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Relationship between Widal test Titer Levels with Lymphocyte and Platelet Count Fever Patients *in Typhoid* at Porsea Regional General Hospital, North Sumatra

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Abstract: ***Introduction: Typhoid fever is a a bacterial infection caused by Salmonella typhi. Salmonella typhi infection is bacteremic which enters the small intestine and then spreads to the bone marrow. Diagnosis of Samonella typhi using Widal test and routine blood tests. Widal test and routine blood tests to see the body's mechanism against lymphocytes and platelets which are produced in the bone marrow and function as the body's defense against infection. When these bacteria reach the bone marrow, it will inhibit the formation of lymphocytes and platelets. This is also due to the presence of endotoxin from bacteria so that in cases of typhoid , lymphocytosis and thrombocytopenia occur.***
Objective: To determine the relationship between Widal titer and the number of lymphocytes and platelets in patients with typhoid fever.
Research methods: Analytical Observation. The number of samples used as many as 24 samples using primary data. The data collected is in the form of Widal titer with the number of lymphocytes and platelets. Then processed using the Pearson Correlation.
Results: The mean of lymphocytes on the O antigen with a titer of 1/160 was 24.84%, a titer of 1/320 was 43.95%, the mean of platelets with a titer of 1/160 was 312,000 gL and a titer of 1/320 was 230,750 gL. While on H antigen the mean number of lymphocytes with a titer of 1/160 is 35.48% and a titer of 1/320 is 39.86%. The mean platelet count with a titer of 1/160 is 196,670 gL and a titer of 1/320 is 158,000 gL. Statistical test results p>0.05.
Conclusion: There is no relationship between Widal titer and the number of lymphocytes and platelets in typhoid at the Gunungsari Health Center, West Lombok.
Keywords : Typhoid fever, Widal, Lymphocytes, Platelets

I. INTRODUCTION

Fever *Typhoid* is a bacterial infection caused by *Salmonella typhi* which is found in many developing countries, especially in tropical and subtropical areas. The disease is transmitted through food or drink contaminated by the feces or urine of an infected person. This group of diseases is a disease that is easily transmitted and attacks many people, especially children (Maulida, *et al*2015). The spread of this disease is closely related to population density, personal hygiene, poor environmental sanitation, and the lack of health facilities that can be reached by most people (Sulistia, 2016). The diagnosis of *typhoid* is made clinically and through laboratory tests. The examination can be in the form of hematological examination in the form of complete blood, serological tests, cultures and cultures (Soegijanto, 2012). One of the serological methods commonly used in the diagnosis of *typhoid* is the Widal test. Widal test is a laboratory examination to detect the presence or absence of antibodies in patients with *typhoid* against *Salmonella typhi* , namely antibodies to O antigen (from the germ body), H antigen (germ flagella), and Vi antigen (germ capsule). Of the three antibodies, only antibodies against O and H antigens have a diagnostic value for *typhoid* by reacting a person's serum with O and H antigens (Entjang, 2003). In addition, hematological examination in the form of complete blood is used to support the diagnosis of a disease and or to see how the body responds to a disease (Jiwintarum *et al*., 2020). The examination carried out was to count the number of lymphocytes and platelets (Lesmana, 2009).

Obeagu Emmanuel Ifeanyi in 2014 in his research concluded that the average value (mean) of the number of lymphocytes in patients with *typhoid* was 61%, which means there was an increase in lymphocytes (lymphocytosis) from 42 people with *typhoid* and concluded that the P-value was P<0.05 which means there is a relationship. In contrast to the research conducted by Billy Lesmana in 2009 at the Immanuel Hospital in Bandung on *typhoid* by examining the type of leukocyte count examined as many as 28 people, the study subjects with lymphopenia were 18 people (64.3%) normal lymphocytes were 9 people (32 ,1%), lymphocytosis in 1 person (3,6%) (Ifeanyi, 2014).

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II. METHOD

The research method that will be used is *observational analytic*. The sample used in this study is part of the blood in patients with *typhoid* in the laboratory of the Porsea Regional General Hospital, North Sumatra, Indonesia. The sample criteria used are as follows: 1) Blood from patients with *typhoid fever. 2)* Patients with *typhoid* with fever less than and more than one week. 3) Patients with *typhoid* with O and H antigen titers above 1/80. This research was conducted by *Pearson Correlation test* to find the relationship between two variables.

