



## MICROSCOPIC ANALYSIS OF SURROUND BLOOD SCRAPS BASED ON DEGREE OF MICROCYTIC ANEMIA IN PREGNANT WOMEN IN MAKASSAR CITY AREA

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### Abstract

Microcytic anemia is the formation of red blood cells to become small as a result of poor hemoglobinization characterized by a Mean Corpuscular Volume (MCV) < 80fl. The purpose of this study was to determine the microscopic analysis of peripheral blood smears in pregnant women with Microcytic Anemia. The population in this sample is pregnant women with anemia as many as 112 pregnant women. The samples in this study were 70 third trimester pregnant women with microcytic anemia. There were five microscopic analyzes of peripheral blood smears which revealed microcytic anemia. And the one with the greatest value was hypochromic microcytic anemia, suspected as the cause of Fe dd deficiency/accompanied by leukocytosis with signs of infection in 50 pregnant women. Among them were 37 (82.2%) pregnant women with mild anemia, there were 13 (59.1%) pregnant women with moderate anemia, 3 (100%) pregnant women with severe anemia. Examination of the peripheral blood smear can only show the results of the cause of microcytic anemia in the direction of suspicion, so other investigations are needed to determine the cause of anemia in pregnant women.

**Keywords:** Microcytic Anemia, Peripheral Blood Smear, Degree of Anemia

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### 1. Introduction

Anemia is a contributor to the increased morbidity and mortality of women and children. Anemia is a condition of deficiency in the quality or quantity of red blood cells which can cause complications in maternal and perinatal outcomes. Anemia of pregnant women is defined as maternal hemoglobin levels in the first and third trimesters lower than 11 gr/dl. And the hemoglobin level in the second trimester is less than 10.5 gr/dl.

During pregnancy, there are changes in erythrocyte mass, plasma volume, and blood volume. The increased plasma volume occurs to fill the intravascular space that has been created by the blood vessels and placenta. The need for oxygen during pregnancy will increase, resulting in an increase in the mass of erythrocytes.

Data from the World Health Organization (WHO), reports that around 32.4 million pregnant women suffer from anemia worldwide, and 0.8 million suffer from severe anemia. The highest prevalence was in Africa (44.6%), followed by Asia with a prevalence of 39.3%. As many as 50% of anemia cases are caused by iron deficiency, micronutrient deficiencies (folic acid, riboflavin, and vitamin B12), acute and chronic infections (malaria and tuberculosis), and disorders that affect hemoglobin synthesis. (World Health Organization, 2015).

For 5 (five) consecutive years the Indonesian Basic Health Research Reports in 2008, 2013 and 2018 have shown the prevalence of persistent anemia in various people at risk. In 2008 the prevalence of anemia was 19.7%, 13.1% and 9.8% in adult women, men and children, respectively (WHO, 2017). In 2018, the prevalence of anemia was 27.2%, 20.3%, 38.5%, and 48.9% in adult women and men, children under five, and pregnant women respectively (Lukito & Wahlqvist, 2020).

Microcytic anemia is anemia with the condition of the red blood cells that are smaller than normal in size and from a complete blood examination the MCV value is less than 80 fl. Microcytic anemia can be enforced by determining the type of anemia based on the cause through several laboratory tests. Among them is a complete blood test that can be traced to the hemoglobin (Hb) level of pregnant women.

Diagnosing microcytic anemia can be done in several ways, namely by carrying out a complete blood count to determine MCV levels accompanied by examination of Serum Fe, Ferritin, TIBC (Total Ion Comparison Capacity), and ADT (Peripheral Blood Smear). Peripheral blood smear is an examination to assess various peripheral blood elements such as erythrocytes, leukocytes, and platelets and look for parasites such as malaria, trypanosoma, microfilaria.

In cases of microcytic anemia, it can be seen based on the results of peripheral blood smears that microcytic anemia tends to lead to causes including infection, iron deficiency, chronic disease, and bleeding.

## **2. Methods**

The research design used is descriptive with cross sectional method. This study aims to determine the microscopic analysis of peripheral blood smears in pregnant women with microcytic anemia based on the degree of anemia in the Makassar City area. The research time is 15 June 2021 – 30 December 2023.

