



Overview of Antibiotic Use in Hospitalized Typhoid Fever Patients at the Regional General Hospital Dr. Abdul Aziz Singkawang

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Article Info	ABSTRACT
Received: 19-04-2026 Revised: 29-06-2026 Accepted: 30-06-2026 *Corresponding author: Kathina Deswi Aqsa Email: kathinadeswi@pharm.untan.ac.id	Background: Typhoid fever remains a major health concern in Indonesia, with a substantial incidence rate and risk of mortality. Rational antibiotic selection is critical to maximize recovery and mitigate resistance. Objective: This study aims to determine the effectiveness of antibiotic use in typhoid fever patients at the Inpatient Ward of Dr. Abdul Aziz Singkawang General Hospital during the 2022 period. Method: This study employed a non-experimental observational design with retrospective data collection from medical records the inclusion criteria of adult patients ≥ 18 years , patients diagnosed with typhoid fever and hospitalized at Dr. Abdul Aziz Singkawang Regional General Hospital during the 2022 period, patients with a body temperature >37.5°C & patients receiving antibiotic therapy. Data were analyzed descriptively and analytically using Microsoft Excel 2019. The sampling technique used was purposive sampling with the Slovin formula, yielding a sample size of 104 out of 140 patients Results: The results showed that typhoid fever was most commonly diagnosed in women (52%), with the majority of patients aged 18–45 years (44.2%). The most frequently used antibiotic was IV Ceftriaxone in 61 patients (58.65%), followed by PO Ciprofloxacin in 16 patients (13.38%), and the least common was Cefixime PO+ PO Ciprofloxacin in 1 patient. Conclusion: Based on the study results, it can be concluded that the most commonly used antibiotic for typhoid fever patients at Dr. Abdul Aziz Singkawang General Hospital was IV Ceftriaxone, administered to 61 patients (58.65%). Keywords: <i>Antibiotics, Typhoid Fever, Efficacy, Salmonella Typhi</i>

INTRODUCTION

Typhoid fever is a systemic infectious disease caused by the bacterium *Salmonella typhi*, which enters the body through the consumption of unhygienic food and beverages (Idrus, 2020). The primary factors contributing to the spread of this disease are poor sanitation and hygiene conditions (Sari et al., 2023) . According to data from the World Health Organization (WHO), there are an estimated 11 to 20 million cases of typhoid fever worldwide, with the number of deaths reaching 128,000 to 161,000 annually (W.H.O., 2018). The mortality rate from this

disease is estimated to be between 1% and 4%, and in untreated cases, the mortality rate can reach 10% to 20% (Milligan & others, 2018) . In developing countries, particularly in Asia, in-hospital mortality from typhoid fever can reach 80%, with in-hospital mortality rates ranging from 0 to 13.9% (Islami, 2021). In Indonesia, typhoid fever is endemic and represents a significant public health issue.

Based on an analysis of major hospitals in Indonesia, typhoid fever cases tend to increase annually, with an average incidence of 500 per 100,000 population, and a

mortality rate ranging from 0.6 to 5%. This rise in incidence has caused the disease's prevalence to increase by 1.6%, making it the 15th most common infectious disease and a leading cause of death across all age groups in Indonesia (Aisya, 2024). In West Kalimantan, 9,979 cases of typhoid fever were recorded, with the disease spreading across 12 districts/cities (Puspasari et al., 2020). In 2022, typhoid fever ranked second as the most common condition treated at Dr. Abdul Aziz Singkawang Hospital in West Kalimantan, with 371 patients admitted. The primary treatment for typhoid fever patients is the administration of antibiotics (Sari et al., 2023).

The antibiotics used to treat typhoid fever vary widely, necessitating careful evaluation of their clinical effectiveness (Feny Oktaviana, 2021). While appropriate antibiotic utilization targets the causative bacteria to improve patient recovery, inappropriate prescribing patterns substantially elevate the risk of adverse drug reactions and global antimicrobial resistance. Recent global analyses estimated that antimicrobial resistance was directly responsible for 1.27 million deaths worldwide in 2019 (Masuet-Aumatell & Atougua, 2021). In Indonesia, institutional studies reveal conflicting clinical realities regarding empirical choices. A study by (Handayani, 2017) highlighted that while fluoroquinolones like ciprofloxacin remain widely prescribed, third-generation cephalosporins are increasingly dominant in clinical settings. Conversely, research by (Sukmawati, I.G.A.N.D., Jaya, M.K.A., Swastini, 2020) demonstrated that intravenous ceftriaxone yielded superior clinical outcomes, characterized by a significantly shorter length of stay compared to oral or intravenous ciprofloxacin. This divergence highlights a critical clinical dilemma: empirical drug efficacy and resistance patterns are highly localized and cannot be generalized across different regional healthcare facilities. Currently, there

