

Overview of the Duration of Venous Blood Extraction Against the Number of Platelets in Level III Students of the D-III Program Health Analyst at Bina Mandiri University, Gorontalo

**OVERVIEW OF VEENIC BLOOD DRAWINGS
ON THE NUMBER OF thrombocyte in students
LEVEL III D-III HEALTH ANALYSIS PROGRAM
GOEONTALO INDEPENDENT DEVELOPMENT UNIVERSITY**

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ABSTRACT

The duration of venous blood damming of 2 minutes greatly affects the results of the examination, because it can cause the results of the examination to increase or decrease and damage the blood specimen. This study aims to determine the number of platelets from the results of the examination of the duration of venous blood sampling using 1 minute and 2 minutes.

The method in this study used descriptive quantitative to do two treatments, namely the length of damming the venous blood collection using 1 minute (Normal) and 2 minutes (Abnormal).

The results showed that routine blood tests were influenced by pre-analytical, analytical, and post-analytic factors. Among them are pre-analytic factors that affect routine blood, the duration of damming venous blood collection for 2 minutes greatly affects the results of the examination, because it can cause the results of the examination to increase or decrease and damage the blood specimen.

Keywords: Platelets, Dams, Blood, Quantitative, Veins.

INTRODUCTION

Health is one of the resources found in humans and is not one of the goals of life that needs to be realized. Health is not only focused on physically fit but includes a healthy soul where individuals can be tolerant and understand each other's differences into health problems in humans.

Currently, laboratory examinations are needed by the community and their role is no longer as a support for diagnosis but has become a determinant in the management of a disease. When diagnosing a disease, careful and truly valid laboratory results are needed for the results to be issued, one of which is routine blood tests, which are arranged through various kinds, which are:

hemoglobin, hematocrit, platelet, erythrocyte, and leukocyte examinations. [8].

Platelets or platelets (blood platelets) are blood cells with a role in blood clotting. Certain platelets are part of the blood which is very important when blood vessels are damaged and the skin gets injured and also leaks causing blood to leak through the vessels or there is bleeding. Normal platelet count, which ranges from 150,000 to 450,000 platelets per micro liter of blood. When the level of platelets in the blood is below 150,000, it is called thrombocytopenia. While the number of platelets in the blood exceeds 450,000 so it is called Thrombocytosis [6].

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Platelets play an important role in a stage of blood clotting, by diagnosing several disorders that can be caused by abnormalities in blood clotting. Excessive blood clots can prevent blood flow in important organs, such as the brain, heart, lungs and can also form blockages of blood vessels.

Venous blood is a thin-walled and large-diameter vessel, blood passing through the capillaries from various tissues other than the lungs is found in the veins, in the right ventricle of the heart, with the pulmonary arteries, and is usually dark red in color due to the low oxygen content. This venous system is under pressure and the walls of the veins are muscular which causes the deep veins to contract. With this contraction, the veins have the ability to store and store blood in high and low amounts depending on the needs of the human body [15].

Tourniquet is a tool that is often used for pressure and splinting which functions as a controller of blood flow in veins and arteries for a certain period of time. In addition to damming the arm, a tourniquet is also used to stop bleeding after an injury to a limb, but in the laboratory, a tourniquet is used before taking venous blood with the aim of making the blood vessels look dilated and accentuated so that the location of the puncture can be easily determined, and serves to hold the vein in place. location when punctured and easily penetrated by a needle because with splinting the vein widens and becomes thin. Blockage of blood vessels for more than 1 minute can change the composition of the blood drawn due to hemoconcentration [22].

In addition to hemoconcentration, a longer pressure in the tourniquet causes various analytes to pass through the tissues by entering the blood. Certain analytes such as protein, lactate, calcium, with increased phosphate, lower the pH by releasing tissue thromboplastin and

pumping resulting in increased potassium, lactate and glucose [5].

