B-ICON Proceeding

Proceeding Paper

DESCRIPTION OF THE RESULTS OF EXAMINING HEMOGLOBIN LEVELS WITH THE SAHLI METHOD USING CAPILLARY BLOOD AND VENOUS BLOOD

Anisa Ummairoh, Tedy Febriyanto*, Evi Fitriany

Department of Medical Laboratory Technology, Poltekkes Kemenkes Bengkulu, Bengkulu, Indonesia

**tedyfoo01@gmail.com*

Abstract

Hemoglobin examination is used as an early detection of symptoms of anemia. The simple method used to check hemoglobin levels is the Sahli method because the equipment is light, easy to carry, cheap and the equipment and materials are easily available. Samples used in hemoglobin examination can use venous blood and capillary blood. This study aims to describe the results of checking hemoglobin levels using venous blood and capillary blood using the Sahli method. This research uses descriptive research methods to determine the description of hemoglobin examination using the Sahli method for venous blood and capillary blood. The results of the research showed a decrease in hemoglobin examination results using venous blood and capillary blood, most of the samples examined experienced a decrease (68.75%) and almost half of the examination results were at the same level (31.25%), and none of the examination results with elevated levels (0%). Based on the research results, it can be concluded that most of the hemoglobin levels examined using venous blood were normal and almost all of the results were abnormal, almost half of the hemoglobin levels examined using capillary blood were normal and most of the results were abnormal.

Keywords : Hemoglobin Levels, Sahli Method, Venous Blood, Capillary Blood

Presented at The 4rd Bengkulu International Conference on Health (B-ICON), Bengkulu-Indonesia, September 24-26th, 2024

Published: December 31st, 2024

ISSN : 2986-027X

INTRODUCTION

Blood is liquid connective tissue consisting of blood plasma, red blood cells, white blood cells and blood platelets, which functions as a means of transporting substances, preventing the body from being attacked by germs, and so on. Blood flows throughout the body until it returns to the heart through arteries, veins and capillaries Even though the circulation is interdependent, there are

significant differences in hemoglobin levels examined using capillary and venous blood samples.(Solehkah et al., 2019), while hemoglobin levels in arterial blood do not have a significant difference in results from venous blood (Nugrahini et al., 2018).

According to Ningning and Andika (2021), capillaries have a smaller diameter than erythrocytes. The diameter of capillaries is 4 mm, while erythrocytes have a diameter of 7.2 mm, resulting in deformability. Deformability is the adjustment (elasticity) of the shape of erythrocytes as they pass through microvasculature such as capillaries. The occurrence of deformability affects the viscosity of erythrocytes, so that capillary blood is thinner (less hemoglobin content) than venous blood. This is what causes the hemoglobin level in capillary blood to be lower than in venous blood. (Wahyuni dan Aliviameita, 2021).

Hemoglobin examination aims to determine the level of red blood cells in the body. According to WHO (World Health Organization), normal Hb levels in adult men are >13% and adult women are >12% (Tambunan and Maritalia, 2023). Nationally, community health centers have a percentage of 46.3% that use Hb sahli as a means of measuring hemoglobin, and 37.7% for the percentage of community health centers that use Hb sahli and use it for MCH (mother and child health) services, because the method is simple, light, easy to carry, cheap and easily available tools and materials, but this test has an error rate of up to 15% -30%. Until now, measuring Sahli hemoglobin levels is still taught to be mastered by medical personnel, because in remote areas and access to health services in government-owned institutions is difficult and in remote areas there is still no access to electricity. (Faatih, 2017).

The Sahli method is a simple method that can be used as a quick check to determine hemoglobin levels. The Sahli method usually uses capillary blood as an examination sample, however the use of capillary blood samples has disadvantages, namely the possibility of dilution of the sample caused by the thin capillary lining, the structure of the endothelium layer which has gaps allowing the exchange of fluids and substances, and this often occurs. a mistake in the stabbing so that the blood does not come out smoothly and then the finger will be massaged. This causes dilution of the blood by tissue fluid so that the examination results will tend to be lower (Widiyanto et al., 2021).

Based on the description above, researchers are interested in conducting research with the title Description of the Results of Sahli Method Hemoglobin Examination Using Capillary and Venous Blood in 2024.

MATERIALS AND METHODS

The type of research carried out is analytical descriptive research because this research aims to describe or provide an overview of the Sahli method of hemoglobin examination using capillary and venous blood which has been collected by carrying out analysis and making conclusions that apply to the general public regarding the research to be carried out.

This research was conducted on January 24 2024 and April 25 2024. The research location was carried out at the integrated laboratory of the Bengkulu Ministry of Health Polytechnic, Bengkulu Jl. Indragiri Pd. Harapan No.3, Padang Harapan, Kec. Gading Cemp., Bengkulu City, Bengkulu

The population was taken from students of DIII Medical Laboratory Technology level II in 2024, Poltekkes, Ministry of Health, Bengkulu. The population is the entire object under study, namely 106 students, and the research sample was taken using the purposive sampling method, namely taking all respondents who were available, willing, and who met the research criteria, totaling 15 students.

