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Haematology Blood Profile and Peripheral Blood Smear In Pregnant Women

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Abstract: *Hematologic changes in pregnancy occur to meet the needs of the developing fetus and placenta, with major changes in blood volume. Although physiological, an abnormal hematological profile predisposes to pregnancy. The most common laboratory test is a complete blood count (CBC). This test provides information about blood cell production and identifies the patient, oxygen-carrying capacity through evaluation of erythrocyte, hemoglobin and hematocrit indices. Peripheral blood smear examination is an important part of the hematological evaluation. Peripheral blood smears in general can provide information about possible diseases, both primary due to hematological disorders and secondary due to other systemic diseases. This study used 40 pregnant women as subjects who came to the Wihdah Medical Center maternity clinic. The research was conducted from November 1, 2023 – January 5, 2024. In this study, it was found that there were more pregnancies with anemia at younger or older ages, normal hemoglobin levels were more at ages 20 – 35 years, normochromic normocytic features were more at ages 20-35 year. Alauddin Makassar, Indonesia*

Keywords: *Hematologic profile, peripheral blood smear, pregnant women*

I. INTRODUCTION

Changes in the hematological profile are one of the factors that influence pregnancy and its outcome. Consequently, hematological profiles are measured worldwide to estimate the general health status of individuals due to their reliability and cost-effectiveness. Severe anemia during pregnancy is associated with prematurity, spontaneous abortion, low birth weight, operative delivery, postpartum hemorrhage and fetal death.(Akinbami AA, Ajibola SO, Rabiu KA, et al; 2013)

Hematological changes occur to meet the needs of the developing fetus and placenta, with major changes in blood volume. Mean plasma volume increases by 40 to 45%, this increase is mediated by the direct action of progesterone and estrogen on the kidneys. Red blood cell mass increases by 15-20% as a result of increased erythropoietin production. Because the increase in red blood cell mass is relatively smaller than the increase in plasma volume, the final result is that the hemoglobin (Hb) concentration decreases by 1-2 g/dl. This is called physiological anemia of pregnancy (Shitie, D., Zewde, T. & Molla, Y; 2018)

Laboratory tests are used to determine the presence of abnormalities in the body, physiological processes, help establish a diagnosis, make a differential diagnosis, monitor the course of the disease, manage sufferers and determine the prognosis. The most common laboratory test is a complete blood count (CBC). This test provides information about blood cell production and identifies the patient's oxygen-carrying capacity through evaluation of erythrocyte, hemoglobin and hematocrit indices. This examination also provides information about the immune system through evaluating the number of leukocytes with a differential count. The CBC test can be carried out manually or automatically by calculating each parameter (Red Blood Cell (RBC), White Blood Cell (WBC), platelet count, hemoglobin, Platelet Corpuscular Volume (PCV) and differential leukite count (Ahmed MM, Ghauri SK, Javaeed A et al)

Peripheral blood smear examination is an important part of the hematological evaluation. Peripheral blood smears can generally provide information about possible diseases, both primary due to hematological disorders and secondary due to other systemic diseases. Peripheral blood allows cell identification and cell morphology to be easily recognized using a microscope (Hardjoeno; 2012), (Breymann C. (2015)

II. MATERIALS AND METHODS

This research is an observational study with a cross-sectional approach with a total of 40 subjects. Sample analysis and smear work at the Wihdah Ummah Medical Center maternity clinic on November 1 2023 – January 5 2024.

III. RESULT

The results of this study were obtained from the medical records of 43 first trimester pregnant women with hematology examinations available. There were seven research subjects who were excluded because they did not have routine blood checks, so there were 40 research subjects.

