The Comparison Results of Examination of Platelet Counts using EDTA Blood and Sodium Citrate Using Hematology Analyzer

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Abstract
The Platelet count is one of the most important examinations for various cases both involving hemostasis and other cases, including establishing the diagnosis, evaluating the outcome of therapy or the course of a disease, determining the prognosis, and assessing the severity of the disease. So in doing so, we must pay attention to the pre-analytic, analytic, and post-analytic stages. One of the factors that influence platelet count is the use of anticoagulants, which sometimes the use of EDTA anticoagulants can cause cases of pseudo thrombocytopenia, so it is necessary to re-draw blood using Sodium Citrate anticoagulant. This study aimed to determine the Comparison of Platelet Count Examination Results using EDTA blood and Sodium Citrate is a Hematology Analyzer. This study applied a descriptive with a sample of 7 patients with a purposive sampling technique. This research was carried out at the Prodia Manado laboratory from April to May 2020. Data were obtained and analyzed using paired sample t-test. The research findings showed an average number of platelets using EDTA blood of 92.71 (10^3 / µL) and Sodium Citrate 197.71 (* 10^3 / µL) with a (p-value) sig (2-tailed) of 0.001 < alpha value (0.05), thus it can be concluded that there is a significant difference between the number of platelets using EDTA blood and Sodium Citrate in the Hematology Analyzer.*

Keywords: Thrombocyte, EDTA, Na Citrate, Hematology Analyzer

Introduction

Health laboratory services are an integral part of health services that are needed to support efforts to improve health, prevent and treat disease, and restore health.

As an important component in health services, the results of laboratory tests are used to establish a diagnosis, administer treatment, monitor treatment outcomes, and monitor prognosis. Therefore, the quality of laboratory examination results must always be guaranteed (Depkes, 2008).

A hematological examination is an examination that is mostly done in the laboratory. This examination aims to help establish the diagnosis of a disease. Hematological examinations include routine hematological examinations and physiology of hemostasis. A routine hematological examination that is often carried out is the platelet count (Pramytasari et al, 2016).

Platelet count is one of the most important examinations for various cases, both concerning hemostasis and other cases, which include establishing a diagnosis, assessing the results of therapy or the course of a disease, determining the prognosis, and assessing the severity of a disease. So in doing it must pay attention to the pre-analytic, analytical, and post-analytic stages.

Errors in the pre-analytic process can contribute about 61% of the total errors, while 25% analytical errors and 14% post-analytic errors. The process includes patient preparation for specimen collection, specimen delivery to the laboratory, specimen handling, and specimen storage. One of the factors that affect the number of platelets is the use of anticoagulants (Jumailia R, 2017).

Examination of the platelet count is most often taken from venous blood with the addition of the anticoagulant EDTA. Apart from being cheaper and easier to obtain. EDTA did not affect the size and shape of erythrocytes and did not affect leukocytes' shape. In addition, this EDTA anticoagulant can prevent platelet clumping. Therefore, EDTA anticoagulant is very good to be used as an anticoagulant for the examination of platelet count. every 1 mg of EDTA can prevent 1 ml of blood from clotting (Gandasoebrata, 2013).

However, sometimes the use of EDTA anticoagulants can cause cases of pseudo thrombocytopenia. Pseudothrombocytopenia is a condition characterized by a low platelet count (with a Hematology Analyzer), but there is no tendency or signs of bleeding. In pseudo thrombocytopenia, the platelet count is normal, but there is aggregation, adhesion to other blood cells (such as

leukocytes), or the presence of platelets with a size exceeding normal (giant platelets) that cannot be identified by the Hematology Analyzer, causing the platelet count to appear low. In cases of pseudo thrombocytopenia due to EDTA use, the platelet count will usually be normal if sodium citrate anticoagulant is used (Kurniawan LB, 2014).

Sodium citrate is used in solution form at a concentration of 3.2%. Sodium citrate is the type of anticoagulant recommended by the International Committee For Standardization in Hematology (ISCH) and the International Society for Thrombosis and Haematology as the anticoagulant of choice for coagulation and platelet aggregation tests (Nugraha, 2015).

Material And Method

The type of research used is descriptive research with a cross-sectional design. The samples used in this study were pseudo thrombocytopenia patients who were examined in a private laboratory. The sample size used in this study was 7 patients with 2 treatments. Inclusion Criteria: Pseudothrombocytopenia patients whose examination results were confirmed by Thin Blood Smears and gave normal results. Exclusion Criteria: Patients with thrombocytopenia whose examination results have been confirmed with Thin Blood Smears and still give low results.

The data in this study were processed using descriptive calculations. Data were analyzed inferentially by looking at the different test results. Numerical variables were tested for normality, if a normal data distribution was obtained, paired t-test was used to determine the difference in the mean of the two samples. Through this test, it can be seen that there is a significant difference in the average of the two groups of related samples. However, if the data is not normally distributed, an alternative one sample sign test is carried out.

RESULT AND DISCUSSION

In this study, data were collected on patients who did a platelet count with EDTA blood which gave low results, and blood was taken again using sodium citrate blood.