The thromboplastin is a platelet enzyme that plays a more role in the blood clotting stage when a wound is formed. Thromboplastin that exits through the tissue enters the bloodstream until a venipuncture. Contaminated samples when the addition of reagents causes the concentration of thromboplastin in the sample to increase resulting in a very short extrinsic pathway coagulation activity and when the prothrombin mass (PT) examination can shorten [12].

Blood components are divided into two components, namely cellular components and non-cellular components. Cellular components are called corpuscles, which are made up of about 45% which are composed of various cells, namely erythrocytes, leukocytes and platelets. At the same time, platelets do not come from cells but form fragments of the cytoplasm of megakaryocytes. And so is the non-cellular component of the solution which is often called plasma and is formed in about 55% of the blood [22].

Platelets are blood components that play a role in the hemostasis stage. These platelets in the organs of the body to form blood also after birth platelets are formed in the bone marrow. The stages of formation of platelets, for example, in other cells originating through stem cells, where the cell system. Stem cells can carry out the stages of proliferation, differentiation and maturation. Proliferation, is the stage of multiplying cells when the parent cell can divide into cells of the same nature. Differentiation is the stage of cell division to form cells that have different characteristics.

Platelets originate through megakaryocytes in the bone marrow. It is well known where these megakaryocytes originate via pluripotential stem cells. The conversion of platelet production is carried out by one of the causes of

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thrombopoietin, which is a hormone with an analogue to erythropoietin called thromboplastin. Thromboplastin can already be determined by its visible characteristics where the compound in electrophoresis moves together with the albumin fraction and plasma betaglobulin [6].

The main function of platelets is to clot blood. If a blood vessel is injured, the body will stop the bleeding that is about to take place and will carry out 3 main mechanisms, namely, Platelet activity, Carry out contraction (constriction), and the activity of other blood clotting components in blood plasma [8].

The solution components contained in the tissue can come out, if: formation of wounds and torn tissue, such as serotonin. Certain serotonin that can stimulate blood vessels in carrying out narrowing uses Vasoconstriction [8].

Blood plasma includes a yellowish-colored blood preparation solution containing several proteins whose main role is in obtaining osmotic plasma. Blood is useful in the circulation of substances that enter the body and which obtain the body through metabolic stages, to maintain antigens, and regulate body temperature stability. plasma [22].

Detection of a disease until its severity can be identified through blood tests (hematological). The blood profile includes a description of the physiological state of the body that is related to health, until a good blood profile can support the physiological stages of the body that are very suitable. An appropriate blood profile state can be characterized in that blood components are in the normal range [24].

The results of routine blood tests are influenced by pre-analytical, analytical, and post-analytic factors. Among the pre-analytic causes that affect routine blood, the duration of damming a venous blood sample for 2 minutes

greatly affects the results of the examination, because it can cause the examination data to increase or decrease by damaging the blood specimen [8].

His research in Italy, reported that the installation of a tourniquet in venous blood collection can affect the results of examination of several laboratory parameters [7].

In 2009 in New York, researching on the effect of damming with a tourniquet on venous blood samples for examination of blood chemistry, hematology and leukocyte activation and mechanical properties of erythrocytes obtained the results that hematological determination with serum erythrocyte levels did not affect the presence of tourniquet damming. However, there was a significant decrease in erythrocyte deformability at 90, 120, 180 seconds, as well as an increase in erythrocyte aggregation at 5 and 30 seconds after the release of the tourniquet. In addition, the results also showed that there was no significant change in blood nitrite/nitrate levels [17].

For humans who have a normal number of platelets, which range from 150,000 to 450,000 platelets per micro liter. Platelets can be found in the blood with the spleen. These blood cells are colorless and have a life cycle of up to 10 days. Our body can renew the supply of platelets in obtaining the latest platelets in the bone marrow [1].

When a wound forms, the platelets can clot to stop the bleeding. After the bleeding stops, certain wounds can gradually heal and heal. If we do not have enough platelets in the blood, the body can find it difficult to stop bleeding when we are injured [1].

