STUDY OF PLATELOCYTE COUNT ON PATIENT FEVER TYPHOID AT BAITURRAHIM JAMBI HOSPITAL

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ABSTRACT

Background: Typhoid fever is an infectious disease caused by the bacteria Salmonella typhi. The highest prevalence distribution of typhoid fever is aged 5-14 years (1.9%). Typhoid fever can cause thrombocytopenia. In typhoid fever, thrombocytopenia usually occurs in the second week (week of complications). Thrombocytopenia is caused by endotoxin from the Salmonella typhi bacteria. Study this is purposeful to find out the average – average picture and differences in quantity platelets on patient typhoid fever based on category age and duration of fever.

Method: Method used in this research was a cross-sectional method with an Independent T data analysis test using the IBM SPSS tool. The total sample was 30 people taken using purposive sampling technique.

Results: The results of statistical tests show that the average number of platelets by age category, the low platelet count is found at the age of 6 - 11 years (children) (155.437,50/μL) and the average high platelet count is found at the age of 12 - 25 years (teens) (226.071,43/μL). Meanwhile, the average number of platelets in the fever duration category was found to have a low platelet count, namely fever duration $\geq$ 7 days (141.071,43/μL) and a high average platelet count was found for fever duration $<$ 7 days (229.812,50/μL).

Conclusion: There is a significant difference between age and duration of fever and the number of platelets in typhoid fever patients, namely that $p < \alpha$ (0.05) is indicated by the p-value based on age = 0.002 and the p-value based on fever duration = 0.000.

Keywords: Typhoid Fever; Platelets; Age; Duration of Fever

INTRODUCTION

Typhoid fever caused by salmonella typhi bacteria, where individuals have the potential to become infected through food or drink contaminated with these bacteria (foodborne disease). The Salmonella typhi bacteria that causes typhoid fever attacks mainly in the ileocecal area (part of the small intestine) with typical symptoms, namely experiencing fever for one week or more, digestive disorders, impaired consciousness and serious complications in the form of sepsis (Rahmat et al., 2019) . According to World Health data from the World Health Organization (WHO) 11 to 21 million cases of typhoid fever are estimated in 2020, along with approximately 128,000 to 161,000 deaths per year. Based on the Health Research and Development Agency of the Republic of Indonesia (2018) , the prevalence of typhoid fever in Indonesia has reached 1.7%. The highest prevalence distribution is aged 5-14 years (1.9%).

Typhoid fever can cause thrombocytopenia. This condition prolongs healing of the disease (Febriani et al., 2019) . In typhoid fever, thrombocytopenia is common , with a reported incidence of up to 26% in children (Reesi et al., 2016). Thrombocytopenia in typhoid fever is caused by endotoxin from Salmonella typhi bacteria which stimulates products from macrophages to attack the bone marrow, this results in decreased production and maturation stages of platelets (Handayani, 2020) .In the development of typhoid fever, the second week is usually described as the week of complications. Thrombocytopenia is the most

common complication of typhoid fever (Widary et al., 2022) .

Platelets are blood cells that play an important role in hemostasis. Platelets attach to the endothelial lining of torn blood vessels (wounds) by forming a platelet plug. Platelets do not have a nucleus, measure 1-4 μ , and their cytoplasm is blue with reddish-purple granules. The normal number of platelets is 150.000 - 400.000/μL (Kiswari, 2014) .

Based on research conducted by (Situmorang et al., 2022) , regarding the frequency distribution of platelet counts in typhoid fever patients, it shows that out of 33 samples of typhoid fever sufferers, 16 samples (48.5%) were found to have low platelet counts. There were 15 samples with normal platelet counts (45.5%). There were 2 samples with high platelet counts (6.1%). So the highest number of platelets in typhoid fever sufferers are samples with low platelet counts and the lowest are samples with high platelet counts.

METHODS

This type of research uses a descriptive method with a cross-sectional approach, examining platelet counts using an automatic method using a Hematology Analyzer.

This study used a sample of patients diagnosed with typhoid fever in the inpatient ward of Baiturrahim Hospital, Jambi City in 2024. Using a purposive sampling technique.

RESULTS AND DISCUSSION

Based on table 1. of 30 respondents, it shows the distribution with age characteristics, the 6 - 11 year old category (children) has a higher percentage (53.3%) compared to category age 12 – 25 years (adolescents) (46.7%). Respondents with male gender have a smaller percentage (40%) than the female gender category (60%). Length of hospitalization < 7 days has a smaller percentage (23.3%) than length of stay ≥ 7 days

(76.7%). The fever duration category < 7 days had a higher percentage (53.3) than the fever duration category ≥ 7 (46.7%).

