Quantitative Antibiotic Use Profile in Typhoid

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Abstract

Background. Typhoid fever is a common health problem in developing countries. Antibiotics are used to treat typhoid fever which is caused by a bacterial infection. Selection and use of appropriate and rational antibiotic therapy can determine a success in treatment to avoid bacterial resistance and minimize drug side effects. This study aims to determine the rationality of the use of antibiotics in adult patients diagnosed with typhoid fever in the Inpatient Installation of X Hospital in Yogyakarta. **Method.** Non-experimental research with descriptive observational research design and retrospective data collection. The sample of this study was inpatients with a diagnosis of typhoid fever and was recorded at the X Hospital Medical Records Installation in Yogyakarta for the period January 2016 - December 2017 which was included in the inclusion criteria. **Result.** Data taken came from 75 medical records that were included in the inclusion criteria. Patients were dominated by female patients as many as 64% and the adult age range was 18-30 years. The single most widely used antibiotic was levofloxacin in 27 cases (36%). The use of antibiotics with the right indication was 75 patients (100%), the right type was 75 patients (100%), the exact duration of administration was 64 patients (85.33%), the right dose was 73 patients (97.33%), the right interval was 73 patients (97.33%) and the right route of administration were 75 patients (100%). **Conclusion**. The rationality of using antibiotics is good with accuracy> 75%.

Keyword: Typhoid Fever, Antibiotics, Rationality

1. Introduction

Typhoid fever is a health problem that often occurs in developing countries, because its spread is closely related to population density, environmental health, poor sanitation, water resources and the low hygiene standards of the food processing industry. Typhoid fever is an acute infection of the small intestine caused by the bacteria Salmonella typhi.[1]

Based on data from WHO, it is estimated that there are 17 million cases per year with 600 thousand cases ending in death. Typhoid fever cases in developing countries are reported as endemic with 95% of cases are outpatient so that the incidence is about 15–25 times greater than hospitalizations and 5% of them end in death.[2,3]

The incidence of typhoid fever in Indonesia ranges from 358–810 cases per 100,000 population with a mortality rate of 3.1 to 10.4% in 2007. In 2008, the morbidity rate for typhoid fever in Indonesia was reported at 81.7 out of 100,000 population, with the distribution according to the age group of 148.7 / 100.000 population (2–4 years), 180.3 / 100.000 (5–15 years), and 51.2 / 100,000 (≥16 years).[4.5]

Typhoid fever that occurs in Indonesia is caused by several factors, including food hygiene, personal hygiene and the environment. People know this disease as typhoid, but in medicine it is called *typhoid fever or typhoid abdominalis*.[1]

Antibiotics are used for the treatment of infectious diseases due to bacteria. Selection and use of appropriate and rational antibiotic therapy can determine the success of treatment and avoid bacterial resistance. Apart from having an impact on morbidity and mortality rates, bacterial resistance also has a very high economic and social adverse impact.[6,7,8]

Various studies found that the use of antibiotics is not appropriate for about 40% – 62% for diseases that do not require antibiotics. Research in various hospitals about the quality of antibiotic use found 30%–80% not according to the indication. Research on the use of antibiotics in a hospital in Yogyakarta in 2017 showed that the accuracy of drug selection was 70.96%, the accuracy of the dose was 96.77%, the accuracy of the interval was 83.87%, and the accuracy of the duration was 83.87%. The increasing prevalence of typhoid fever and the rampant irrational use of antibiotics prompted researchers to conduct research at other hospitals in the Yogyakarta area.

2. Method

This research is a non-experimental study with a descriptive observational research design and retrospective data collection.

