

Comparison Results of Hemoglobin Checkup in Pregnant Women using Cyanmethemoglobin Method and Azidemet Hb Methods

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ABSTRACT

The hemoglobin checkup in pregnant women was done by several methods, some of those were Cyanmethemoglobin and Azidemet Hb methods. The incidence of anemia during pregnancy, childbirth and during the puerperium can be reduced by early detection of anemia by checking hemoglobin levels. The purpose of this study was to determine hemoglobin levels using the Cyanmethemoglobin method and the Azidemet Hb method. Data collection was carried out by observational method using cross sectional design. The research was conducted at the Ajibarang II Public Health Center, Banyumas Regency in October - November 2020. The sample used was 20 respondents. The results of the examination using the Cyanmethemoglobin method for venous blood were 10.12 ± 0.62 g / dL and the Azidemet Hb method for capillary blood was $11.98 \pm 1,0009$ g/dL. There is a significant difference between the results of hemoglobin examination using the Cyanmethemoglobin method of venous blood and the Azidemet Hb method of capillary blood.

Keywords:
pregnant women,
pregnancy, hemoglobin,
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INTRODUCTION

Pregnancy, process and series of changes that take place in a woman's organs and tissues as a result of a developing fetus. The entire process from fertilization to birth takes an average of 266–270 days, or about nine months. Pregnancy begins with fertilization which will develop into a fetus and ends with the delivery process (Khoiriah & Latifah, 2020). Factors that affect pregnancy are physical, psychological and lifestyle factors. Physical factors include health status which is one of the factors related to the health condition of pregnant women. Psychological factors arise due to the immaturity of a person's emotional development to adapt to certain situations, including pregnancy. A healthy lifestyle is somewhat that pregnant women must pay attention to (Puspitasari *et al.*, 2020).

Risks that can occur during pregnancy include urinary tract infections (UTI), anemia, mental health conditions, high blood pressure that occurs during pregnancy and increased blood glucose that occurs during pregnancy (H. Sari *et al.*, 2015) (Sukartiningih, 2020). Lack of nutrients in pregnant women can lead to risks and nutritional problems such as anemia (T. Rusmiati *et al.*, 2021). Pregnant women are very susceptible to iron deficiency anemia, because of during pregnancy the demand for oxygen is higher, triggering an increase in erythropoietin production. Plasma volume will increase and erythrocytes will increase, so that the concentration of hemoglobin (Hb) decreases due to hemodilution (Kundayanti *et al.*, 2019) (Hariati *et al.*, 2019) (WHO, 2011) (National Heart Lung and Blood institute, 2011).

According to (Puspitasari *et al.*, 2020), their research showed of hemoglobin examination in pregnant women using the capillary blood azidemet Hb method with the venous blood cyanmethemoglobin method were analyzed statistically using the Independent Sample T Test. The results of the analysis showed that there was no statistically significant difference between the average results of hemoglobin examination by the

azidemet Hb capillary blood method and the venous blood cyanmethemoglobin method, whereas based on Evi's research (2019) hemoglobin examination in pregnant women using the azidemet Hb method and the cyanmethemoglobin method showed significant difference (Asih *et al.*, 2019) (Sunarto, 2000) (Dacie, 2016). Because there were differences in the results of several previous studies, the researcher was interested in conducting this research.

MATERIALS AND METHODS

Materials and Equipment

This research is a laboratory observational study with cross sectional method which compares the results of examining hemoglobin levels using the Cyanmethemoglobin method and the Azidemet Hb method (Faatih, 2018). The population in this study were pregnant women who had their Hb checked at the Ajibarang II Health Center. The sampling technique used random sampling. The sample of the research object with an age range of 16-40 years was 20.

The tools used in the study were the Easy Touch GCHb photometer and hemoglonometer, while the research materials were venous and capillary blood. The stages carried out in the study included taking blood samples, examining Hb levels in venous and capillary blood using the Cyanmethemoglobin method and the Azidemet Hb method (Kusumawati *et al.*, 2018) (Purwanti *et al.*, 2012) (Umami SW *et al.*, 2019).

The research data were analyzed statistically using SPSS 25 for the Normality test, this test functions to determine whether the data is normal or not, which is then followed by the Mann Whitney U test to find out the difference between the Cyanmethemoglobin method and the Azidemet Hb method.