Table 1. Characteristics of Respondents

Characteristics		Frequency	Percentage (%)
Age		n=30	
	6 – 11 years (children)	16	53,3
	12 – 25 years (teen)	14	46,7
Gender		n=30	
	Male	12	40
	Female	18	60
Length of Hospitalization	< 7 day	23	76,7
	≥ 7 day	7	23,3
Duration of Fever	< 7 day	16	53,3
	≥ 7 day	14	46,7

Table 2. Description of platelet count in inpatients with typhoid fever based on age

Variable	N	Mean	Min	Max	Std. Deviation	P-value
6-11 years	16	155437,50	105000	204000	33206,362	
12-25 years	14	226071,43	106000	298000	65297,502	0.002
Total	30	188400,00	105000	298000	61369,767	

Table 3. Description of platelet count in inpatients with typhoid fever based on fever duration

Variable	N	Mean	Min	Max	Std. Deviation	P-value
< 7 day	16	229812,50	159000	298000	50141,425	
≥ 7 day	14	141071,43	105000	189000	31266,754	0.000
Total	30	188400,00	105000	298000	61369,767	

Results of platelet count research on Typhoid fever patients were conducted on 30 samples, it was found that the majority of respondents were female, namely 18 people and the number of male respondents was 12 people. This is in line with research conducted by Mustofa et al. (2020) typhoid fever can occur in all genders, both women and men and this is not an indication that the incidence of typhoid fever is more in women than men, it is possible that more patients who are hospitalized are women. Typhoid fever is closely related to personal hygiene and poor food hygiene, as well as a dirty environment so that typhoid fever can happen to anyone.

Based on table 1, it was found that the most respondents were in the 6 - 11 year age category (children) with a percentage (53.3%) compared to the 12 - 25 years age category (adolescents), namely the percentage (46.7%) The results of this study are in line with research conducted by Rahmat et al. (2019)

which states that there is an age group of children Often snacking at school or outside the home , at this age children still pay less attention to personal hygiene and have the habit of snacking carelessly which can basically cause the transmission of typhoid fever.

The characteristics of respondents with the highest length of stay were respondents with a length of stay < 7 days, namely 23 people, compared to the number of respondents with a length of stay ≥ 7 days, namely 7 people. This is in line with research conducted by Laode et al. (2021) the length of treatment time can be used as a measure of the performance of a hospital's health services. The length of patient treatment can assess the efficiency of a health service, where the average length of treatment that is considered efficient according to medical service standards is 3 - 5 days.

This research aims to determine the description and differences in platelet counts in typhoid fever patients based on age and duration of fever . Based on the results of data analysis, the average was obtained average platelet count in age category 6 - 11 years (children) lower, namely 155.437,50/µL, while the average age 12 - 25 years (teenagers) is higher, namely equal to 226.071,43/µL. Statistically, from the results of the independent T test, it was found that there were significant differences between the two age categories, this was indicated by the p.value = 0.002. The results of this study are in line with research conducted by Umami et al. (2023) , namely the results of platelet counts in typhoid fever where thrombocytopenia occurs more frequently in the <12 year age category compared to the 12 - 25 year age category. At the age of <12 years , children are very susceptible to various diseases, while the immune system in typhoid fever sufferers can affect the number of platelets in the body (Umami et al., 2023) . If the immune system of a typhoid fever sufferer is good enough then The hematology results were still within normal limits. (Handayani & Mutiarasari,

2017). Thrombocytopenia is relatively common in typhoid fever, with a reported incidence of up to 26% in children - child (Reesi et al., 2016) .

Based on the results of data analysis , it was found that the average number of platelets in the category of fever duration < 7 days was higher, namely 229.812,50/µL. Meanwhile, in the category of fever duration ≥ 7 days it was lower, namely 141.071,43/µL. Statistically, From the results of the independent T test, it was found that there was a significant difference between the two categories of fever duration, this was indicated by the p.value = 0.000. This is in line with research by Widary et al. (2022) which states that the platelet count at the start of typhoid fever usually does not decrease so drastically that it is found that the platelet count is within normal limits. In the development of typhoid fever, the second week is usually described as the week of complications. Thrombocytopenia is the most common complication of typhoid fever. The results of this research are also in line with research by Febriani et al. (2019) , namely someone who experiences a fever duration of <7 days, the platelet count is still within normal limits, compared to someone who experiences a fever duration of ≥ 7 days. This is because the amount of endotoxin in the body of a typhoid fever sufferer affects the duration of the fever . If the amount of endotoxin is still small or has not reached the toxic limit, then the effect of endotoxin is not too bad, indicating that the typhoid fever patient has a fever duration of <7 days. Endotoxin will have a bad impact if the amount is large enough. The amount of endotoxin present in the bodies of typhoid fever sufferers varies, causing variations Platelet counts vary too.

Endotoxin itself is a toxin complex that is only found in the cell walls of gram-negative bacteria such as salmonella typhi which can cause fever (Hashmi & Thakur, 2019) . Low platelets in typhoid sufferers are caused by the endotoxin of the Salmonella typhi bacteria

which stimulates macrophages to release their products, namely cytokines (interleukins and tumor necrosing factor) and mediators (histamine, bradykinin, serotonin). The products released by macrophages will attack the bone marrow. As a result of the attack on the bone marrow, the production of the number of platelets and the stage of platelet maturation is reduced (decreased) which can cause thrombocytopenia (Handayani, 2020) . Factors that influence differences in the number of platelets in each patient's blood sample include different immune systems, different nutritional intake, the presence of other diseases, duration of illness, vaccination and administration of antibiotics Widary et al. (2022) .