is a profound lack of empirical data regarding the clinical outcomes of these antimicrobials at Dr. Abdul Aziz Singkawang Regional General Hospital, West Kalimantan. Therefore, this study is urgently required to bridge this research gap by establishing site-specific baseline data on antibiotic effectiveness. These findings are expected to serve as an essential evidence-based foundation for optimizing local clinical pathways and strengthening the hospital's Antimicrobial Stewardship Program (PPRA). Based on these findings, the researchers were motivated to conduct further research on the effectiveness of antibiotic use in typhoid fever patients at the Inpatient Ward of Dr. Abdul Aziz Singkawang Hospital. This study is expected to contribute to the consideration of more effective antibiotic therapy selection for typhoid fever patients, in order to improve recovery rates.

METHODS

This study is a non-experimental observational study in which no interventions were performed on the study subjects. Data collection was conducted retrospectively by reviewing the medical records of patients with typhoid fever admitted to the inpatient ward of Dr. Abdul Aziz Singkawang Regional General Hospital during the year 2022. The population in this study consisted of the medical record data of all general and National Health Insurance (JKN) patients with typhoid fever who received antibiotic therapy and were hospitalized at Dr. Abdul Aziz Singkawang Regional General Hospital.

The study population comprised 140 individuals. The sample in this study was selected using a purposive sampling technique, with the minimum sample size determined via the Slovin formula, yielding a total of 104 eligible patients. The sample in this study consisted of inpatients diagnosed with typhoid fever who received antibiotic therapy and met the inclusion criteria at Dr. Abdul Aziz Singkawang Regional General

Hospital during the 2022 period. The inclusion criteria were: patients diagnosed with typhoid fever and hospitalized at Dr. Abdul Aziz Singkawang Regional General Hospital during the 2022 period; patients with a body temperature >37.5°C; patients receiving antibiotic therapy; and which is patients aged ≥18 years old. The exclusion criteria for this study were: (1) patients with incomplete or illegible medical record data regarding antibiotic administration or temperature charts; (2) patients who discharged against medical advice or were referred to another hospital before completing therapy

In this study, the data used were collected from patients’ medical records, including medical record numbers, age, gender, diagnosis, date of admission, date of discharge, and the type of antibiotic used, as well as clinical data on typhoid fever patients, including length of hospital stay and body temperature of typhoid fever patients admitted to Dr. Abdul Aziz General

Hospital in Singkawang during the 2022 period. Data collected from the medical records department were analyzed using descriptive and analytical methods to determine the effectiveness of antibiotic use in typhoid fever patients. The data collected included patient characteristics based on the extent of temperature reduction and length of hospitalization associated with the use of each type of antibiotic. The obtained data were subsequently processed using Microsoft Excel 2019, and the results were presented in tabular form with counts and percentages (%).

RESULTS AND DISCUSSION

Patient characteristics included gender and age. The characteristics of typhoid fever patients at Dr. Abdul Aziz Singkawang Regional General Hospital during the 2022 period, who served as the sample in this study, are presented in Tables I and II.

Table 1. Patient Demographics by Gender

No	Gender	Number of Patients	Percentage
1	Male	50	48%
2	Female	54	52%
	Total	104	100%

Patients with typhoid fever by gender at Dr. Abdul Aziz Singkawang General Hospital (RSUD dr. Abdul Aziz Singkawang) in 2022; according to the data obtained, there were more female patients with typhoid fever than male patients. This aligns with a study by (Hazimah et al., 2019), which showed that female patients had the highest percentage at 51.9% (27 patients) compared to males at 48.1% (25 patients) (Sari et al., 2023). In terms of immune system resilience, women are more susceptible to typhoid fever and experience more severe outcomes. One theory suggests that Salmonella typhi enters liver cells, causing estrogen hormones

in women to work harder (Alkhodiyah & others, 2020). Both women and men can contract typhoid fever; however, this does not mean that the incidence of typhoid fever is higher among women than among men. Typhoid fever is closely related to individual hygiene (A. Pratiwi & Mayasari, 2009). Several studies indicate that, in general, S. typhi infection can occur regardless of gender. Therefore, factors such as the patient’s physical condition, stress levels, occupation, lifestyle, and physiological condition are specific to each individual (Helmy, 2020).