Table 1. Data on the results of the examination of the platelet count using EDTA blood and sodium citrate on the Hematology Analyzer *are* as follows.

No	Kode sampel	Hasil pemeriksaan	
		Edta	Na.sitrat
1	A	144 (10^3/µL)	277 (10^3/µL)
2	B	65 (10^3/µL)	184 (10^3/µL)
3	C	90 (10^3/µL)	237 (10^3/µL)
4	D	75 (10^3/µL)	236 (10^3/µL)
5	E	67 (10^3/µL)	109 (10^3/µL)
6	F	112 (10^3/µL)	198 (10^3/µL)
7	G	96 (10^3/µL)	143 (10^3/µL)

Source: Secondary data in 2020

Figure 1. Overview of the results of the examination of the platelet count using EDTA blood and sodium citrate on the Hematology Analyzer

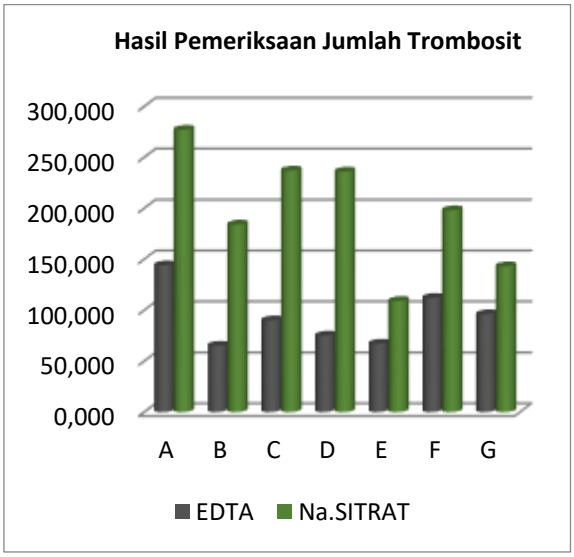

Table 2. The average value of the results of the platelet count using EDTA blood and sodium citrate on the device Hematology Analyzer

No	Jenis Antikoagulan	Rata-rata Hasil Pemeriksaan Jumlah Trombosit
1	EDTA	92,71 (*10^3/µL)
2	Na. Sitrat	197,71 (*10^3/µL)

Table 3 Results of the Shapiro-Wilk Normality Test -*Wilk*

Kelompok	Shapiro-Wilk		
	Statistic	Df	Sig.
EDTA	0.910	7	0.393
Natrium Sitrat	0.970	7	0.900

Based on the statistical results in the test on the examination of the platelet count using EDTA blood and sodium citrate, there was a significant difference. This is because most cases of Pseudothrombocytopenia due to the use of EDTA are in vitro phenomena due to the presence of a specific protein, where platelet agglutination caused by EDTA occurs due to circulating antibodies against the epitope in the glycoprotein complex alpha IIb / beta IIIa platelet membrane which only appears in the presence of EDTA. and causes platelet aggregation. The hematology analyzer cannot count platelets in large aggregations and the calculated platelet count only reflects the combination of platelet counts from small aggregations and non-aggregated platelets. So that the platelet count is falsely low. The most important thing in this situation is that there are no symptoms or signs of bleeding. (Kurniawan LB, 2014)

Another factor that can cause pseudo thrombocytopenia is the result of Leukocyte Satellites. Platelet satellites, satellites, or resetting is an in vitro phenomenon resulting from the attachment of platelets to mature polymorphonuclear neutrophils (PMNs) and sometimes to other cells as well. This phenomenon is rare, with a prevalence of 1 in 12,000 cell counts, often associated with autoimmune diseases but mostly not associated with specific diseases.

Platelet satellites can be found in patients with vasculitis, lupus, lymphoma, and healthy individuals, but its clinical significance is unknown. His platelet count was moderately reduced (50,000-100,000/µL), causing pseudo thrombocytopenia. In addition to PMN, platelet satellites are also found in monocytes, basophils, lymphocytes, and lymphoma cells. (Kurniawan LB, 2014)

In addition to pseudo thrombocytopenia due to leukocyte satellites, Pseudothrombocytopenia can also occur due to the presence of giant platelets. Under normal circumstances and certain pathological conditions, a small number of platelets have a large volume and are referred to as giant platelets. Some hematology analyzers count particles having a volume of 30-36 fL (or up to 60 fL in some laser light examination methods) as platelets so that platelets larger than 40 fL may not be detected. In pathological conditions, such as myeloproliferative disorders and myelodysplastic syndromes, sometimes platelets that are the size of leukocytes are not counted as platelets but as leukocytes or erythrocytes. (Kurniawan LB, 2014)

The results of this study are in line with the results of research conducted by Rian in the laboratory of the Karang Asam Bali Hospital in 2017, where a significant value was obtained 0.000 < 0.05. It can be concluded that there is a significant difference in the number of platelets in blood smears using blood. EDTA and Sodium Citrate. (Jumailia R, 2017)

CONCLUSION

there is a significant difference between the platelet count results using EDTA blood and Sodium Citrate on the Hematology Analyzer.

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