This research was conducted at the X Hospital Medical Record Installation Yogyakarta. Data collection and collection were carried out in March - August 2018

The population in this study were all inpatients who suffered from typhoid fever and were recorded in the X Hospital Medical Record Installation Yogyakarta for the period January 2016 - December 2017. Sampling was done by *purposive sampling*. The samples in this study were all populations that were included in the inclusion criteria. The inclusion criteria were patients aged 18 - 64 years with a diagnosis of typhoid fever who had complete data and contained important data (patient name, age, sex, symptoms, diagnosis, type, dose, time and interval of antibiotic administration). and received antibiotic therapy for the period January 2016 - December 2017, as well as adult typhoid fever patients who completed treatment at X Hospital Yogyakarta who had been allowed to go home by the treating doctor. Data analysis was performed by quantitative antibiotic use profile analysis.

3. Result

Based on medical record data, there were 374 patients diagnosed with typhoid fever, but 75 patients who entered the inclusion criteria were dominated by female patients as many as 64% and the adult age range was 18-30 years.

The main symptom of typhoid fever is

fever and accompanied by gastrointestinal symptoms, namely nausea and vomiting, with the most length of treatment for 3 days.

Table.1 shows the characteristics of the study subjects and **table 2** is the antibiotic use profile.

Table 1. Description of Research Subjects

Characteristics	Total	Percentage
Gender		
Male	27	36 %
Female	48	64 %
Age		
18 – 30 years old	48	64 %
31 – 40 years old	10	13.3 %
41 – 50 years old	11	14.6 %
51 – 64 years old	6	8.0 %
Clinical Symptoms		
Fever	71	94.67 %
Headache	4	5.3 %
Nausea	56	74.67 %
Vomiting	35	46.67 %
Abdominal pain	17	22.67 %
Dizziness	30	40.00 %
Diarrhea	7	9.33 %
Fatigue	16	21.33 %
Constipation	4	5.33 %
Anorexia	13	17.33 %
Hospital Exit Conditions		
Get well	44	58.67 %
Getting better	31	41.33 %
Duration of treatment		
2 days	1	1.33 %
3 days	32	42.67 %
4 days	20	26.67 %
5 days	13	17.33 %
6 days	7	9.3 %
7 days	2	2.67 %

Table 2. Antibiotic Usage Profile

Types of Use of Antibiotics	Total	Percentage
Single Therapy		
Generation III Cephalosporins		
Ceftriaxone	8	9.33 %
Cefixime	20	2.67 %
Flurokuinolone group		
Ciprofloxacin	14	16 %
Levofloxacin	33	36 %
Old Accuracy of giving		
Shorter duration	10	13.33 %
The duration is accurate	64	85.33 %
Longer duration	1	1.33 %
Appropriateness of Antibiotic Doses		
Less dosage	0	0 %
The dosage is right	73	97.33 %
More dose	2	2.67 %
Accuracy of Delivery Intervals		
Less interval	1	1.33 %
The interval is right	73	97.33 %
More interval	1	1.33 %
Route Accuracy		

The route is right	75	100 %
The route isn't right	0	0 %

4. Discussion

There is a difference in gender distribution according to a report from the Ministry of Health of the Republic of Indonesia (2011) which explains that the incidence of typhoid fever is found more in women than men. The results of another study conducted by Saraswati et al (2012) of the 65 subjects studied showed that the incidence of typhoid fever was more common in women than men.[11]

Everyone infected with *Salmonella typhi* will excrete the bacteria through feces and urine for a period of 3 months. Patients who continue to excrete *S.typhi* for more than 3 months are called *carriers*. *Carrier* patients are mainly women, middle age and rarely in children[12]

There is a difference in the age distribution according to previous research data, namely typhoid fever is one of the top ten diseases affecting adults aged 25-44 years in Yogyakarta and 50.76% of the total 65 cases of typhoid fever that occur in the age range 12-30 Years. Adolescents and adults are the more active age ranges and are more often outside the home, so that they have a higher risk of being infected with *Salmonella typhi* followed by consumption of less hygienic snacks or food outside the home.[11,13]

