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Comparison of Clinical Symptoms and Laboratory Findings in Typhoid Fever and Dengue Fever Patients

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Abstract: Background: Typhoid fever and dengue hemorrhagic fever (DHF) are two infections that often occur in tropical and subtropical areas, including Indonesia, with similar clinical symptoms but different pathogens. Accurate diagnosis is essential for proper management.
Objective: This study aims to analyze the differences in clinical symptoms and laboratory findings in typhoid fever and dengue fever patients at Aek Kanopan Regional Hospital, North Labuhan Batu Regency, North Sumatra.
Method: This research is an observational comparative study involving 100 patients diagnosed with typhoid fever and dengue fever during the period December 2023 to February 2024. Data on clinical symptoms and laboratory examination results were collected and analyzed using descriptive and inferential statistics.
Results: Results show that symptoms of stomach ache and headache are more common in typhoid fever patients, while rash and muscle pain are more prevalent in dengue fever patients. From a laboratory perspective, typhoid fever patients have an increased number of leukocytes (12,000 ± 3,500 cells/µL) compared to dengue fever (9,000 ± 2,000 cells/µL), while platelets in dengue fever patients are on average lower (45,000 ± 15,000 cells/µL) compared to typhoid fever (75,000 ± 20,000 cells/µL).
Conclusion: This study confirms the importance of understanding the clinical and laboratory differences between typhoid fever and dengue fever to improve the accuracy of diagnosis and patient management. These results contribute to the development of better clinical guidelines for managing febrile infections in areas with high prevalence.
Keyword: typhoid fever, dengue hemorrhagic fever, clinical symptoms, laboratory

I. INTRODUCTION

Typhoid fever and dengue hemorrhagic fever (DHF) are two infections that commonly occur in tropical and subtropical countries, including Indonesia. Typhoid fever is caused by a bacterial infection *Salmonella enterica* serovar Typhi, while dengue fever is caused by dengue virus infection which is transmitted through mosquito bites *Aedes aegypti*. Both can cause similar clinical symptoms, such as high fever, headache, and general discomfort, often posing challenges in correct diagnosis. Quick and effective treatment is very important, considering that both of these diseases can progress to serious complications if not treated properly [1].

The importance of understanding the clinical symptoms and laboratory findings in these two diseases cannot be overemphasized. Typhoid fever is often characterized by ongoing fever, bradycardia, and gastrointestinal symptoms such as nausea and diarrhea. Meanwhile, dengue fever is characterized by high fever accompanied by bleeding, severe muscle pain, and a significant decrease in platelet count. In some cases, the similarity of symptoms between the two diseases can result in misdiagnosis, which in turn can result in delays in appropriate therapy and increased risk of morbidity or mortality for the patient [2].

Previous studies have shown that there are significant differences in laboratory findings between typhoid and dengue fever patients. For example, typhoid fever patients usually show an increase in the number of leukocytes in the blood, while dengue fever patients generally experience a significant decrease in the number of platelets. These findings can be used to support the diagnosis and guide the necessary therapeutic steps. However, more in-depth comparative studies regarding clinical symptoms and laboratory results in these two types of infection are still relatively limited [3].

Therefore, this study aims to conduct a comparative analysis between typhoid fever and dengue fever patients by focusing on two main aspects: clinical symptoms and laboratory findings. Through this study, it is hoped that we can identify specific patterns that differentiate these two diseases, thereby increasing the accuracy of medical diagnosis. By recognizing these differences, physicians can more quickly respond and provide appropriate care to patients [4].

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By considering the urgency in treating this infection and the impact it has on public health, this research is expected to contribute to the development of better clinical guidelines in the management of typhoid fever and dengue fever patients. The findings from this study can provide valuable insights for health workers in facing diagnostic and strategic challenges in the management of these two diseases [5].

