



Differences in platelet counts using venous blood and capillary blood for medical laboratory technology students at the Aisiyiah Pontianak Polytechnic

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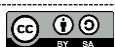
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Abstract

Background: Platelets are blood cells that are important for the blood clotting process. Platelets make up most of the blood when blood vessels burst, bleed, or when the skin is torn and injured. In humans, platelets normally number between 150,000 - 400,000 per microliter of blood. Platelets are a very important component in the hemostasis response which is related to other hemostasis components **Objectives:** The aim of the research was to determine the difference in platelet count results using venous blood and capillary blood for students of the 'Aisiyiah Pontianak Polytechnic Medical Laboratory Technology Study Program **Materials and Methods:** The type of research method used is quantitative observational analytical research using a cross sectional approach research design. Purposive sampling research sampling. The sample population in the study consisted of 64 venous blood and 64 capillary blood from students **Results:** The results of the T-test statistical analysis of the difference in platelet count using venous blood and capillary blood found a p value of 0.000 where the T-test value, if the p value is $0.000 < 0.05$, **Conclusions:** means that the conclusion is that there is a difference between the platelet count of venous blood and capillary blood. towards 'Aisiyiah Pontianak Polytechnic Medical Laboratory Technology students.

Keywords

Platelets, Venous blood, Capillary blood.



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1. Introduction

Platelets are blood cells that are essential for the blood clotting process. Platelets make up the majority of blood when blood vessels rupture, bleed, or when the skin is torn or injured. In humans, the normal platelet count is between 150,000 and 400,000 per microliter of blood. If you have fewer than 150,000 platelets, you have a condition called platelet deficiency or thrombocytopenia. However, if your platelet count exceeds 400,000, you have a condition called platelet excess, or thrombocytosis. Platelet lifespan: The lifespan of platelets is 5 to 9 days. Platelets perform their function throughout life and age, but are destroyed in the body by the spleen and replaced by newly formed

platelets(hidayat fahrul 2023).

Platelets are a crucial component in the hemostatic response and interact with other hemostatic components. Platelets are very small, measuring 2 to 4 μm and oval in shape. Platelets become active because they contain cytoskeletal proteins that enable them to rapidly move from a resting to an active state when a blood vessel is damaged. These proteins support platelet shape and function changes, enabling them to play an effective role in blood clotting and wound healing(Nugraha 2025).

Venous blood transports deoxygenated blood back to the heart. This process begins with the formation of veins, which originate from the merging of capillaries. The main veins leading to the heart form when blood from smaller veins flows into larger veins. Compared to arteries, veins are more numerous and larger. The three layers of the vein wall are composed of smooth muscle in the middle layer, called the tunica media, and connective tissue in the outer layer, called the tunica adventitia. The middle layer, called the tunica media, is less elastic and more prone to collapse because it is composed of smooth muscle, which is weaker and thinner than that of arteries. Its inner layer, formed by endothelium, is a flat membrane composed of single cells, commonly called the intima. In adults, a common site for venous blood testing is one of the veins in the cubital fossa (Sandy 2019).

Substances can move between cells, tissues, and blood vessels thanks to these small, thin blood vessels. Capillary blood connects venous and arterial blood, transporting various chemicals that can affect blood sugar levels, which are difficult to regulate, including hormones, carbon dioxide, oxygen, vitamins, and minerals (Sandy 2019).

The purpose of platelet measurement is to measure the number of platelets per microliter of blood. Platelets play a crucial role in hemostasis, the body's natural mechanism for preventing and stopping bleeding. Platelets function to close wounds, reduce the risk of blood loss, and protect the body from pathogen invasion. Platelet count measurement is crucial in diagnosing various diseases and medical conditions(Prasetya, H. R., Dentri, M. I. 2016). The researchers aimed to differentiate platelet count results using venous and capillary blood in medical laboratory technology students at the Aisyiyah Pontianak Polytechnic.

2. Materials and Methods

2.1. Subsection

This study employed a quantitative, observational, and analytical cross-sectional approach, a study conducted on multiple populations simultaneously. This does not mean that all respondents are measured or observed simultaneously, rather, each not respondent is observed only once, and the respondent's variables are measured at the time of the examination.

This study employed non-probability and purposive sampling techniques. Data were collected using questionnaires completed by students in the Medical Laboratory Technology Study Program. Respondents were given an explanation of the research to the students. If they agreed to participate, they were asked to sign an informed consent form and voluntarily complete the questionnaire.