Fever is the most common manifestation, accompanied by other clinical symptoms including fever, dizziness, aches, anorexia, nausea, vomiting, constipation, diarrhea, abdominal pain, tachypnea, weak pulse, flatulence and coughing. During the first week, the body temperature increases gradually. Various non-specific *flu-like syndrome* symptoms are generally found in the course of typhoid fever. The delay in starting typhoid fever treatment and the longer the time to decrease body temperature (> 7 days) can affect patient recurrence and will lead to increased treatment costs due to the longer hospitalization time.[14,15]

The condition of the patients when they left the hospital did not die or go home at their own request, but with the condition of outpatient treatment with the approval of the doctor. Typhoid fever patients who are declared cured or improved must perform a bacteriological examination at least once a month to detect *Salmonella typhi* bacteria because these bacteria can still be excreted by the body within 3 months or more than a year.[15]

The fluoroquinolone class of antibiotics (ciprofloxacin, levofloxacin, pefloxacin and ofloxacin) is an effective therapy for typhoid fever in isolates that are not resistant to fluoroquinolones. This class of antibiotics has a clinical cure rate of up to 98%, a recurrence rate and fecal career of less than 2%, and a fever reduction time of 4 days.[16]

Currently, cefixime is not used as a first-line drug for typhoid fever. Cefixime is given in suspected *multi drug resistant* cases. Likewise, administration of other third-generation cephalosporin drugs such as ceftriaxone, cefotaxime and ceftazidime is indicated in cases that are resistant to first-line drugs. The use of the drug ceftriaxone as an alternative therapy in combination with azithromycin and cefixime is considered to still bring good results and is sensitive to strains resistant to the fluoroquinolone class. Ceftriaxone and chloramphenicol are still used as alternative therapies despite their toxicity to bone marrow and a history of *plasmid-mediated* resistance, because they have shown good results in developing countries.[17]

In this study, the shortest use of antibiotics was 3 days and the longest was 15 days. According to WHO in 2011, cefixime was given for 7-14 days but in this study there was one prescription that was given less than 7 days. . The fluoroquinolone class of antibiotics was given a minimum of 5 days and a maximum of 14 days, but in this study there was one prescription of a levofloxacin type antibiotic that was given less than 5 days and one prescription levofloxacin that was given for more than 14 days. Ceftriaxone antibiotics

should be given for 10–14 days (APhA, 2013), whereas in this study there were 8 prescriptions for ceftriaxone that were given less than 10 days.[15]

Long duration of treatment is associated with the development of antibiotic resistance. Administration of antibiotics that are too short or too long can affect the outcome of treatment and will have an impact on morbidity, mortality, bacterial resistance and very high economic and social disadvantages.

In this study, the accuracy of the antibiotic dose was 96% and the dose was 4% inaccurate.

The dosage of antibiotics is very influential on the effect of therapy. Giving a dose that is too high can increase the risk of side effects while an insufficient dose of antibiotics cannot guarantee the achievement of the expected therapeutic levels. The use of antibiotics with excessive doses is the main cause of antibiotic resistance. [8,20]

In this study, there was administration of antibiotics at different intervals. The administration of antibiotics at inappropriate intervals can cause the pharmacodynamics of the antibiotics to be disturbed and can increase the risk of antibiotic resistance[8]

The antibiotics of the type cefotaxime, ceftazidime, ceftriaxone are only given intravenously. Cefixime can only be given orally. Meanwhile, levofloxacin and ciprofloxacin can be given orally or intravenously. Oral antibiotics should be the first choice for infection therapy, but moderate to severe infections may be considered parenteral antibiotics. When the patient is allowed to go home, the given parenteral antibiotics are replaced with oral antibiotics because the patient's condition allows it to be given orally[8]

5. Conclusion

The use of antibiotics with the right indication was 75 patients (100%), the right type was 75 patients (100%), the exact duration of administration was 64 patients (85.33%), the right dose was 73 patients (97.33%), the right interval was 73 patients (97.33%) and the right route of administration were 75 patients (100%). The rationality of using antibiotics is good with accuracy> 75%.

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