III. RESULTS

From the examination conducted on 11 samples, the highest titer was 1/320 and the lowest titer was 1/160. The mean number of lymphocytes with a titer of 1/160 is 26.47% and a titer of 1/320 is 39.34%. The mean platelet count with a titer of 1/160 was 292,667 /µL and a titer of 1/320 was 282,200 /µL (Table 1).

Table 1. Results of Widal O Titer Examination with Total Lymphocytes and Platelets

No.	Sample code	Titer	Lymphocytes (%)	Mean	Platelets (/µL)	Mean
1	S1	1/160	9		581.000	
2	S2	1/160	17.1		397.000	
3	S3	1/160	22.1		137,000	292.667
4	S4	1/160	29	26.47	150,000	
5	S5	1/160	47		295,000	
6	S6	1/320	34.6		196,000	
7	S7	1/320	37.3		522,000	
8	S8	1/320	38		250,000	
9	S9	1/320	38.3	39.34	240,000	282,200
10	S10	1/320	38.7		150,000	
11	S11	1/320	44.4		249.000	

In table 2, the highest titer is 1/320 and the lowest titer is 1/160. The mean number of lymphocytes with a titer of 1/160 was 35.48% and a titer of 1/320 was 39.86%. The mean platelet count with a titer of 1/160 was 196,670/µL and a titer of 1/320 was 158,000/µL.

Table 2. Widal H Titer Examination Results with Total Lymphocytes and Platelets

No	Sample code	Titer	Lymphocytes (%)	Mean	Platelets (/µL)	Mean
1	S1	1/160	19.5		53,000	
2	S2	1/160	26.9		293,000	
3	S3	1/160	33.1	35.48	190,000	196,670
4	S4	1/160	43.7		215,000	
5	S5	1/160	44.4		249,000	
6	S6	1/160	55.3		180,000	
7	S7	1/320	23.5		135,000	
8	S8	1/320	34.6		196,000	
9	S9	1/320	38.7	39.86	150,000	158,000
10	S10	1/320	43		236,000	
11	S11	1/320	59.5		73,000	

Pearson Correlation test showed $p > a = 0.05$ on lymphocyte examination with O antigen is $p = 0.758$. Platelet examination with O antigen was $p = 0.098$. Lymphocyte examination with H antigen was $p = 0.051$. Platelet examination with H antigen was $p = 0.035$. These results indicate that there is no significant relationship between Widal titer and platelet count in patients with typhoid fever (Table 3).

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Table 3. Statistical Test Results Widal Titer with Total Lymphocytes and Platelets Patients with *Typhoid*

	Lymphocytes	Platelets
	p	Value
O Antigen	0.758	0.098
H Antigen	0.051	0.350

IV. DISCUSSION

The results showed that the number of lymphocytes against O antigen increased was 8 people (61.53%) , Normal lymphocyte count is 3 people (23.07%) and low lymphocyte count is 2 people (15.38%). While the H antigen showed an increase in the number of lymphocytes (54.54%), the normal lymphocyte count was 4 (36.36%) and the low lymphocyte count was 1 (9.09%). After the analysis test, the results showed that there was no relationship between the Widal titer and the number of lymphocytes in patients with typhoid (Jiwantoro & Jannah, 2019).

The number of lymphocytes varies due to several factors, namely related to the age of the patient and the duration of fever experienced by typhoid. In this study, the average typhoid with a fever duration of approximately one week. Antibodies to the O antigen appear on days 6-8 and antibodies to the H antigen 10-12 days after exposure. At the end of the first week since the onset of symptoms, both antibody titers to both H and O antigens increased to 1/160. Antibody formation begins to occur at the end of the first week of fever, increases rapidly to a peak in the fourth week, and remains high for several weeks (Renowati & Soleha, 2019).