2.2. Subsection

The subjects in this study were taken by purposive sampling of 64 venous blood samples and 64 capillary blood samples from Medical Laboratory Technology students of the 'Aisyiyah Pontianak Polytechnic and the number of platelets was examined using the Sysmex Xp-100 Hematology Analyzer.

2.3. Subsection

Data analysis using univariate and bivariate analysis Data test using Normality Test used in this study is Kolmogorov-Smirnov with normal distribution or not at less than 0.05, then the collected data is subjected to statistical test Paired T test. to determine the difference in the results of the examination of the number of venous and capillary blood platelets. Before conducting statistical tests, the Kolmogorov Smirnov test is first carried out to determine the distribution of the data. The results of the Kolmogorov Smirnov test show that the data is normally distributed where the p value is > 0.05 , then the parametric Paired T test is carried out.

3. Results and Discussion

3.1. Subsection

a. Respondent Characteristics

The frequency distribution consisted of 64 respondents. In this study, respondents were aged between 18 and 24 years, with the most respondents being 20 years old (19) (29.7%), the least being 23 years old and 24 years old (1.6%). The most respondents were female (52) (81.3%), and 12 were male (18.8%).

Table 1. Frequency distribution based on respondent age and gender

Respondent characteristics	Frequency (n)	Percentage (%)
Umur		
18	3	4.7
19	15	23.4
20	19	29.7
21	16	25.0
22	9	14.1
23	1	1.6
24	1	1.6
Gender		
Men	12	18.3
Women	52	81.3
Total	64	100%

b. Research Results Average Value

The results of the study showed that the average value of venous blood was 336.75, SD of venous blood was 85.146 and Mean of capillary blood was 234.23, SD of capillary blood was 66.386. This was influenced by the fact that capillary blood taken from the fingertips was small in size, in contrast to the size of larger veins, so that when taking capillary blood samples, the finger from which blood was taken was treated by massaging it until the blood came out. Research conducted by (Naim, et al. 2022. P.830 - 831, Suryatama, Deni, F., Sebayang, R., & Hutabarat 2023). on the comparison of cell counts in venous and capillary blood, after statistical tests, obtained a value of (p; 0.000) meaning that there was a difference in the number of platelets in venous and capillary blood. The difference was caused by the puncture being less deep so it needed to be pressed and resulted in blood dilution.

Table 2. Average value

		Mean	SD	Unit
Platelet (Vein)	Results	336.75	85.146	/ μ L
Platelet (Capillary)	Results	234.23	66.386	/ μ L

3.2. Subsection

a. Normality test

Table.3 Normality test

	Statistic	N	P-value
Platelet Results (Vein)	0.084	64	0.200
Platelet Results (Capillary)	0.080	64	0.200

The results of the research on the normality data of the Kolmogorov-Smirnov test at a p value of 0.20 where the normality value, if the p value < 0.05 , then from the data results p-value $0.20 < 0.05$ means it is categorized as normally distributed. Research according to Prasetya et al., (2016) Differences in Platelet Count Using Venous Blood and Capillary Blood, there are significant differences in the results of platelet count examinations using venous blood and capillary blood.

b. Statistik Paired t-test

Table 4. Statistik Paired Sampel Correlation test

	N	Correlation	P-value
Platelet Results (Vein and Capillary)	64	0.621	0.000

The results of table 4 above show that there is a relationship between the number of venous platelets and the number of capillary platelets, and the results of the t-test show a P value of 0.000 (< 0.05) it can be concluded that there is a significant difference in the number of platelets between venous blood and capillary blood in Medical Laboratory Technology students of the 'Aisyiyah Pontianak Polytechnic. These results are in accordance with research according to (Suryatama et al. 2023) Comparison of Platelet Levels in Venous and Capillary Blood Using EDTA Anticoagulant that there is a significant difference between venous blood and capillary blood in platelet count examinations.

4. Conclusions

The results of the research that has been done obtained an average value in platelet examination using venous blood of $335.5 \times 10^3/\mu\text{L}$ and an average number of platelets using capillary blood of $296.1 \times 10^3/\mu\text{L}$. The results in analyzing using the t-test obtained a significant value with a P value ($0.000 < 0.05$) so there are significant results with differences in platelet counts between venous

blood and capillary blood for Medical Laboratory Technology students at the 'Aisiyiah Pontianak Polytechnic.

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