Tabel 1. Subject

	Amount	Percentage (%)
Age		
< 20 Years	2	5
20 – 35 Years	30	75
>35 Years	8	20
Hemoglobin		
Low (<11 gr/dl)	16	40
Normal (11 gr/dl)	25	60
MCV		
Normocytic	25	62.5
Macrocytic	0	0
Microcytic	15	37.5
MCH		

Normochrome	25	62.5
Hyperchrome	0	0
Hypochrome	15	37.5
MCHC		
Normal	15	37.5
Low	25	62.5
High	0	0
Peripheral Blood Smear		
Normocytic normochrome	15	37.5
Heperchromic Microcytic	0	0
Hypochromic microcytic	25	62.5

Source: Primary data

IV. DISCUSSION

In the study, hemoglobin levels were found to be as low as 40%. Anemia in pregnancy cannot be separated from the physiological changes that occur during pregnancy, the age of the fetus, and the previous condition of the pregnant woman. During pregnancy, the body will experience significant changes, the amount of blood in the body increases by around 20 - 30%, thus requiring an increased need for iron and vitamin supplies to make hemoglobin (Hb). When pregnant, the mother's body will make more blood to share with her baby. The body requires up to 30% more blood than before pregnancy (Sifakis, S., & Pharmakides, G. (2000)

Anemia is a condition where there are not enough erythrocytes to deliver tissue oxygen needs. Because this is difficult to measure, anemia is defined as a low concentration of hemoglobin (Hb), erythrocyte count, and hematocrit (Hct) from normal values. Based on WHO, anemia in pregnancy is confirmed if the hemoglobin (Hb) level is low. According to WHO, iron deficiency anemia is a condition where the body lacks iron, which is proven by signs of iron deficiency in the tissues and insufficient iron reserves in the body, accompanied by a decrease in hemoglobin levels of more than 2 standard deviations from the reference value in the same population. (Gemechu et; (2023)

During pregnancy there is an increase in blood volume (hypervolemia). Hypervolemia is the result of an increase in the volume of plasma and erythrocytes (red blood cells) in the body, but this increase is not balanced, namely the increase in plasma volume is much greater, thus having the effect of reducing the hemoglobin concentration from 12 g/100 ml. Sarwono (2002). In pregnancy, anemia occurs relatively often because pregnant women experience hemodelusion (dilution) with an increase in volume of 30% to 40%, which peaks at 32 to 34 weeks of pregnancy. The number of blood cells increases by 18% to 30% and hemoglobin by around 19% . If the mother's hemoglobin before pregnancy is around 11 gr% then hemodilution will result in anemia during pregnancy and the mother's Hb will be 9.5-10 gr%. In this research it was found Hypochromic microcytic anemia was 62.5%. Hypochromic microcytic anemia is caused by any factor that reduces iron stores in the body. Hemoglobin is a globular protein which is the main component of red blood cells, produced in the bone marrow by erythroid progenitor cells. It has four globin chains, two of which are alpha-globin chains while the other two are beta-globin chains, these four chains are attached to a porphyrin ring (heme) whose middle part contains iron in the form of iron (reduced iron) which is capable of binding four oxygen molecules. . Decreased iron stores stop the production of hemoglobin chains, and their concentration begins to decrease in newly formed red blood cells. Because the red color of red blood cells is caused by hemoglobin, the color of

newly formed red blood cells begins to fade and is called hypochromic. Because newly produced red blood cells contain less hemoglobin, they are relatively small compared to normal red blood cells, so they are called microcytic. Iron deficiency hypochromic microcytic anemia is caused by disruption of the supply of iron in the diet due to decreased iron content in the diet, small intestinal disorders such as mouth ulcers and chronic diarrhea, gastrectomy, and lack of vitamin C in the diet. This may be due to acute or chronic blood loss and also due to suddenly increased demands of pregnancy or major trauma and surgery. Reduced hemoglobin in red blood cells decreases the amount of oxygen delivered to peripheral tissues causing tissue hypoxia. (Chaudhry HS, Kasarla MR, 2023), (Gebreweld A, Bekele D, Tsegaye A, 2018)

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