ISSN:xxxx-xxxx

Proceedings of the 1st ACEH INTERNATIONAL CONFERENCE ON HEALTH Poltekkes Kemenkes Aceh November 10-11, 2024, Banda Aceh, Indonesia

DESCRIPTION OF LEUKOCYTE COUNT AND ERYTHROCYTE SEDIMENTATION RATE (LED) VALUES IN TYPHOID FEVER PATIENTS

Nur Ade Marscella[1], Irwana Wahab[2]
[1,2]Poltekkes Kemenkes Aceh

***** Corresponding email: *nurademarschella@gmail.com*, *irwanawahab1969@gmail.com*

ABSTRACT

Typhoid fever is an infection caused by the bacteria Salmonella typhi. It is usually spread through contaminated food or drink. Typhoid fever infections are present worldwide, and the prevalence is high in developing countries, especially in the tropics. Typhoid fever is endemic. Symptoms range from mild to severe, which can be characterized by a number of complications. Diagnosis is made based on clinical symptoms, physical examination and supporting examinations, including laboratory examinations. The purpose of this study was to determine the number of leukocytes and the value of ESR in patients with typhoid fever at Pertamedika Ummi Rosnati Hospital, Banda Aceh. This study is a descriptive study, which aims to describe or provide an overview of each research variable. Of all respondes (21) the number of leukocytes at a normal level is (66.7%) with an average value of 6.59 cells / mm3. And there are (33.3%) respondents who have a high leukocyte count, with an average value of 12.35 cells/mm3. And of all respondents (21) all respondents had normal ESR values (100%). Of all respondents (21) the majority had leukocyte counts at a normal level, namely 14 people. And 7 respondents had a high leukocyte count. And of all respondents (21) had a normal ESR value of 21 people.

Keywords: *Typhoid Fever, Leukocytes, Erythrocyte Sedimentation Rate*

INTRODUCTION

According to the World Health Organization (WHO) in 2023 typhoid fever is an infection caused by Salmonella Typhi bacteria. It is usually spread through contaminated food or drink. Typhoid fever infection is present worldwide, and the prevalence is high in developing countries, especially in tropical areas. The number of typhoid fever cases in the world is around 21 million cases with a mortality rate of 128,000-161,000 per year. While in Indonesia, typhoid fever cases range from 358-810/100,000 population. The incidence of typhoid fever shows an increase from year to year with an average

incidence of 500/100,000 population with a mortality rate of around 0.6-5% (Widat, Jumadewi and Hadijah, 2022).

Meanwhile, typhoid fever cases in Aceh in 2020 totaled 891 cases with 1 death (Kusmayati and Putri, 2022). Meanwhile, the number of typhoid fever in Aceh Province or Banda Aceh is among the highest cases at 344.7 per 100,000 population (Widat et al., 2022). Typhoid fever is endemic. Symptoms vary from mild to severe clinical symptoms, which can be characterized by a number of complications. Some cases of typhoid fever can end in death. Diagnosis is made based on clinical symptoms, physical examination and supporting examinations, including laboratory examinations (Marzalina, 2019).

The types of laboratory examinations to diagnose typhoid fever include widal examination, TF tubex, peripheral blood examination, bile culture and Blood Sedimentation Rate (ESR) or ESR (Erythrocyte Sedimentation Rate) or BSR (Blood Sedimentation Rate) is one of the routine examinations for blood and to determine the level of inflammation in a person's body (Yuswardi W et al., 2021). To diagnose a patient with typhoid fever, a leukocyte count examination must be carried out, which is a peripheral blood examination to determine whether there is an attachment or relationship between normal leukocyte counts and the incidence of typhoid fever. Examination of the number of leukocytes is a clue to infection. If the patient's leukocytes increase or decrease more than the normal value limit, it is relatively a strong suspicion that someone has an infection. The normal leukocyte count is (10,000/mm3) if it is higher or lower than the normal limit, there will be a condition of leukocytosis or leukopenia that needs to be watched out for in typhoid fever patients (Widat et al., 2022).