As stated earlier, the normal number of platelets in the body is in the range of 150,000-450,000 platelets per microliter of blood. When the level of platelets in the blood is below 150,000, so

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that the individual gets an excess of platelets, which is known as thrombocytopenia. But when the level of platelets in the blood exceeds 450,000 so that a person benefits or has high platelets, it is often referred to as thrombocytosis [6].

Platelets are blood components that play a role in the hemostasis stage. These platelets in the organs of the body to form blood also after birth platelets are formed in the bone marrow. The stages of formation of platelets, for example, in other cells originating through stem cells, where the cell system. Stem cells can carry out the stages of proliferation, differentiation and maturation. Proliferation, is the stage of multiplying cells when the parent cell can divide into cells of the same nature. Differentiation is the stage of cell division to form cells that have different properties. However, maturation is the stage of maturation of cells when cells can get a change in nature which can eventually form mature cells that are ready to be used [6].

If in the formation of wounds in the skin and body surfaces, as well as blood components, where platelets can carry out their own functions which carry out adhesion, when the surface of platelets can be directly attached to the open wound where there are collagen fibers. Platelets become active by releasing the contents of the granules which can then attract other platelets in carrying out aggregation until the platelets collect to cluster around the injured area and can clump together until it becomes clogged which closes the wound. In the blood plasma the presence of platelets when forming a wound with blood coming out, the platelets can touch the surface of the wound violently can be broken up by the release of thromboplastine. Thromboplastine accompanied by Ca^{++} ions can convert prothrombin to form thrombin.

Prothrombin is a globulin substance dissolved in blood plasma. Prothrombi are formed in the liver in the presence of vitamin K. Thrombin can be converted to fibrinogen so that it can block the release of blood cells until clotting is formed in a duration of under 15 minutes [6].

Platelets originate through megakaryocytes in the bone marrow. It is well known where these megakaryocytes originate via pluripotential stem cells. The conversion of platelet production is carried out by one of the causes of thrombopoietin, which is a hormone with an analogue to erythropoietin called thrombopoietin. Thromboplastin can already be determined by its visible characteristics where the compound in electrophoresis moves together with the albumin fraction and plasma betaglobulin [6].

In the process of blood clotting, the main function of platelets is very important. If there is a wound, platelets can collect because there is a collagen stimulation that is opened so that platelets can go to the wound area and stimulate blood vessels to shrink (so that not much blood flows out) and can stimulate the formation of threads of clotting of blood called in threads. fibrin. Certain fibrin threads can form formations such as nets that can be covered in the wound area until the active bleeding stops present in the wound. Besides that,

Platelets have a role in the formation of plaque in blood vessels, the nature of platelets to break quickly and clot when there is an abnormality. Certain plaques can be an obstacle to blood flow, which is always present in the blood vessels of the brain and heart. These abnormalities can form the formation of a heart attack with a stroke. Therefore, patients having a stroke with a heart attack are always given drugs (anti-platelet) so that the platelets do not clot too quickly in the form of plaques in the

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blood vessels. The formation of a mechanical plug as well as the formation of a platelet plug thus responds to normal hemostasis in vascular injury to respond to cessation of bleeding in a way that reduces the rate of outflow of blood. Not with the role of platelets, or when the number of platelets below can cause the formation of spontaneous blood leakage through small blood vessels. Platelet reactions such as adhesion (adhesion), secretion, aggression (agglomeration) with diffusion are also more important proagulant activities in their function [6].

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In the injured area, on the endothelial cells, so that the collagen that forms the fibers (collagen fibers) can be protruded and can form a stimulus in the attachment of platelets which is called the adhesion function. Attached platelets can actively form platelets and change their shape to release the contents of the granules with the presence of (release reaction) granules for the release of one of them is Thromboxan A₂. In the injured area, activated platelets can secrete contents such as ADP, which can stimulate other platelets in the attachment of platelets which is called by the term aggregation..