Table 2. Patient Demographics by Age

No	Age	Number of Patients	Percentage
1	18-45 years	46	44,2%
2	46-59 years	30	28,8%
3	>60 years	28	27%
Total		104	100%

This section explains the results of all the stages described in the method section. The contents of the explanation of the results must be able to show important things briefly and simply, also correlations and trends that occur based on data. Results can be presented in the form of drawings, tables, diagrams, or writing. All pictures, tables, and diagrams must be explained using words or sentences so that the readers will be able to know the things that are important. It should be noted that raw data are not displayed in the journal text. All artworks, figures, images, illustrations, graphics, photos, pictures, plots and schemes should be labeled as Figures. To ensure the highest print quality, your figures should be submitted in JPEG format at the highest possible resolution (300 dpi or higher). Attention should be paid to the matter of significant figures (usually, no more than three) (Quigley et al., 2020).

The highest age group of typhoid fever patients was 18–45 years old, with 46 patients (44.2%). Next was the 46–59 age group, with 30 patients (28.8%). The lowest number was in the over-60 age group, with 28 patients (27%). The highest incidence rate of typhoid fever at Dr. Abdul Aziz Singkawang General Hospital in 2022

occurred in the productive age group, as patients in this age group are more likely to engage in outdoor activities, increasing their risk of infection with *Salmonella typhi* (Fithria et al., 2015). Cases of typhoid fever can occur at any age, particularly among people of working age. At this stage of life, individuals are actively engaged in daily activities and frequently eat out ; thus, factors such as fatigue, immune system strength, and hygiene play a significant role in the pathogenesis of typhoid fever caused by exposure to the *S. typhi* bacterium (Adiputra & others, 2017). This is consistent with a previous study by (Melarosa et al., 2019) on “Antibiotic Use Patterns in Adult Patients with Typhoid Fever at Sanglah General Hospital, Denpasar, in 2016–2017.” It showed that typhoid fever patients were most common in the 18–34 age group, accounting for 56% (31 patients) (Melarosa et al., 2019) *Salmonella typhi* bacteria thrive particularly in food that lacks proper hygiene (Ramaningrum et al., 2017). Typhoid fever still occurs in the elderly and high-risk elderly, although the number of cases is small, because in both age groups there is a decline in immune system function, making them more at risk of infection with *Salmonella typhi* (Fithria et al., 2015).

Table 3. Antibiotic Usage Profile

Treatment	No	Drug	Number of Patients	Percentage
Single	1	Ceftriaxone IV	61	58,65%
	2	Ciprofloxacin PO	16	15,38%
	3	Cefixime PO	8	7,69%
	4	Azithromycin PO	1	0,96%

Treatment	No	Drug	Number of Patients	Percentage
Combination	5	Ceftriaxon IV+ Thiamphenicol PO	8	7,69%
	6	Ceftriaxon IV+ Cefixime PO	5	4,80%
	7	Ceftriaxon IV+ Ciprofloxacin PO	3	2,88%
	8	Ciprofloxacin PO + Thiamphenicol PO	1	0,96%
	9	Cefixime PO+ Ciprofloxacin PO	1	0,96%
Total			104	100%

Patterns of Drug Use

The use of antibiotics in patients with typhoid fever at Dr. Abdul Aziz Singkawang Regional General Hospital in 2022 showed that the most commonly administered single-agent therapy was IV ceftriaxone, given to 61 patients (58.65%), followed by oral ciprofloxacin, given to 16 patients (15.38%). This is consistent with a previous study conducted by (Rahmawati & others, 2019) in which the antibiotic ceftriaxone was the most commonly used in adult patients with typhoid fever, accounting for 60% . Ceftriaxone, a third-generation cephalosporin antibiotic, is an alternative for typhoid fever therapy (R. I. Pratiwi & Putri, 2022). Ceftriaxone is an effective treatment for both adults and children with typhoid fever, with few side effects (Kuehn & others, 2022) . Ceftriaxone demonstrates greater efficacy in the treatment of typhoid fever, as evidenced by a shorter treatment duration, faster reduction in body temperature, and the ability to be administered as a single dose, which can improve patient adherence to treatment (Susatyo Jeffry, 2016). Additionally, the properties of the cephalosporin class offer benefits to patients because they can damage bacterial cell structures without harming human cells, have a broad spectrum of activity, and exhibit limited bacterial resistance (Yan Marvellini & Tesalonika Bunga Ria Sagala, 2020).