Another supporting examination is that typhoid fever patients are also examined for blood sedimentation rate (ESR), which is a process of examining blood sedimentation. ESR is a laboratory value in the evaluation of infection, inflammation and malignant disease. To determine the presence of inflammation in the intestine which can cause the ESR to increase. The high value of ESR in typhoid fever means that the blood viscosity is also high, which is dangerous for the heart and nervous system (Yuswardi W et al., 2021). The determination of results for normal ESR values is 0 to 15 mm/hour for women and 0 to 10 mm/hour for men (Susanti, 2022). If the ESR value is more than the normal value, the ESR is declared to be elevated, which can be an estimate of a person experiencing intestinal inflammation caused by Salmonella bacteria if the ESR value exceeds the normal reference value level.

According to data obtained by researchers from Pertamedika Ummi Rosnati Banda Aceh Hospital, the number of typhoid fever patients who underwent hospitalization in 2022 amounted to 282 patients. Then in 2023 the number of typhoid fever patients who underwent hospitalization amounted to 886 patients. Within a year there was a very drastic increase in typhoid fever patients, namely an increase in the number of patients by 604 patients. From the description above, the researcher is interested in conducting research on the description of the number of leukocytes and the value of ESR in typhoid fever patients at Pertamedika Ummi Rosnati Hospital in Banda Aceh, because from the data obtained at Pertamedika Ummi Rosnati Hospital in Banda Aceh, typhoid fever cases at the hospital continue to increase every year.

METHODS

The type of research used is descriptive research, where this study aims to describe or provide an overview of the number of leukocytes and the value of ESR in typhoid fever patients based on the results of blood tests at Pertamedika Ummi Rosnati Hospital Banda Aceh. This research was conducted at Pertamedika Ummi Rosnati Hospital, Banda Aceh City. On April 15 to 29, 2024. The population in this study were all typhoid fever patients treated at Pertamedika Ummi Rosnati Hospital Banda Aceh. At the time of the research, the number of samples taken in this study using the Lameshow formula and the results obtained were 21 people. The technique used in sampling is non probability sampling technique. The steps of this study were carried out by taking the patient's venous blood followed by a typhoid fever examination using the slide method widal test, then a leukocyte examination using a sysmex hematology analyzer, and finally a blood ESR examination using the westergren method. The data obtained from the study of leukocyte counts and ESR values are primary data obtained from examinations conducted at Pertamedika Ummi Rosnati Hospital in Banda Aceh. Data analysis in this study used univariate analysis using the relative frequency formula (Fr). The data in this study will be presented in the form of a frequency distribution table.

RESULTS AND DISCUSSION

After conducting research on the correlation of leukocyte counts and ESR values in typhoid fever patients at Pertamedika Ummi Rosnati Banda Aceh hospital on April 15 to 29, 2024, the following results were obtained.

Table 1.
The Results Of The Study Of Leukocyte Counts And ESR Values In Typhoid Fever Patients At Pertamedika Ummi Rosnati Hospital, Banda Aceh.

Variabel	Frekuensi	Presentase (%)
Leukocyte Count		
≤ 4.000 sel/mm3		
4.000 – 10.000 sel/mm3	14	66,67%
≥10.000 sel/mm3	7	33,33%
Total	**21**	**100%**
Sedimentation Rate (ESR) value		
0-15 mm/ hours (Male)	9	42,85%
0-20 mm/ hours (female)	12	57,15%
Total	**21**	**100%**

Based on the table of the 21 respondents, the majority had a normal leukocyte count, namely 14 people (66.7%) with an average value of 6.59 cells/mm3. And there were 7 respondents who had a high leukocyte count, namely (33.3%) with an average value of 12.35 cells/mm3. All respondents had normal ESR values (100%). From the results of the study of leukocyte counts and ESR values in typhoid fever patients at Pertamedika Ummi Rosnati Banda Aceh hospital, the following results were obtained:

Based on table 1. Shows that of the 21 respondents had a normal leukocyte count, namely 14 people with a percentage of 66.7%. Which means that there is no increase in the number of leukocytes in these typhoid fever patients. This is in line with research (Widat et al., 2022) found a normal leukocyte count of 80%, which means typhoid fever can occur at normal leukocyte levels.