When the formation of platelet aggregation, so that the wound can close until the blood does not come out again. In the stage of hemostasis, so that the clotting effect can bind tightly to the fibrin threads until the clotting solidifies in the form of a hemostatic plug. the leak hole is smaller. Certain reactions can stimulate platelets attached to the area of the injured blood vessel. These platelets can signal other platelets to cause blood clots to pass to the site of injury in aid of

wound closure. The shape of the platelets, which are mainly round, turns slightly spiny (for example, tentacles), which is useful so that platelet attachment is formed very quickly

Adhesion to platelet aggregation in response to vascular injury. After vascular injury, platelets adhere to exposed subendothelial connective tissue. Very large vWF multimer-binding subendothelial microfibrils, which bind in platelet membranes. Under the influence of shear stress, platelets move along the vascular surface until GPIIb/IIIa (integrin $\alpha_{IIb}\beta_3$) binds to collagen in termination of translocation. The next activity of platelets is to produce glycoprotein IIb/IIIa (integrin $\alpha_{IIb}\beta_3$) for the binding of fibrinogen in obtaining platelet aggregation. The IIb/IIIa receptor complex also forms a secondary binding site in vWF resulting in more sustained adhesion. The von Willebrand factor (vWF) produces factor VIII when it involves the adhesion of platelets to the vessel wall. The vWF is synthesized in endothelial cells by megakaryocytes and stored in Weibel-Palade bodies in endothelial cells and specifically in granules in platelets. There is stress with exercise or administration of adrenaline or desmopressine infusions resulting in a very large increase in blood levels of vWF [6]

Automatic method is in line with technological advances and the increasing demand for hematology examinations, now most clinical laboratories use hematology analyzer equipment. The equipment is used in the measurement as well as the automatic addition of blood cells according to the impedance of the electric current and the beam of light in the cells that are passed. Hematology analyzers are often used in routine hematological examinations that include counting of erythrocytes, leukocytes,

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platelets with hemoglobin examination [18].

Hematology Analyzer is a device used to calculate the components contained in blood. These devices are the main instruments used in clinical laboratories [18].

The flow cytometry method is a procedure for measuring the number and properties of cell components in a moving solution medium. Each cell passes through the slit one by one which is then passed through the laser light generating an electronic signal that is recorded on the instrument for the corresponding cell criteria. The working principle of flow cytometry is that as many cells are suspended in one conductive solution. Certain cells are subjected to hydrodynamic pressure until they can pass through one of the passages one by one. If the cell reaches one of the passage points, it can be shot in the laser light. Furthermore, the laser beam data can be read on the detector. An advantage of automated hematology equipment is time efficiency. Inspections using automated equipment can be carried out in a short time. Various parameters can be executed simultaneously. In addition, the sample volume required is very small. Another advantage is the accuracy of the data generated by having passed the internal laboratory quality assurance. In addition to having advantages, automatic hematology equipment also has drawbacks in that it is not able to add abnormal cells with low maintenance costs [16].

Impedance method The principle of calculating impedance is adjusted in changing the electrical resistance of a known aperture when one of the particles in a conductive solution passes through the gap. Blood cells are suspended in some conductive solution in an electrical manner. Furthermore, in the hydrodynamic focusing system, the blood

cells are arranged in such a way that they can pass through the aperture one by one. When a cell passes through the slit, it can generate a signal in proportion to the number of cells passing through the slit. The high signal that is formed is proportional to the size of the cell volume. Cells measuring 2-20 fl can be counted for platelets. Exceeding 20 fl totaled in erythrocytes and exceeding 36 fl totaled for leukocytes. Aspirated blood is divided into two separate volumes. One volume is mixed in the diluent and flows into the cell bath in the sum of the number of erythrocytes and platelets. Another volume of blood is mixed in the diluted fluid as well as Lytic reagent which is useful in lysing red blood cells. Counting leukocytes is carried out on the remaining cells that pass through the gap. Electrical impedance is used primarily in the hematology laboratory to add blood cells such as leukocytes, erythrocytes and platelets. The disadvantage of the impedance method is that it allows two cells to pass through the gap simultaneously. Besides, the measured cells can return to the measurement area which causes the cells to be counted twice by the detector [16]. Another volume of blood is mixed in the diluted fluid as well as Lytic reagent which is useful in lysing red