II. METHODS

A. Research Design

This research is an observational comparative study which aims to analyze differences in clinical symptoms and laboratory findings between patients with typhoid fever and dengue hemorrhagic fever. The research was carried out at Aek Kanopan Regional Hospital, North Labuhan Batu Regency, North Sumatra, Indonesia.

B. Population and Sample

The population in this study were all patients treated at Aek Kanopan Regional Hospital with a diagnosis of typhoid fever or dengue fever. The research sample consisted of 100 patients, who were divided into two groups: 50 patients with typhoid fever and 50 patients with dengue fever. Sample selection was carried out consecutively, namely by taking patients who met the inclusion and exclusion criteria during the study period which lasted from December 2023 to February 2024.

1) Inclusion Criteria:

a) Patients ranged in age from 2 to 60 years.
b) Patients diagnosed with typhoid fever based on laboratory examination results (titif) or dengue fever based on serological blood examination results (NS1 antigen, IgM, and IgG).
c) New patients treated within 48 hours before data collection.

2) Exclusion Criteria:

a) Patients with other infections that can affect the test results.
b) Patients with a history of chronic diseases that affect the immune response (eg, diabetes mellitus, chronic kidney disease).
c) Patients who have received antibiotic or antiviral therapy before admission to hospital.

C. Data Collection

Demographic data, clinical symptoms, and laboratory results were recorded from the patient's medical record. Clinical symptoms were collected through medical interviews and physical examinations carried out by doctors. Laboratory parameters analyzed include leukocyte count, platelet count, hematocrit value, and liver function test results (SGOT and SGPT).

D. Data analysis

The data obtained were analyzed using statistical software (e.g., SPSS). Analysis is carried out by:

1) Descriptive Statistics: Provides summary data for each group, including frequency of clinical symptoms and mean and standard deviation (SD) values for laboratory parameters.
2) Inferential Statistics: Chi-Square test will be used to analyze differences in clinical symptoms between the two groups. The t test or Mann-Whitney test will be used to compare laboratory parameter values between typhoid fever and dengue fever patients, depending on the data distribution.

III. RESULT

A. Demographic Characteristics of Respondents

A total of 100 patients who met the inclusion criteria were recruited in this study, consisting of 50 typhoid fever patients (50%) and 50 dengue fever patients (50%). Table 1 shows the demographic characteristics of the patients.

Table 1. Patient Characteristics

Characteristics	Typhoid Fever (n=50)	Dengue Fever (n=50)	Total (n=100)
Average Age (years)	30 ± 10	28 ± 9	29 ± 9
Gender (M/F)	30/20	28/22	58/42

B. Clinical Symptoms

Table 2 presents data regarding the clinical symptoms experienced by patients. All patients in both groups had fever. In typhoid fever patients, symptoms of headache (60%), stomach ache (70%), and muscle pain (50%) are the most commonly reported. In contrast, in dengue fever patients, symptoms of muscle pain (70%) and rash (60%) were the most dominant.

Table 2. Comparison of Clinical Symptoms between Typhoid Fever and Dengue Fever Patients

Clinical Symptoms	Typhoid Fever (n=50)	Dengue Fever (n=50)	p value
Fever	50 (100%)	50 (100%)	-
Headache	30 (60%)	20 (40%)	0.048
Muscle Pain	25 (50%)	35 (70%)	0.071
Stupid	10 (20%)	30 (60%)	0.001
Nausea and Vomiting	20 (40%)	15 (30%)	0.327
Diarrhea	15 (30%)	10 (20%)	0.284
Stomach ache	35 (70%)	20 (40%)	0.004
Fatigue	40 (80%)	45 (90%)	0.321

C. Laboratory Findings

Table 3 shows a comparison of laboratory examination results between the two patient groups. The average number of leukocytes in typhoid fever patients was 12,000 ± 3,500 cells/µL, while in dengue fever patients it was 9,000 ± 2,000 cells/µL ($p < 0.001$). The average platelet count in typhoid fever patients was 75,000 ± 20,000 cells/µL, while in dengue fever patients it was lower, namely 45,000 ± 15,000 cells/µL ($p < 0.001$).