Normal leukocytes in typhoid fever patients are also called mild leukocytosis, which is accompanied by fever or increased body temperature. In addition, the length of treatment and medication also determine the leukocyte count. Based on the case, a normal leukocyte count in typhoid fever patients may occur because the patient has received previous treatment, so they do not experience bone marrow suppression and intestinal bleeding or the leukocyte count has increased from normal. In addition, balanced nutritional intake also affects the process of leukocyte cell formation (Widat et al., 2022). While the level of leukocyte count above normal is thought to be due to the continued infection because the Salmonella typhi bacteria have not been successfully killed by antibiotics. Factors that affect the increase in leukocyte counts in typhoid fever patients indicate an infection in the patient's body, leukocytes will

increase to initiate and maintain the body's defense mechanisms in overcoming infection (Widat et al., 2022).

Typhoid fever patients showed normal ESR values as much as 100%. This study obtained different results from previous research conducted by (Yuswardi W et al., 2021) which stated that the value of ESR results in typhoid fever patients was high, namely 70%. In examining the value of ESR in typhoid fever patients, it can produce different values depending on the typhoid fever suspect. The higher the widal titer, the lower the examination results, but there are several typhoid fever patients with high titers but the results of the examination on the ESR value are normal and high. This occurs due to differences in the patient's immune response and the level of resistance to these bacteria. As well as other infections caused not by typhoid fever (Xena & Aliviameita, 2020).

CONCLUSION

The conclusion of this study is that the majority of typhoid fever patients at Pertamedika Ummi Rosnati Banda Aceh hospital have leukocyte counts and ESR values at normal levels.

Suggestion, To medical staff at Pertamedika Ummi Rosnati Hospital Banda Aceh to continue to ensure and maintain the number of leukocytes and the value of ESR of patients (+) typhoid fever remains within normal limits.

ACKNOWLEDGEMENT

The author would like to thank the Director of the Poltekkes Kemenkes Aceh and the Supervising Lecturer as well as the Director of the Pertamedika Ummi Rosnati Banda Aceh Hospital for allowing research to be conducted.

REFERENCES

Ani, J., Lumanauw, B., & Tampenawas, J. L. A. (2021). The Influence of Brand Image, Promotion and Service Quality on Consumer Purchase Decisions on Tokopedia E-Commerce in Manado City. EMBA Journal, 9(2), 663-674.

Aprilia, L. (2022). Overview of Leukocyte Counts in Patients with Typhoid Fever Systematic Review. http://ecampus.poltekkes-medan.ac.id/xmlui/handle/123456789/7001

Dwiningtyas, S. F., Woelansari, E. D., & Suhariyadi. (2022). Picture of Leukocyte Cell Counts with a History of Typhoid Fever in College Students. 1, 1-5.

Khairunnisa, S., Hidayat, E. M., & Herardi, R. (2020). The Relationship of Leukocyte Count and Lymphocyte Percentage to Fever Level in Pediatric Patients with Typhoid Fever at Budhi Asih Hospital 2018 - October 2019. National Seminar on Medical Research (SENSORIK), 60-69. https://conference.upnvj.ac.id/index.php/sensorik/article/download/434/196

Kusmayati, E., & Putri, N. A. (2022). Typhoid Fever and Dengue Hemorrhagic Fever Grade II in Children. Galenical: Malikussaleh Student Journal of Medicine and Health, 1(4), 36. https://doi.org/10.29103/jkkmm.v1i4.9043

Levani, Y., & Prastya, A. D. (2020). Typhoid Fever: Clinical Manifestations, Therapeutic Options and Views in Islam. Al-Iqra Medical Journal: Journal of Scientific Medical Periodicals, 3(1), 10-16.

Maksura, A. (2021). Incidence of Typhoid Fever Based on Serological Examination at Hasanuddin University Hospital Makassar, Tamalanrea Jaya Health Center and Tamalanrea Health Center in 2019-2020.