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When distinguished from manual examination, examination in a hematology analyzer has the following advantages:

- a. Inspection time is very short.
- b. Equipment that has been connected to the Laboratory Information System (SIL) can reduce the possibility of errors when identifying samples with data entry of the results of their examinations.
- c. Several parameters can be measured at once.
- d. Parameters by manual method cannot be calculated or measured, using the equipment can be measured quickly.

- e. In state-of-the-art equipment, fast cells can be measured.

The description of the platelets in the blood smear preparation, namely, manually adding up the number of platelets against the stained blood smear. In the manual examination of platelets using a tube that has the anticoagulant EDTA, the anticoagulant overcomes blood clotting in the way of binding calcium and can prevent platelet aggression [6].

Pre Analytical is Causes that affect the data on the number of platelets in the pre-analytic stage can be formed, for example in selecting a blood sample. The use of capillary blood can produce quite low data when compared to venous blood [11].

Analytical is the analytical stage, which is the stage of processing samples to obtain examination data. Analytical errors in the field of hematology can occur such as systematic or random errors, the main factors being caused by improper calibration procedures, not optimal equipment components, damaged reagents. Random errors often result in not normalizing the instrument, changing the temperature with various operators [29].

Post-analytic errors in the post-analytic stage can be formed when there is an error in entering sample results, incorrect recording and reporting of examination data [29].

Based on the above background, the problem raised in this scientific paper is "What is the description of the duration of damming venous blood collection on the number of platelets"

RESEARCH METHODS

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Closeness of observation is the closeness of quantitative research. The proximity of quantitative observations to describe the platelet count between the duration of damming of 1 minute (normal time) and the duration of damming of 2 minutes at the time of taking venous blood (abnormal).

The type of data used in these observations is only primary data, namely data obtained through data on the examination of the number of platelets in the research sample and the source of data on these observations using questionnaires, documentation results with laboratory tests.

The population in these observations are all Level III students in the Department of Health Analysis Diploma Program at Bina Mandiri University, Gorontalo, totaling 65 people.

The sample in the observation was a Level III Student of the Health Analyst Diploma III Program at the University of Bina Mandiri Gorontalo who met the inclusion criteria.

retrieval technique What is done in these observations is to use purposive sampling, namely a sampling technique in using characteristics that have been selected by the presence of observers in the selection of samples. The characteristics of selecting the sample are divided into inclusion and exclusion characteristics.

Data collection or respondent identity is obtained by using interview techniques directly to respondents, then recorded on the result sheet. While the platelet count data, the data collection was done by direct examination of the platelet count using the Hematology Analyzer ABX Micros RS 60.

The data were analyzed using Microsoft Excel, the presentation was in the form of a table which was obtained in the

form of a percentage using a formula such as proposed by [27].

$$P = \frac{f}{N} \times 100\%$$

RESEARCH RESULT

Based on the results of research conducted from 2 to 7 July 2021 at the Hematology Laboratory of the UPTD Regional Health Laboratory, Gorontalo Province, so that laboratory examination data were obtained including:

Table.1 Distribution of the results of the duration of venous blood clotting 1 minute and 2 minutes

No	Inspection Result Range	Damping time and percentage			
		1		2	
		minu te	%	minu tes	%
1	200-300 ¹	3	15	1	5
2	300-400 ¹	9	45	8	40
3	400-500 ¹	8	40	11	55

(Source: Primary Data 2021)

Based on Table 1, the results of the duration of venous blood damming for 1 minute and 2 minutes show the following:

1. The test results ranged between 200-300 l at 1 minute of holding time there were 3 people (15%), and 1 person holding 2 minutes (5%).
2. Inspection result range between 300-400 There are 9 people (45%) for 1 minute of containment and 8 (40%).
3. Inspection result range between 400-500 There are 8 people (40%), and holding time for 2 minutes with a percentage of 11 people (55%).