Ethics Statement

This research has received research ethics approval from the Health Research Ethics Commission, University of Muhammadiyah Purwokerto with reg No. KEPK/UMP/13/X/2020. Information about the participant includes age, gestational age, and pregnant condition, type of supplement, drug, and vitamins consumption, and laboratory findings were collected.

RESULTS AND DISCUSSION

A total of 40 pregnant women had their blood samples taken either through veins or capillaries. The most pregnant women used in this study were aged between 21 and 25 years, with a percentage of 40.0%, while the least with a percentage of 10.0%, namely 31 to 40 years. Table 1 shows the characteristics of the respondents based on consumption of Fe supplements. It can be seen that 100% of pregnant women respondents consumed Fe supplements. None of the 20 pregnant women respondents took supplements other than Fe. The type of Fe supplement consumed is a hemobion supplement. The gestational age in this study was 25% of the first trimester respondents, 20% of the second trimester respondents, and 55% of the third trimester respondents. Pregnant women aged <20 years were 3 people (15%), aged 21-25 years were 8 people (40%), aged 26-30 years were 3 people (15%), aged 31-35 years were 2 people (10%), aged 36-40 years amounted to 2 people (10%), aged >40 years amounted to 2 people (10%). From the 20 respondents, 100% of the respondents were in good health and none of the respondents were sick. Based on Table 2, the normality test shows that the sig value is more than 0.05, so the data is normally distributed. Then proceed with the Independent T test to determine whether there is a significant difference between the Cyanmethemoglobin method and the Azidemet Hb method.

Based on Table 3, it is known that the average hemoglobin level in pregnant women using the Cyanmethemoglobin method is 10.12 ± 0.62 g/dL and the average hemoglobin level in pregnant women using the Azidemet Hb method is 11.98 ± 1.009 g/dL. The lowest hemoglobin level value in the Cyanmethemoglobin method was 9.00 g/dL and the highest value was 11.50 g/dL, while the hemoglobin level value in the Azidemet Hb method was 8.30 g/dL and the highest hemoglobin level value was 13.50 g/dL. The value of $p=0.000$ ($p<0.05$) means that there is a significant difference in the average Hb levels in pregnant women using the Cyanmethemoglobin method and the Azidemet Hb method.

The number of samples used in this study were 40 samples from a total of 34 pregnant women at the Ajibarang II Health Center. The data that has been obtained is analyzed using the Normality test, if the data is normally distributed then it is continued with the independent T test. This study uses primary data. Retrieval of primary data on hemoglobin levels in pregnant women using the Cyanmethemoglobin and Azidemet Hb methods in the October-November 2020 period.

There is a significant difference in the results of examination of hemoglobin levels in pregnant women. This is due to using two different methods and two different samples so the refraction is greater, the maintenance of the equipment is not good and the error factor in the work technique is also greater. This is in line with Evi's research (2019) the results of a study of hemoglobin examination in pregnant women using the venous blood Cyanmethemoglobin method was 10.58 ± 0.67 g/dL and the Azidemet Hb capillary blood method was 11.25 ± 1.002 g/dL. There is a statistically significant difference between the average hemoglobin examination results in pregnant women using the Cyanmethemoglobin method and the Azidemet Hb method.

This result is not in line with Puspitasari's study (2020) the results of hemoglobin examination in pregnant women using the venous

blood Cyanmethemoglobin method were 10.77 ± 1.36 g/dL and the Azidemet method Hb capillary blood was 11.28 ± 1.17 g/dL. The results of the analysis showed that there was no statistically significant difference between the average hemoglobin examination results using the Cyanmethemoglobin method for venous blood and the Azidemet Hb capillary method (Puspitasari *et al.*, 2020).

Based on Table 1, it is known that 100% of pregnant women respondents took Fe

supplements to maintain their immune system during pregnancy. The type of supplement consumed is hemobion. According to Permenkes No. 88 of 2012 concerning the standard of iron supplement tablets for women of childbearing age and pregnant women, states that to protect women of childbearing age and pregnant women from malnutrition and prevent iron deficiency anemia, it is necessary to consume iron supplement tablets.