The type of data used is primary data. The research carried out direct examination of the samples. The samples used were level II DIII Medical Laboratory Technology students who were examined for capillary blood and venous blood levels at the Bengkulu Ministry of Health Polytechnic Integrated Laboratory.

Blood obtained from the results of hemoglobin (Hb) presence tests in venous blood and capillary blood was tabulated and analyzed using univariate statistical tests.

RESULTS AND DISCUSSION

Results

Univariate analysis was used to determine the frequency distribution of hemoglobin levels examined using venous and capillary blood samples to obtain the results as below.

Table 1 Percentage of Hemoglobin Level of Inspection Type

Type of Inspection	Hemoglobin Levels	Frequency	%
Venous Blood	Normal	10	66,7
	Abnormal	5	33,3
	Total	**15**	**100**
Capillary Blood	Normal	4	26,7
	Abnormal	11	73,3
	Total	**15**	**100**

Based on table 1, it is known that most of the hemoglobin levels examined using venous blood were normal levels (66.7%) and almost all of the results were abnormal levels (33.3%), almost half of the hemoglobin levels examined using capillary blood were normal levels. (26.7%) and most of the results were with abnormal levels (73.3%).

Discussion

Based on research that has been carried out on hemoglobin levels examined using capillary blood and venous blood in 15 samples, it was found that most of the hemoglobin levels examined using venous blood were normal levels (62.5%) and almost all of the results were abnormal levels (31, 25%), the hemoglobin levels examined using capillary blood were a small number of normal levels (25%) and not most of the results were abnormal levels (68.75%). The results of this study are in line with the research of Luluk Sholekah et. al (2019) who conducted research on hemoglobin levels using the cupric sulfate method using capillary blood and venous blood, the results were that most of them decreased. This is because blood mixed with tissue fluid can affect hemoglobin levels.

Capillaries only have one layer of endothelium which allows lymph fluid to seep out to form tissue fluid carrying water, minerals and nutrients for cells which causes capillary blood to be thinner than venous blood which has a thicker layer (Solehkah et al., 2019) . This is also supported by research conducted by Widianto et. al (2021) which states that the hemoglobin level in venous blood is higher than the hemoglobin level in capillary blood because sometimes when taking capillary blood where only a small amount of blood is taken, the finger is massaged with the aim of increasing the volume of the deficient blood, this treatment causes the blood fluid that comes out to mix with the fluid. the tissue comes out, so that the capillary blood becomes thinner. This is supported by research conducted by Wahyuningsih (2022), stating that massaging fingers can cause hemodilution (changes in hemodynamics and an increase in blood volume but the number of erythrocytes decreases) which causes a decrease in blood concentration, resulting in lower hemoglobin levels.

The Sahli method of hemoglobin examination using venous blood is of better quality than using capillary blood because veins have thicker walls than capillaries so they do not mix easily with interstitial fluid (tissue fluid) which causes the blood to be thinner (Surdayati, 2020).

The decrease in hemoglobin levels in capillary blood is related to the MCH (Mean Corpuscular Volume) and MCV (Mean Corpuscular Hemoglobin) values. Based on the results of research conducted by Nining and Andika (2021), it was stated that there was a decrease in MCH and MCV values when examining erythrocytes using capillary blood and venous blood. The MCH value describes the amount of hemoglobin in red blood cells. The presence of high hydrostatic pressure in the capillaries pushes fluid out into the interstitium so that more O2 diffuses out into the interstitium and results in more CO2 flowing in the blood. (Sherwood, 2015). Capillary blood containing CO2 causes lower MCH values in capillary blood because oxygen can only bind to iron molecules in hemoglobin. The MCV value describes the average size of erythrocytes. Erythrocyte levels in the blood are influenced by erythrocyte deformability. Capillary blood vessels have a smaller size than erythrocytes. The lower MCV value in capillary blood proves that erythrocyte deformability causes

the average size of erythrocytes to be smaller so that the hemoglobin content contained in erythrocytes in capillary blood is less than in venous blood.

CONCLUSION

Based on the results of the research and discussion on "Overview of the Results of the Sahli Method of Hemoglobin Level Examination Using Capillary Blood and Venous Blood in 2024", it can be concluded that most of the hemoglobin levels examined using venous blood were normal levels and almost all of the results were abnormal levels. Almost half of the hemoglobin tested with capillary blood was at normal levels and most of the results were at abnormal levels.

Acknowledgements

Thank you to the supervisors, examiners and colleagues who were willing to give their time to help carry out this research.

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