This research was conducted for the first time by looking for areas of Public Health Centers and Hospitals in the Makassar City area which had the highest incidence of anemia. Based on the number of cases of anemia, it was found that the locations that had the highest rates were Antang Health Center, Dahlia Health Center, Makassau Health Center, Pampang Health Center, Tamalate Health Center, Sitti Khadijah Mother and Child Hospital, Masyita Mother and Child Hospital, Pertiwi Special Mother and Child Hospital and Fatimah Mother and Child Hospital.

From the total number of pregnant women who were respondents based on criteria including third trimester pregnant women, primiparous/multiparous pregnant women, and not having blood disorders, there were 70 pregnant women who had microcytic anemia which was determined through a complete blood examination, and there were 42 pregnant women who did not have anemia.

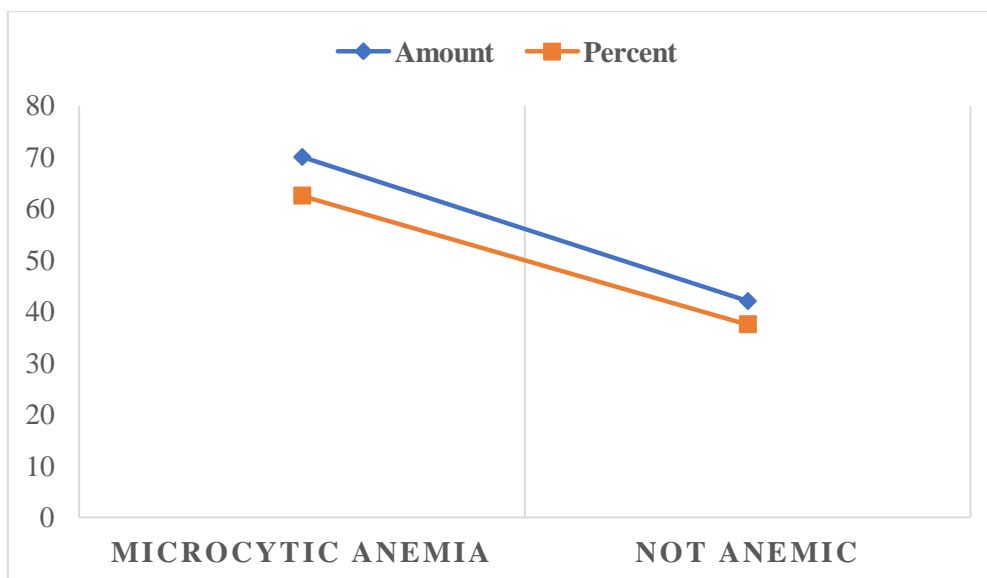
From the results of a complete blood count, it was found that the degree of microcytic anemia was classified in pregnant women. After a complete blood count, pregnant women who have a hemoglobin level <11 gr/dl will continue to do a peripheral blood smear.

## **3. Results**

### **Anemia Incidence in Makassar City Region**

From graph 1 above, it can be seen that of the 120 samples of pregnant women, there were 70 (58.3%) pregnant women who were anemic with hemoglobin levels < 11 gr/dl and there were 50 (41.6%) women who were not anemic with > 11 gr/dl.