Marzalina, C. (2019). Laboratory examination for diagnostic support of typhoid fever. Cehadum Health Journal, 1(3), 61-68.

Natsir, M. (2019). Blood Specimen Collection Procedure (pp. 1-4). https://ppid.sumbarprov.go.id/images/2021/08/file/c4ca4238a0b923820dcc509a6f75849b-sop_pengambilan_darah_spesimen.pdf

Ningsih, S. (2020). Overview of Widal Examination in School Children Suspected of Typhoid Fever at the Badrul Aini Hospital Laboratory Medan. In Sustainability (Switzerland) (Vol. 14, Issue 2). http://www.unpcdc.org/media/15782/sustainableprocurementpractice.pdf%0Ahttps://europa.eu/capacity4dev/unep/document/briefing-note-sustainablepublicprocurement%0Ahttp://www.hpw.qld.gov.au/SiteCollectionDocuments/ProcurementGuideIntegratingSustainabilit

Puspitasari, A. A. (2019). Hematology Course Textbook. In Umsida Press (Issue 471). https://doi.org/10.1016/S1773-035X(15)30080-0

Rahayaan, H. S. (2022). Comparison of the results of the Westergren method of blood sedimentation rate (ESR) examination using 3.8% sodium citrate anticoagulant with EDTA anticoagulant. 8.5.2017, 2003-2005.

Salman, Y., Nadia, N., & Wahidah, R. (2021). Differences in Leukocyte Count Results with Modified Lime Juice (Citrus aurantifolia Swingle) and Vinegar Acid as a Substitute for Turk's Solution Composition. The Indonesia Journal of Health, 12(1), 12-15. http://journal.stikeshb.ac.id/index.php/jurkessia/article/view/559

Saputri, R., Rahimi, A., & Chiuman, L. (2022). Clinical Features of Typhoid Fever Compared with Tubex Test Results at Royal Prima Medan Hospital in January - December 2021. Journal of Education and Counseling, 4, 1349-1358. http://journal.universitaspahlawan.ac.id/index.php/jpdk/article/view/8419

Siska, A. (2020). Differences in Leukocyte Count Examination Results Between the Improved Neubauer Manual Method and the Automatic Hematology Analyzer Method at M. Natsir Solok Hospital.

Sukarmin, M., & Iqlima, D. (2019). Comparison of Blood Sedimentation Rate Measurement Results Using Manual and Automatic Methods. Journal of Health Management of Dr. Soetomo Hospital Foundation, 5(1), 1-5.

Sun, N. N. (2022). Error Analysis of Pre-analytical and Analytical Processes for Patient Serum Samples at Budhi Asih Hospital.

Susanti, E. W. (2022). Literature Review: An Overview of the Results of the Westergreen Method Led (Blood Stimulation Rate) Examination in Pulmonary Tuberculosis Patients. Unisa Yogyakarta, 1-11. http://digilib.unisayogya.ac.id/6638/1/1811304061_EkaWarniSusanti_Naskah Publications - Eka Warni..pdf

Widat, Z., Jumadewi, A., & Hadijah, S. (2022). Overview of Leukocyte Counts in Patients with Typhoid Fever. Healthy: Journal of Health Science Research Innovation, 1(3), 142-147. https://doi.org/10.51878/healthy.v1i3.1461

Wijaya, D. W. (2023). Examination of Hemoglobin (Hb) Levels and ESR (ESR) in Patients with Typhoid Fever at Jombang Hospital. In Institut Teknologi Sains Dan Kesehatan (Issue 201310034). https://repository.unsri.ac.id/12539/

Xena, A. J., & Aliviameita, A. (2020). The Relationship of Differential Counting with Blood Suction Rate in Patients with Typhoid Fever. Indonesian Journal of Innovation Studies. https://ijins.umsida.ac.id/index.php/ijins/article/view/518/393

Yuswardi W, D., Masyitah, C., & Oktavialina, C. (2021). Analysis of Blood Stability Rate (Led) in Patients with Typhoid Fever at Bandung Medan

General Hospital in 2021. Journal of Technology, Health and Social Sciences, 3(2), 220-224.