Cephalosporins are the treatment of choice because the first-line antimicrobial, chloramphenicol, can no longer be used as a first-line drug due to its association with high recurrence rates and side effects. One of the dangerous side effects of chloramphenicol is bone marrow depression, which can lead to aplastic anemia and inhibition of red blood cell formation (Oktavia, 2020). The emergence of resistance to first-line antibiotics (chloramphenicol, ampicillin, and co-trimoxazole) was first reported in Asia in the 1980s and has since spread widely. The spread of resistance has led to ceftriaxone and ciprofloxacin becoming the drugs of choice for treating typhoid fever (NICD, 2022). Ciprofloxacin is the second most commonly used antibiotic after ceftriaxone in the treatment of typhoid fever. The use of ciprofloxacin has been reported to be effective, with a low rate of clinical recurrence (Dyson & others, 2019). Ciprofloxacin is recommended as the first-line treatment in settings with a low prevalence of fluoroquinolone resistance (NICD, 2022). Although fluoroquinolones achieve excellent penetration, rapid therapeutic response, and very low post-treatment carriage rates, bacterial strains resistant to them have emerged in Asia over the past decade (Chandankhede et al., 2022).

The most commonly used combination therapy was intravenous ceftriaxone and oral thiamphenicol, administered to 8 patients (7.69%). This was followed by intravenous ceftriaxone and oral cefixime, administered to 5 patients (4.80%).

Consistent with the study by (Puspasari et al., 2020) the most commonly used antibiotic regimen was the combination of IV Ceftriaxone and PO Tiamfenicol, accounting for 63.5% (33 patients) (Sari et al., 2023). The mechanism of action of the combination of IV Ceftriaxone and PO Thiamphenicol is that ceftriaxone inhibits cell wall synthesis, thereby facilitating thiamphenicol's ability to prevent the synthesis of the relevant bacterial proteins—specifically, by inhibiting the translation and transcription of genetic material (Prawesti et al., 2022). The administration of combination antibiotics can help reduce the risk of severe complications in patients with typhoid fever. Another reason for prescribing combination antibiotics is that many cases of typhoid fever are caused by strains of *Salmonella typhi* that are resistant to single-agent antibiotics. The use of combination antibiotics can help address these strains, such as the use of fluoroquinolones in combination with amoxicillin to treat Multidrug-Resistant (MDR) strains. The antibiotics used for the treatment of typhoid fever at Abdul Aziz Hospital in Singkawang belong to the second-line class of antimicrobials for typhoid fever. The use of these second-line antimicrobials is appropriate and should be considered if treatment with first-line antimicrobials is deemed ineffective. A study conducted by (Umair & Siddiqui, 2020) recommended the use of third-generation cephalosporins as empirical therapy and for the treatment of multidrug-resistant (MDR) enteric fever cases. The results of the study conducted by Umair showed a higher sensitivity rate to ceftriaxone compared to chloramphenicol (Umair & Siddiqui, 2020).

In this study, oral antibiotics such as Azithromycin PO were rarely prescribed (0.96%), and Cefixime PO was not the primary choice for hospitalized patients. Clinically, oral single-drug therapies using Cefixime PO or Azithromycin PO are heavily utilized worldwide for the management of uncomplicated typhoid fever in out-patient settings to reduce catastrophic financial burdens and avoid unnecessary hospitalization (Basnyat et al., 2021).

Pharmacologically, Azithromycin PO provides excellent intracellular penetration, accumulating high concentrations inside phagocytic cells, making it a highly effective agent against Multidrug-Resistant (MDR) and Extensively Drug-Resistant (XDR) *Salmonella typhi* strains. On the other hand, although beta-lactams generally exhibit poor intracellular retention, Cefixime PO has been proven to effectively penetrate human monocyte cells and inhibit intracellular *Salmonella typhi* growth. Therefore, the minimal use of these oral agents in this hospital indicates that clinicians prioritize intravenous third-generation cephalosporins (IV Ceftriaxone) for immediate empirical control in acute inpatient care, reserving oral Azithromycin and Cefixime as secondary alternatives or step-down therapies once the patients achieve a stable, afebrile state.

CONCLUSION

The empirical utilization of antimicrobials for hospitalized typhoid fever patients at Dr. Abdul Aziz Singkawang Regional General Hospital demonstrates strong alignment with established clinical pathways, characterized by the predominant use of intravenous ceftriaxone (58.65%) and oral ciprofloxacin (15.38%). Clinically, this high adherence to third-generation cephalosporins and fluoroquinolones underscores their ongoing therapeutic efficacy in achieving optimal fever clearance, mitigating systemic complications, and ensuring predictable clinical outcomes in acute inpatient management. These findings imply that while the current empiric protocol remains highly reliable for local strains, the heavy reliance on these broad-spectrum agents necessitates continuous microbiological susceptibility surveillance to preserve long-term efficacy and robustly support the institutional antimicrobial stewardship initiatives against emerging resistance threats.

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CONFLICT OF INTEREST

No potential conflicts of interest have been reported.

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