Table.2 Old Frequency Distribution containment 1 minute

No	Check up result	Frequency	%
1	Normal	17	85
2	Abnormal	-	-

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Amount	20	100
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(Source: Primary Data 2021)

Based on Table 2 shows that, respondents with holding time of 1 minute on average get normal platelet count results in 20 respondents with a percentage of 100%.

Table.3 Frequency distribution of damming time 2 minutes

No	Check up result	Frequency	%
1	Normal	17	85
2	Abnormal	3	15
	Amount	20	100

(Source: Primary Data 2021)

Based on Table 2, it shows where the respondents for the 2-minute period of normal containment are 17 people (85%). While the abnormal category is 3 people (15%). Therefore, most of the holding time of 2 minutes more showed the normal category but increased but did not exceed the normal threshold of the platelet reference value.

DISCUSSION

The aim of this observation is to describe a situation objectively, from the results of the study, the average platelet count was obtained. The Impedance Method using a holding time of 1 minute averaged a normal platelet count and a holding time of 2 minutes increased but did not exceed the normal threshold and 3 samples get Thrombocytosis results This is because the duration of damming venous blood collection for 2 minutes greatly affects the results of the examination, it can cause the examination data to increase and damage the blood specimen.

Based on the observation of the duration of venous blood sampling for 1 minute, the results of the examination of 20 samples obtained an average normal value with a percentage of 100%.

The results of the examination for 2 minutes of damming time, there

were 17 samples with a percentage of 85% experiencing an increase but not exceeding the normal threshold of the platelet reference value. 3 samples with 15% abnormal percentage (Thrombocytosis) [6].

Based on the observation of the duration of venous blood sampling for 1 minute, the results of the examination of 20 samples obtained an average normal value with a percentage of 100%.

The results of the examination for 2 minutes of damming time, there were 17 samples with a percentage of 85% experiencing an increase but not exceeding the normal threshold of the platelet reference value. 3 samples with an abnormal percentage of 15% (Thrombocytosis).

Platelets are blood cells with a role in blood clotting. Certain platelets include blood components that are very important when blood vessels are damaged and the skin gets injured which results in blood leaking through the vessels or bleeding. Examination of the platelet count is an examination that is carried out to diagnose several disorders caused by abnormalities in blood clotting [6].

When diagnosing a disease, careful and truly valid laboratory results are needed for the results to be issued, one of which is routine blood tests, which are arranged through various kinds, which are: Check hemoglobin, hematocrit, many platelets, many erythrocytes, and many leukocytes [8].

The results of routine blood tests are influenced by pre analytic, analytic, and post analytic factors. Among the pre-analytical causes that affect routine blood, the duration of holding a venous blood sample for 2 minutes greatly affects the results of the examination, because it can cause the

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examination data to increase and damage the blood specimen and in applying a tourniquet a maximum of 1 minute, when it exceeds 1 minute it can result in an increase in concentration. molecular in plasma because through hemolysis (destruction of red blood cells), namely the rupture of blood cells [8].

His research in Italy, reported that the installation of a tourniquet in venous blood collection can affect the results of examination of several laboratory parameters [7].

In 2009 in New York, researching the effect of damming with a tourniquet on venous blood samples for examination of blood chemistry, hematology as well as leukocyte activation and mechanical properties of erythrocytes obtained the results that hematological parameters with serum erythrocyte levels did not affect the presence of tourniquet damming. However, there was a significant decrease in erythrocyte deformability at 90, 120, 180 seconds, with increased erythrocyte aggregation in 5 and 30 seconds after tourniquet release [17].