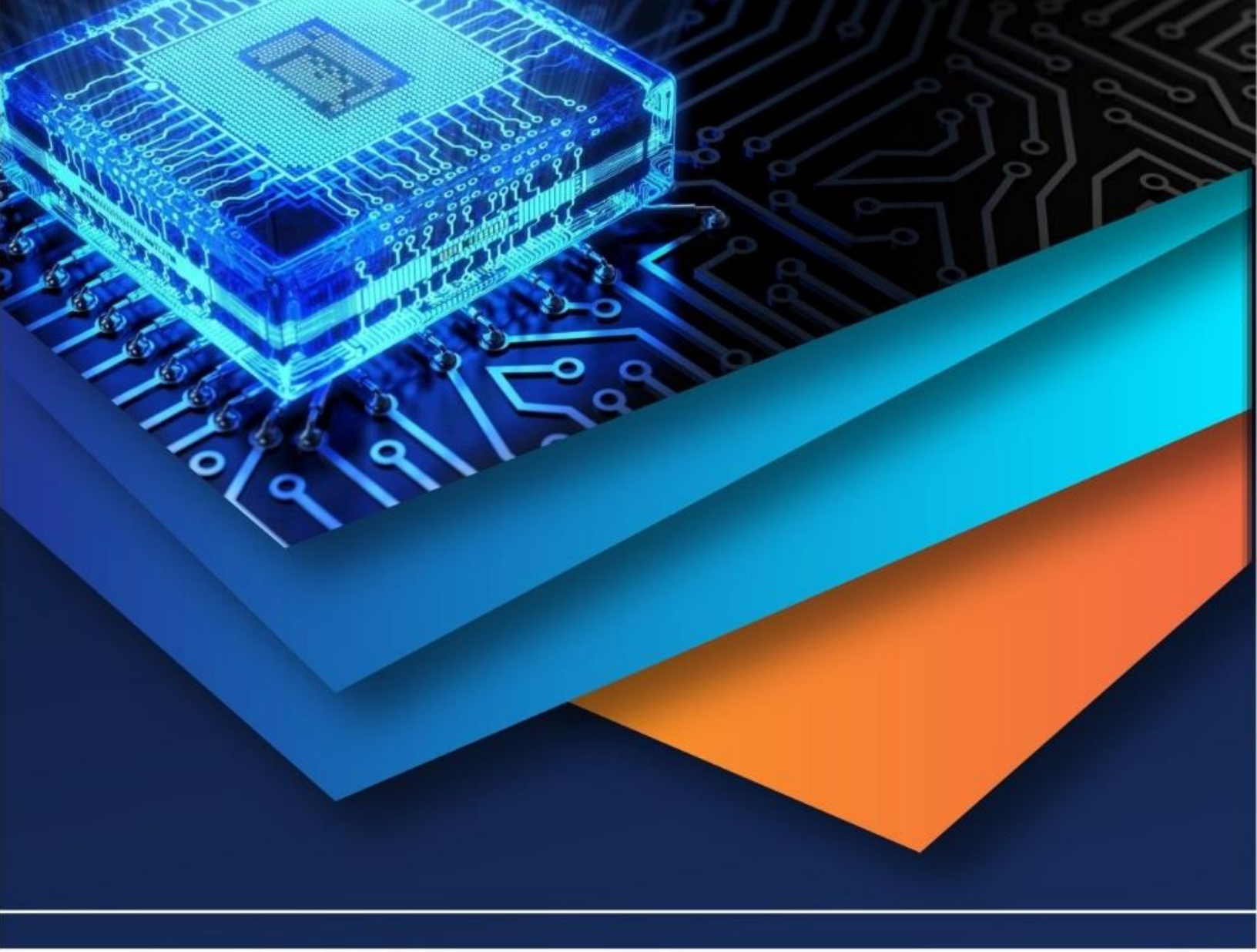
Bone marrow depression is often associated with typhoid which results in high lymphocytes or lymphocytosis (Lesmana, 2009). Several other factors that cause the number of lymphocytes to actually decrease are the presence of other infections that can interfere with the work of the bone marrow, the condition of the patient's immunity and the invasion of Salmonella typhi. In addition, some patients had normal lymphocyte counts due to differences in the patient's immune response and the level of resistance to these bacteria. This case is interesting because in the study, some of the results of the destruction of Salmonella typhi in the phagocytosis process at the end of the second week can be said to be no longer found Salmonella typhi in the blood, but still present in the bone marrow (Handojo, 2004).

V. CONCLUSION

Mean number of lymphocytes with O antigen (1/160) was 26.47% O antigen (1/320) was 39.34% and H antigen (1/160) was 35.48% H antigen (1/320) was 39.86%. The mean number of platelets with O antigen (1/160) was 292,667 /µL O antigen (1/320) was 282,200/µL and H antigen (1/160) was 196,670/µL H antigen (1/320) was 158,000 /µL. Widal titer in patients with *typhoid* is the lowest O titer 1/160 and the highest 1/320. The lowest H titer is 1/160 and the highest is 1/320. There is no relationship between the Widal titer with the number of lymphocytes and the number of platelets.

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