CONCLUSION

Based on the results of research describing the number of platelets in typhoid fever patients at Baiturrahim Hospital Jambi, it can be concluded that the average number of platelets in typhoid fever patients based on age is in category 6 - 11 years (children) is lower, namely 155.437,50/µL compared to the age category 12 - 25 years (teenagers) namely 226.071,43/µL. The average number of platelets in typhoid fever patients based on fever duration in the < 7 days category was higher, namely 229.812,50/µL compared to the duration of fever with the category ≥ 7 days namely 14.,071,43/µL. There are significant differences between age and duration of fever with platelet count in typhoid fever patients.

It is hoped that future researchers will be advised to add or expand other variables such as antibiotic categories, history of other diseases, and length of stay. For typhoid fever patients, they can maintain the body's immune system by eating healthy foods and consuming fruit as well as maintaining personal hygiene and the surrounding environment.

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CONFLICT OF INTEREST

The author declares there is no conflict of interest.

REFERENCES

Febriani, S., Rosyidah, DU, Hernawan, B., & Risanti, E. (2019). The relationship between leukocyte levels and platelet levels and duration of fever in pediatric typhoid fever patients. *BIOMEDIKA, Faculty of Medicine Journals* , *January 2018* , 978–984.

Handayani. (2020). *Systematic Review: Relationship between Immunoglobulin Macroglobulin (IgM) and Immunoglobulin Gamma (IgG) with Thrombocytopenia in Typhoid Fever* . 1–13.

Handayani, NPDP, & Mutiarasari, D. (2017). Characteristics of Age, Gender, Fever Level, Hemoglobin, Leukocyte and Platelet Levels of Typhoid Fever Sufferers in Pediatric Patients at Anutapura Hospital in 2013. *MEDIKA TADULAKO, Medical Scientific Journal* , *4* (2), 30–40. Jurnal.untad.ac.id/jurnal/index.php/MedikaTadulako/article/view/9285.

Hashmi, F., & Thakur, A. (2019). *Bacterial Endotoxin Test using the Gel-Clot Method . April* , 564–567.

Kiswari, R. (2014). *Hematology & Transfusion* (C. Sally & R. Astikawati (eds.)).

Laode, MISP, Nasruddin, H., Surdam, Z., Nurelly, & Syahril, E. (2021). Characteristics of typhoid fever patients at Ibnu Sina Hospital Makassar. *Wal'afiat Hospital Journal* , *02* (02), 141–148.

Mustofa, FL, Rafie, R., & Salsabilla, G. (2020).

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2024

Characteristics of Typhoid Fever Patients in Children and Adolescents. *Sandi Husada Health Scientific Journal* , *12* (2), 625–633. https://doi.org/10.35816/jiskh.v12i2.372

Rahmat, W., Akune, K., & Sabir, M. (2019). Typhoid Fever Complicated by Sepsis: Definition, Epidemiology, Pathogenesis, and a Case Report. *Journal of the Medical Profession (MedPro)* , *3* (3), 264–276.

Reesi, A. M., Stephens, G., & McMullan, B. (2016). Severe thrombocytopenia in a child with typhoid fever: a case report. *Journal of Medical Case Reports* , *10* (1), 1–4. https://doi.org/10.1186/s13256-016-1138-6 .

Republic of Indonesia Health Research and Development Agency. (2018). 2018 National Riskesdas Report.pdf. In *Balitbangkes Publishing Institute* (p. p. 156).

Situmorang, PR, Simanullang, TR, & Bangun, SR (2022). Analysis of Leukocyte and Platelet Counts in Typhoid Fever Patients at Santa Elisabeth Hospital Medan in 2022. *PANNMED Scientific Journal (Pharmacist, Analyst, Nurse, Nutrition, Midwifery, Environment, Dentist)* , *17* (3), 527–532. https://doi.org/10.36911/pannmed.v17i3.1488.

Umami, M., Karneli, K., Refai, R., Hermansyah, H., Mutholib, A., & Nurhayati, N. (2023). Portrait of the Number of Platelets in Typhoid Fever Sufferers at the Siti Khadijah Islamic Hospital, Palembang City. *Journal of Medical Laboratory and Science* , *3* (1), 10–17. https://doi.org/10.36086/medlabscience.v3i1.1665

Widary, BL, Danuyanti, IGAN, & Zaetun, S. (2022). Correlation of Widal Titer with the Number and Platelet Index of Typhoid Fever Sufferers in West Lombok Regional Health Centers. *Andalas Health Journal* , *10* (3), 138. https://doi.org/10.25077/jka.v10i3.1792

World Health Organization. (2020). Typhoid and other invasive salmonellosis. *Online*, 1–13. http://www.who.int/immunization/monitoring_surveillance/burden/vpd/WHO_SurveillanceVaccinePreventable_21_Typhoid_R2.pdf?ua=1