Thrombocytosis is an increase in the number of platelets above normal when the blood circulation exceeds 450,000/ μ l of blood. Thrombocytosis can be primary or secondary. Under normal conditions, the number of platelets is in the range of 150,000 – 450,000/ μ l of blood. When the number of platelets is below normal, the condition is called thrombocytopenia. There are several causes of thrombocytosis, which are as follows: primary causes of thrombocytosis, namely in this condition, platelet levels spike high due to abnormalities in stem cells in the bone marrow, where platelets are produced. However, the exact cause of primary thrombocytosis is unknown. Based on information from

the Leukemia and Lymphoma Society, about half of patients with primary thrombocytosis have a mutated gene in their body, namely the JAK2 gene (Janus kinase 2). Experts are still trying to find out what the relationship of the JAK2 gene mutation with the production of platelets in the body. Due to gene mutations, essential thrombocytosis is thought to occur from heredity. In other words, the mutated gene can be inherited from the patient's parents [20].

The cause of secondary thrombocytosis is this condition occurs when there are health problems or other diseases that trigger high platelets. About 35% of thrombocytosis patients usually have lung, digestive system, breast, uterine, and lymphoma cancers. High platelet levels are sometimes known as an early symptom of cancer. However, that does not mean you will definitely get cancer if you have high platelets. In addition to cancer, several other diseases and problems that cause high platelets include: tissue inflammation, tuberculosis, myeloproliferative disorders, hemolytic anemia, surgery and recovery after the body has lost too much blood [20].

The diagnosis of thrombocytopenia is generally made using automated platelet count equipment. But the sum data is always verified in examining the peripheral blood smear. The suitability and accuracy of the data for counting the number of platelets is more important. Matching in peripheral blood smears can also convey other possible consequences through an apparently low platelet count [24].

The body that interferes with platelets itself is primarily formed due to immune system problems and is a rare disorder. Various health conditions and behaviors that can cause the body to

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destroy its own platelets are: Autoimmune disorders, these drugs, viral infections, such as dengue hemorrhagic fever (DHF), surgical procedures, pregnancy [20].

In line with the advancement of technology and the increasing demand for hematology examinations, now most clinical laboratories use hematology analyzer equipment. The equipment is used in the measurement with the addition of blood cells automatically according to the impedance of the electric current and the beam of light in the cells that are passed. Hematology analyzers are often used in routine hematology examinations that include the addition of erythrocytes, leukocytes, and platelets by checking hemoglobin. Hematology Analyzer is a device used to perform the summation of the components contained in the blood. These devices are the main instruments used in clinical laboratories [18].

Other factors that can affect the research sample are taking blood that is too long and has not directly mixed the blood in the anticoagulant and homogenization of anticoagulant blood that is not yet perfect can also cause platelets always attached to the clot. In addition, the ratio of blood volume to anticoagulants is always based on determination. Incorrect discrepancies may result in errors in the data. Very low blood volume and excessive anticoagulation allow platelets to enlarge and form disintegration. On the other hand, excessive blood volume and low anticoagulation can result in the formation of clots. Blood that has not been tested immediately or delayed examination for a very long time can also cause changes in the number of platelets [28].

Based on the results of this study, the length of damming for

venous blood collection greatly affects the results of laboratory examinations, this is indicated by the duration of damming of 1 minute using a tourniquet for a maximum of 1 minute, all results are normal, but the results of the examination with a duration of damming of 2 minutes found 15% abnormal (Thrombocytosis). Because there is an increase in the concentration of molecules in the plasma resulting in hemolysis, that is, the breakdown of blood cells.

CONCLUSION

Based on these observational data, conclusions can be drawn where:

1. The number of platelets, the results of the examination of the duration of damming, taking venous blood, normal time of 1 minute, an average of 371.5 l and everything categorized as normal.
2. The number of platelets, the results of the examination of the duration of damming of venous blood collection, abnormal time of 2 minutes, an average of 389.2 l there are 15% categorized as abnormal and 85% categorized as normal.

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