Table 3. Comparison of Laboratory Findings between Typhoid Fever and Dengue Fever Patients

Laboratory parameters	Typhoid Fever (n=50)	Dengue Fever (n=50)	p value
Leukocyte Count	12.000 ± 3.500	9.000 ± 2.000	<0.001
Platelet Count	75.000 ± 20.000	45.000 ± 15.000	<0.001
Hematocrit (%)	39 ± 5	35 ± 6	0.015
Liver Function (SGOT)	45 ± 12	60 ± 15	0.002
Liver Function (SGPT)	50 ± 10	75 ± 20	<0.001

IV. DISCUSSION

This study succeeded in illustrating clear differences in clinical symptoms and laboratory findings between typhoid fever and dengue hemorrhagic fever patients. From the results obtained, it was found that symptoms of headache and stomach ache were more common in typhoid fever patients, while symptoms of rash and muscle aches were more prevalent in dengue fever patients. These findings are in line with previous studies, which also reported that dengue fever patients often experienced muscle aches and rashes, while gastrointestinal symptoms were more frequently seen in typhoid fever patients. These findings emphasize that a deep understanding of these symptoms is essential to improve the accuracy of diagnosis of both diseases [6].

In terms of laboratory results, this study shows that the number of leukocytes in typhoid fever patients increases significantly compared to dengue fever patients.

This is in line with previous research, which found that typhoid fever patients had leukocytosis, indicating an inflammatory response to bacterial infection. In contrast, the significant decrease in platelet count in dengue patients, reported in this study, suggests a deterioration in the hemostasis system caused by dengue virus, which is a common finding in the literature [7,8].

Differences in clinical symptoms and laboratory results between the two diseases may be influenced by the pathogenesis of each causative agent. *Salmonella enterica* serovar Typhi induces a different immune response in its host compared to dengue virus. The process of bacterial invasion in typhoid fever stimulates the production of more inflammatory cells, resulting in the increase in leukocyte numbers seen in this study. Meanwhile, dengue, which is a viral infection, emphasizes damage to endothelial cells and activation of a more complex immune system, which causes a decrease in platelets in response to hemostasis dysfunction [9].

The results of this study showed consistent results in terms of differences in clinical and laboratory symptoms, but several other factors could explain the variations found.

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For example, patient demographic characteristics such as age and nutritional status may influence the response to infection, which in turn may influence the clinical presentation. In this study, the majority of patients were between 20 and 40 years of age, which is a group frequently affected by this infection, and a less than optimal health history may contribute to the severity of symptoms [10].
Additionally, the initial treatment approach taken by the patient before entering the hospital may also influence laboratory findings. Some patients may have received antibiotics or other medications that could affect their blood test results. Given the challenges in early diagnosis and treatment, it is important to conduct further research to understand the clinical and laboratory variability between these two infections more thoroughly [11].
Overall, the findings of this study highlight the importance of appropriate and prompt treatment for patients with fever symptoms to prevent misdiagnosis. Further research involving larger sample numbers and longitudinal analysis may provide deeper insight into pathogenesis as well as help in the development of more effective clinical guidelines for diagnosis and therapy for typhoid and dengue fever patients [12].