Graph 1. Incidence of Anemia in Pregnant Women in the City of Makassar

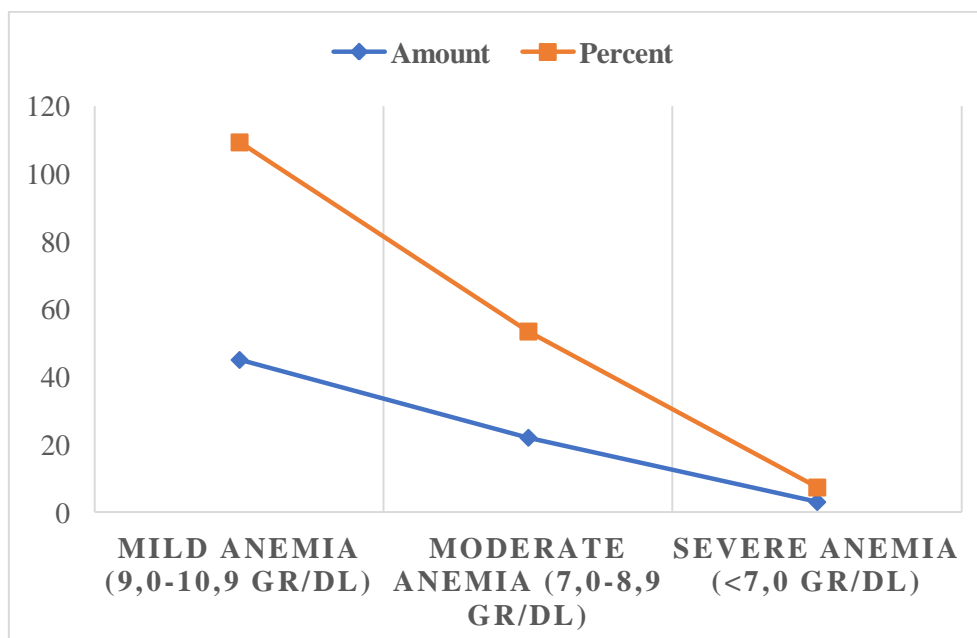


Source: Primary Data for 2022

#### Degree of Microcytic Anemia in Makassar City Region

Of the total number of samples with microcytic anemia, there were 45 (64.3%) mothers with mild anemia with hemoglobin levels (9.0-10.9 gr/dl), 22 (31.4%) mothers with moderate anemia with hemoglobin levels (7.0-8.9 gr/dl), and 3 (4.3%) women with severe anemia with hemoglobin levels (<7.0 gr/dl).

Graph 2. Degree of Microcytic Anemia in Pregnant Women in the Makassar City Region



Source: Primary Data for 2022

### Microscopic Analysis of Peripheral Blood Smears Based on the Degree of Mirocytic Anemia in Pregnant Women in the Makassar City Region

Based on the processed data in the distribution table above, the results were obtained from the ADT examination, where microcytic hypochromic anemia was suspected as the cause of FE deficiency with a picture of liver function consisting of 2 (4.4%) mothers with mild anemia, and 1 (4.5%) mother with moderate anemia, and none had severe anemia. ADT results with microcytic hypochromic anemia suspected of being the cause of iron deficiency consisted of 4 (8.8%) mothers who had mild anemia, and 4 (18.2%) women who had moderate anemia, and none had severe anemia. Results of ADT with hypochromic microcytic anemia suspected to be the cause of Fe DD deficiency/chronic disease consisting of 2 (4.4%) mothers with mild anemia, and 3 (13.7%) mothers with moderate anemia, and none had severe anemia.

Results of ADT with hypochromic microcytic anemia suspected to be the cause of Fe DD deficiency/chronic disease accompanied by leukocytes with signs of infection consisting of 22 (48.9%) mothers with mild anemia, and 11 (50%) mothers with moderate anemia, and 1 (33.3%) mother with severe anemia.

ADT results Hypochromic microcytic anemia with leukocytosis with signs of infection consisted of 37 (82.2%) women who had mild anemia, and 13 (59.1%) women who had moderate anemia, and none had severe anemia. For ADT results of hypochromic microcytic anemia, suspected hemolytic anemia / anemia caused by bleeding, there were 3 (100%) mothers who had moderate anemia, while there were no mild and severe anemia.

Table 1. Microscopic Analysis of Peripheral Blood Smears Based on the Degree of Mirocytic Anemia in Pregnant Women in the Makassar City Region

No	Degree of Anemia	Peripheral Blood Smear										Amount	%
		Hypochromic Microcytic Anemia Suspected Cause of Fe Deficiency with Impaired Liver Function		Hypochromic Microcytic Anemia Suspected Cause of Iron Deficiency		Hypochromic Microcytic Anemia Suspected Cause of Fe Deficiency DD/Chronic Disease		Hypochromic Microcytic Anemia Suspected Cause of Fe DD Deficiency/accompa nied Leukocytosis with Signs of Infection.		Hypochromic Microcytic Anemia Suspected Hemolytic Anemia/Anaemia Causes of Bleeding			
		n	%	n	%	n	%	n	%	n	%		
1	Mild Anemia	2	4,4	4	8,8	2	4,4	37	82,2	0	0	45	64,3
2	Moderate Anemia	1	4,5	4	18,2	3	13,7	13	59,1	1	4,5	22	31,4
2	Severe Anemia	0	0	0	0	0	0	3	100	0	0	3	4,3
	<b>Total</b>	<b>3</b>	<b>4,3</b>	<b>8</b>	<b>11,4</b>	<b>5</b>	<b>7,1</b>	<b>53</b>	<b>75,7</b>	<b>1</b>	<b>1,5</b>	<b>70</b>	<b>100</b>