Table 1. Characteristics of Research Subjects

Characteristics of subject	Number (person)	Percentage (%)
Age of Pregnant Women		
16-20 year	3	15%
21-25 year	8	40%
26-30 year	3	15%
31-35 year	2	10%
36-40 year	2	10%
>40 year	2	10%
Gestational age		
Trimester I	5	25%
Trimester II	4	20%
Trimester III	11	55%
Condition of Pregnant Women		
Healthy	20	100%
Unhealthy	-	-
Consumption of Fe Supplement		
Yes	20	100%
No	-	-
Type of Fe supplement		
Hemobion	20	100%
Sangobion	-	-
Blackmore	-	-
Consumption of drugs or vitamins other than Fe		
Yes	-	-
No	20	100%

Table 2. Normality test of Kolmogorov-smirnov

Treatment	Kolmogorov-smirnov	
	df	sig
Level Hb	40	,113

Table 3. Independent T test

Treatment	N	Average \pm SD (g/dL)	Median (Min-Max) g/Dl	P Value
Cyanmethemoglobin	20	10.12 ± 0.62	10.10 (9.00-11.50)	0.000
Azidemet Hb	20	11.98 ± 1.009	11.98 (8.30-13.50)	

The recommended Fe tablets at the Ajibarang II Health Center in Banyumas Regency are Hemobion containing Fe fumarate, folic acid and vitamin C per one tablet. During pregnancy it is recommended to consume of 90 Fe tablets, this aims to prevent anemia in pregnant women. Giving iron during pregnancy is one effort to increase hemoglobin levels during pregnancy. Each Fe supplement tablet contains of 60 mg of Fe equivalent to 200 mg of Ferrosulfate. In addition to consuming Fe tablets, pregnant women are also advised to maintain a diet that does not hinder the body's absorption of iron. Such as consuming spinach, nuts and fruits that contain lots of vitamin C and avoiding foods or drinks that inhibit the absorption of iron in the body such as milk, tea and grapes (Septiani, 2017) (Khoiriah & Latifah, 2020).

None of the respondents in this study took supplements or vitamins other than Fe because during pregnancy women used as an immune system, namely Fe supplements. Anemia is a condition in which the number and size of red blood cells, or hemoglobin concentration is below normal values. As a result, it can damage the capacity of the blood to transport oxygen which is delivered throughout the body (Ngurah Rai et al., 2016). According to Desi (2019) consuming Fe supplements can maintain endurance because it can prevent anemia and maintain optimal fetal growth. During pregnancy the need for iron increases up to 2 times the need before pregnancy. This happens because during pregnancy the blood volume increases by up to 50%, so more iron is needed to form hemoglobin (D. Rusmiati, 2019).

The number of respondents with the first trimester of pregnancy was 25%, the second trimester was 20%, and the third trimester was 55%. The most frequent gestational age for routine checks is the second and third trimesters of pregnancy. This aims to determine the physical and psychological health, including the growth and development of the fetus and to prepare for the process of labor and birth so that the mother is ready to face her new role as a parent.

As many as 100% of research respondents were in good health and none of the respondents were sick. Respondent's health is one of the risk factors that can cause an increase or decrease in hemoglobin levels in pregnant women. The number of pregnant women aged <20 years was 3 people (15%), aged 21-25 years was 8 people (40%), aged 26-30 years was 3 people (15%), aged 31-35 years was 2 people (10%), aged 36-40 years amounted to 2 people (10%), and aged >40 years amounted to 2 people (10%). Pregnancy that occurs at the age of less than 20 years is prone to anemia, because at that age a growth process occurs that requires more nutrients, plus increased nutritional needs during pregnancy. If the nutrients are not fulfilled, it will become a health problem for the mother and baby. Factors that can affect the stability of the sample so that it affects the examiner's results Hemoglobin includes samples for examining tools and materials, storage time, light, temperature, contamination, and evaporation, work techniques, quality control including poor precision and accuracy, poor calibration or maintenance (Hasan et al., 2015).

CONCLUSION

The average Hb level in pregnant women using the Cyanmethemoglobin method was 10.12 ± 0.62 g/dL. The average Hb level in pregnant women using the Azidemet Hb method was 11.98 ± 1.009 g/dL. There is a significant difference in Hb levels in pregnant women using the Cyanmethemoglobin method and the Azidemet Hb method. This is indicated by the value of $p = 0.000$ ($p < 0.005$).

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CONFLICT OF INTEREST

We have no conflict of interest related to this work.

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