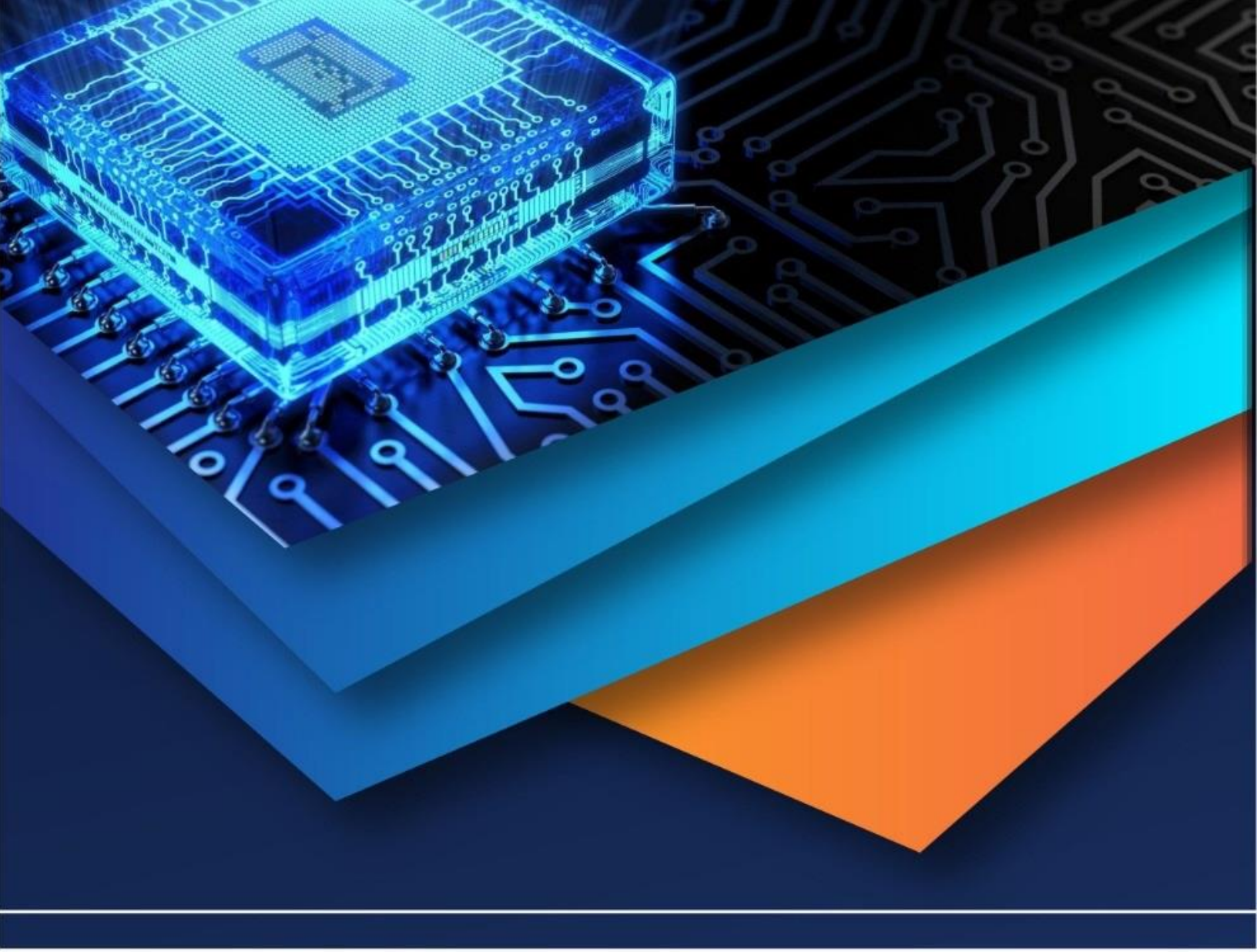
V. CONCLUSION

This study shows significant differences in clinical symptoms and laboratory findings between typhoid fever and dengue fever patients, where symptoms such as abdominal pain and headache are more prevalent in typhoid fever, while rash and muscle pain are more common in dengue fever. Laboratory results also show an increase in the number of leukocytes in typhoid fever patients and a decrease in the number of platelets in dengue fever patients. These findings emphasize the importance of a deep understanding of the clinical and laboratory differences between the two diseases to improve diagnostic accuracy and treatment effectiveness, and highlight the need for further research to refine clinical guidelines for managing these infections.

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