Source: Primary Data for 2022

#### 4. Discussion

The basis of laboratory haematological diagnosis is a complete blood count and examination of a peripheral smear. In patients with anemia, the peripheral smear allows interpretation of diagnostically significant red blood cell (RBC) findings. This includes assessment of RBC shape, size, color, inclusions, and arrangement. RBC deformities and other RBC features can provide key information in the differential diagnosis.

In patients with microcytic anemia, red cell morphology may increase or decrease the likelihood of a thalassemia diagnosis. In normocytic anemia, morphology can help differentiate between blood loss, marrow failure, and hemolysis—and in hemolysis, red blood cell findings can indicate a specific etiology. In macrocytic anemia, (KT, Prasad and Singh, 2022).

Examination of peripheral blood smears is a hematologic examination used to assess various elements of blood cells such as erythrocytes, leukocytes, and platelets and look for parasites such as malaria, microfilariae. This study found that in almost all categories of ADT examinations found high in mothers with mild and moderate anemia categories, while in severe anemia only found microcytic hypochromic anemia suspected to be the cause of Fe deficiency DD/chronic disease accompanied by

leukocytes with signs of infection and microcytic hypochromic anemia suspected to be caused by Fe deficiency accompanied by leukocytosis with signs of infection in a relatively small amount.

The principle of this examination is to drip blood at one end of a glass object exposed to form a blood smear with a deck glass and carry out staining using Giemsa, Wright or other staining then identify it on a microscope. There are several requirements that can be met to make a macroscopic smear of peripheral blood, including: gradual thickness, thickest at the head then thinner towards the tail with a length of one-two to two-thirds of the length of the glass object, not exceeding or touching the edge of the glass object, not perforated or streaked, the tail does not form like a torn bender and has a section thin enough to identify erythrocytes without overlapping or compiling a Rouleaux distribution (Hyder et al., 2004).

The results of the above study show that the picture of peripheral blood smear analysis in pregnant women with microcytic anemia is not purely the cause of Fe deficiency, but there are other suspected causes. Among them are impaired liver function, suspected chronic disease, in addition to suspected chronic disease accompanied by leukocytosis with signs of infection, and suspected anemia caused by bleeding.

Thus, mothers who experience anemia, especially microcytic anemia, which basically can be caused by iron deficiency and malabsorption, thalassemia, inflammatory diseases, and chronic diseases are very rare due to one of the causes above because based on this study, the most data obtained was microcytic anemia with iron deficiency or accompanied by leukocytosis with signs of infection.

## **5. Conclusion**

Based on the results of laboratory tests at Dr. Hospital. Wahidin Sudiro Husodo, that the highest peripheral blood smear (ADT) results were microcytic hypochromic anemia suspected to be the cause of Fe deficiency/chronic disease accompanied by leukocytosis with signs of infection in 53 (75.7%), followed by hypochromic microcytic anemia suspected as the cause of iron deficiency in 8 (11.4%), then microcytic hypochromic anemia suspected as the cause of Fe deficiency/chronic disease in 5 (7.1%), then hypochromic microcytic anemia suspected of causing Fe deficiency with impaired liver function 3 (4.3%), and the lowest, hypochromic microcytic anemia suspected of causing hemolytic anemia / anemia causing bleeding as much as 1 (1.5%).

## **6. Suggestion**

The government needs to carry out screening at the beginning of pregnancy not only to check hemoglobin levels, but also to carry out further tests such as Fe Serum, Ferritin, ADT, and TIBC to clarify the type of anemia experienced by pregnant women, but in this case these tests can be provided free of charge so as not to burden the community.

In further research, it is expected to examine CRP (C-Reactive Protein) as a biomarker for the presence of infectious diseases.

In connection with the government program, namely 14T, namely checking Hb levels as an initial screening to diagnose anemia in pregnant women. It is better not only to do it at the beginning of pregnancy or the first contact of pregnant women, but preferably after administration of Fe tablets it is mandatory to follow up, especially in the final trimester (III).

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