the fluoroquinolone group such as ciprofloxacin and levofloxacin. The results of the rationale evaluation of therapy showed that the right patient was 100%, the indication was 100%, the dose was 100%, the drug was 87.9%, and the duration of drug administration was 81.93%.

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